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# SSMJ

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Index and Copyright Information

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# One Health: A collaborative approach to health security in South Sudan

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The World Health Organization (WHO) defines One Health as "an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) is closely linked and interdependent." [1]

In the current health environment where everything is connected, the One Health Initiative is a welcome strategy, bringing together the Ministries of Health, Environment, and Animal Resources. The need for integrating disease control and prevention has been recognized for a long time, particularly with the emergence of zoonotic diseases that cross-infect from animals to humans.[2]

With the support of the WHO, South Sudan recently launched the National Action Plan for Health Security (NAPHS), a "comprehensive, multi-sectoral roadmap to strengthen the country's core capacities to prevent, detect, and respond to health emergencies, in line with International Health Regulations (IHR 2005). It is a plan that embodies the spirit of 'One Health', integrating human, animal, and environmental health systems to address the major public health threats profiled in the country using the WHO strategic tool for assessing risk."[3]

South Sudan has a very fragile health system, which to many may be nonexistent in some places. From the cholera outbreaks to Ebola Virus Disease, Mpox and Marburg disease, to the rampant insecurity, floods, and famine, the response to all these requires an all-hands-on-deck approach. One Health may tackle some of these issues.

The country has been writing and developing five-year policies, strategic plans, and development initiatives that were barely implemented before they were due for another update. Many such colourful, well-designed plans gather dust on desks and shelves across the country after the fanfare of the launches. These initiatives failed despite assurances of political commitment from the leaders due to a lack of budget allocations.

We call on the government to spare the NAPHS from the fate of many brilliant initiatives that vanished into thin air. One Health is an approach that South Sudan needs in order to address its numerous health challenges. Let us save it.

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# Prevalence and predictors of obstetric outcomes among women with multiple Caesarean Sections at Iringa Regional Referral Hospital, Tanzania

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## ABSTRACT

**Introduction:** Multiple Caesarean Sections (CS) are associated with an increased risk of adverse obstetric outcomes. Data on predictors are scarce. The objective of this study is to determine the prevalence and predictors of obstetric outcomes among women with multiple CS.

**Method:** This analytical cross-sectional study was conducted at Iringa Regional Referral Hospital and included 215 women with multiple CS. The purposeful sampling technique was used to recruit participants in the maternity ward. Data were collected using a structured questionnaire and analysed by SPSS version 26. Descriptive statistics were used to analyse categorical data using frequency and percentages, whereas continuous data were analysed using the median with an interquartile range. Chi squared tests and binary logistic regression, both univariate and multivariate, were used to access the association between variables, and a p value <0.05 was considered statistically significant.

**Results:** The median age was 32 with 6 years inter quartile range (IQR). The prevalence of adverse outcomes was 31.6% for maternal and 24.2% for foetal outcomes. Adverse maternal outcomes were: post-partum haemorrhage (PPH) 61 (28.4%), hysterectomy 20 (9.3%), and bladder injury 12 (5.6%), uterus rupture 5 (2,3%). Adverse foetal outcomes were: low Apgar score 49 (22.2%), prematurity 28 (13%) and neonatal death 7 (3.2%). Predictors of adverse maternal outcomes: lack of third trimester ultrasound [p value= 0.004, OR=4.66, 95% CI (1.66-13.14)], emergency CS [p value<0.001, OR=34.4, 95% CI (7.9-151.1)] and delay one (failure to recognise there is a problem requiring transfer to hospital) [p value<0.001, OR= 6.57, 95% CI (2.50-17.31)]. Foetal outcomes: preterm deliveries [p value<0.017, OR=3.63, 95% CI (1.26-10.48)], lack of ultrasound checkup [p value=0.002, OR=3.92, 95% CI (1.68-9.14)] and first delay [p value<0.001, OR=4.84, 95% CI (2.04-11.48)].

**Conclusion:** The prevalence of adverse outcomes among women with multiple CS deliveries is high in our setting. Third trimester ultrasound is important in detecting risks of adverse obstetric outcomes.

**Keywords:** multiple Caesarean Section, predictors, adverse outcomes, Iringa.

## Introduction

Caesarean Section (CS) is a lifesaving procedure in which surgical intervention is performed to remove a baby through an incision made on the abdominal wall and uterus; however, it is usually done when vaginal birth is observed to pose a threat to good progress for both maternal and child health.[1] In Tanzania, the rate of pregnant women delivered by CS increased from 2% in 1996 to 6% in 2015-2016.[2] Furthermore, CS rates are projected to increase by 5.6% in Sub-Saharan Africa and 44.9% in Northern Africa.[3]

Traditionally, multiple CS is defined as repeated attempts at second and more deliveries by CS after the previous primary CS.[4] Multiple CS is associated with an increased risk of adverse obstetric outcomes, including placenta praevia, rupture of the uterus, difficult operation due to the adhesions leading to bowel and bladder injuries, and, on the other hand, increased foetal complications.[5]

There is limited data in low-resource countries on identifying predictors that could help reduce obstetric outcomes among women with multiple CS. However, one study in Ghana showed that the machine learning technique has a chance of identifying pregnant women who are at risk for caesarean section.[6]

Therefore, the objective of the study is to determine the prevalence and predictors of obstetric outcomes among women with multiple caesarean sections at Iringa Regional Referral Hospital in Tanzania.

## Method

Between October 2023 and March 2024, we recruited all women presenting for delivery at Iringa Regional Referral Hospital who had two or more previous CS, excluding those who had experienced intrauterine foetal death at gestational age of less than 28 weeks.

Structured questionnaires were used to gather information. The data were analysed using SPSS version 26. Descriptive statistics were used to analyse categorical data using frequency and percentages, whereas continuous data were analysed using the median and inter-quartile range (IQR) and summarised into charts and tables. Chi-squared tests and binary logistic regression, both univariable and multivariable, were used to access the association between variables and a p-value <0.05 was considered statistically significant.

Ethical approval was granted by the University of Dodoma and written consent obtained from the women who participated in the study.

**Table 1. Characteristics of study participants**

| Variable | n (%) |
|---|---|
| **Age in years (Median 32, IQR 6)** | |
| 21-34 | 151 (70.2) |
| ≥35 | 64 (29.8) |
| **Residence** | |
| Urban | 98 (45.6) |
| Rural | 117 (54.4) |
| **Education level** | |
| No formal education | 16 (7.4) |
| Primary | 100 (46.5) |
| Secondary | 65 (30.2) |
| Higher education | 34 (15.8) |
| **Occupation** | |
| Peasants | 69 (32.1) |
| Self employed | 75 (34.9) |
| Employed | 71 (33.0) |
| **Total** | **215 (100)** |

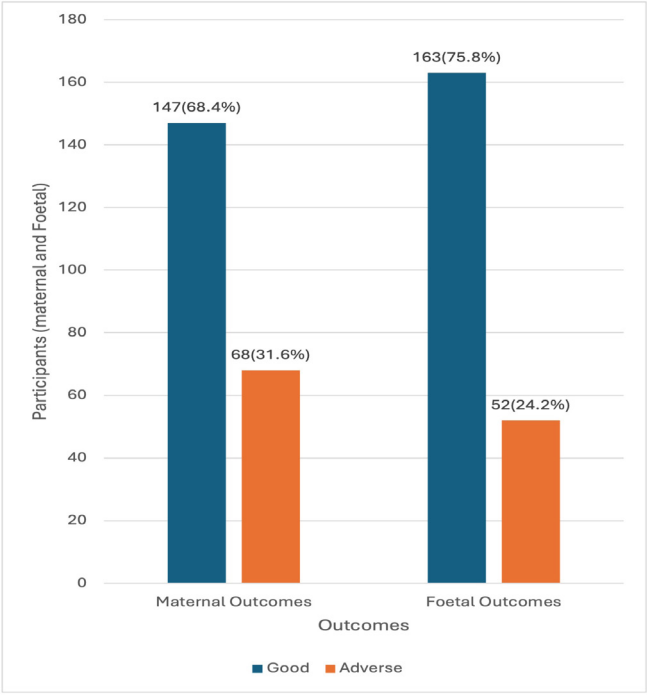


Figure 1. Prevalence of immediate adverse obstetric outcomes

## Results

We recruited 215 women for the study. The median age of participants was 32 years and IQR 6 years. Most (70.2%) were aged between 21-34 years. Nearly half (46.5%) had a primary education (Table 1).

Obstetric outcomes were categorised as good or adverse, the latter including any complications post-delivery. The prevalence of adverse outcomes was 31.6% for maternal and 24.2% for foetal respectively (Figure 1).

Sixty-one (28.4%) women had post-partum haemorrhage (PPH) of which 12 (5.6%) had serious haemorrhage due to atonic uterus. Twenty (9.3%) women underwent Caesarean hysterectomy and 12 (5.6%) experienced bladder injury. In foetal outcomes, 49 (22.8%) had low Apgar score, 28 (13.0%) were premature, 32 (14.9%) had low birth weight and 7 (3.2%) foetal deaths (Table 2).

Tables 3 and 4 show the results of Chi-squared tests of potential predictors of maternal and foetal outcomes respectively.

**Table 2. Obstetric outcomes**

| Maternal | n (%) | Foetal | n (%) |
|---|---|---|---|
| **Status of uterus** | | **Foetal status** | |
| Normal | 178 (82.8) | Alive | 208 (96.7) |
| Dehiscence | 20 (9.3) | Dead | 7 (3.2) |
| Atonic | 12 (5.6) | **Apgar score** | |
| Ruptured | 5 (2.3) | <7 (low) | 49 (22.8) |
| **PPH** | | ≥7 (normal) | 166 (77.2) |
| Yes | 61 (28.4) | **Prematurity** | |
| No | 154 (71.6) | Yes | 28 (13.0) |
| **Caesarean hysterectomy** | | No | 187 (87.0) |
| Yes | 20 (9.3) | **Low birth weight** | |
| No | 195 (90.7) | Yes | 32 (14.9) |
| **Bladder injury** | | No | 183 (85.1) |
| Yes | 12 (5.6) | **Total** | **215 (100)** |
| No | 203 (94.4) | | |
| **Total** | **215 (100)** | | |

**Table 3. Chi-squared tests of potential predictors of maternal outcomes**

| Variables | Maternal outcomes | | p-value |
|---|---|---|---|
| | Good n (%) | Adverse n (%) | |
| **Age** | | | |
| 21-34 years | 102 (67.5) | 49 (32.5) | 0.690 |
| 35 years and above | 45 (70.3) | 19 (29.7) | |
| **Residence** | | | |
| Urban | 72 (73.5) | 26 (26.5) | 0.141 |
| Rural | 75 (64.1) | 42 (35.9) | |
| **Residence** | | | |
| Urban | 72 (73.5) | 26 (26.5) | 0.141 |
| Rural | 75 (64.1) | 42 (35.9) | |
| **Employment status** | | | |
| Unemployed | 36 (52.2) | 33 (47.8) | |
| Self-employed | 52 (69.3) | 23 (30.7) | <0.001 |
| Employed | 59 (83.1) | 12 (16.9) | |
| **Gestational age** | | | |
| <37 weeks (preterm) | 6 (21.4) | 22 (78.6) | <0.001 |
| 37 weeks and above (term) | 141 (75.4) | 46 (24.6) | |
| **Number of antenatal visits** | | | |
| Less than 8 visits | 75 (56.0) | 59 (44.0) | <0.001 |
| More than 8 visits | 72 (88.9) | 9 (11.1) | |

**Table 3. Continue**

| | | | |
|---|---|---|---|
| **Staff who reviewed ANC visit** | | | |
| Nurse | 78 (59.1) | 54 (40.9) | 0.001 |
| Clinical officer | 5 (62.5) | 3 (37.5) | |
| Doctor | 31 (79.5) | 8 (20.5) | |
| Specialist | 33 (91.7) | 3 (8.3) | |
| **Health facility attended for ANC** | | | |
| Dispensary | 21 (47.7) | 23 (52.3) | 0.001 |
| Health Centre | 45 (63.4) | 26 (36.6) | |
| District Hospital | 24 (70.6) | 10 (29.4) | |
| Regional Hospital | 35 (87.5) | 5 (12.5) | |
| Specialized clinic | 22 (84.6) | 4 (15.4) | |
| **Antepartum haemorrhage** | | | |
| Yes | 19 (34.5) | 36 (65.5) | <0.001 |
| No | 128 (80.0) | 32 (20.0) | |
| **Ultrasound performed after 28 weeks gestation** | | | |
| Yes | 100 (87.0) | 15 (13.0) | <0.001 |
| No | 47 (47.0) | 53 (53.0) | |
| **Interval from last CS** | | | |
| Short interval (<24months) | 20 (37.7) | 33 (62.3) | <0.001 |
| Normal interval (24 months and above) | 127 (78.4) | 35 (21.6) | |
| **Complication in previous CS** | | | |
| Yes | 18 (32.1) | 38 (67.9) | <0.001 |
| No | 129 (81.1) | 30 (18.9) | |
| **Urgency of surgery** | | | |
| Elective | 101 (95.3) | 5 (4.7) | <0.001 |
| Emergence | 46( 42.2) | 63 (57.8) | |
| **Delay** | | | |
| Delay to seek care | 29 (40.8) | 42 (59.2) | <0.001 |
| Delay in transport | 15 (62.5) | 9 (37.5) | |
| Delay to receive care | 32 (94.1) | 2 (5.9) | |
| No delay | 71 (82.6) | 15 (17.4) | |
| **Where last delivery was done** | | | |
| Health centre | 26 (74.3) | 9 (25.7) | 0.003 |
| District Hospital | 42 (53.2) | 37 (46.8) | |
| Regional Hospital | 57 (76.0) | 18 (24.0) | |
| Zonal/ National Hospital | 21 (84.0) | 4 (16.0) | |

**Table 4. Chi-squared tests of potential predictors of foetal outcomes**

| Variables | Foetal outcomes | | p-value |
|---|---|---|---|
| | Good n (%) | Adverse n (%) | |
| **Residence** | | | |
| Urban | 83(84.7) | 15(15.3) | 0.005 |
| Rural | 80(68.4) | 37(31.6) | |
| **Education level** | | | |
| No education | 5(31.3) | 11(68.8) | <0.001 |
| Primary | 71(71.0) | 29(29.0) | |
| Secondary | 57(87.7) | 8(12.3) | |
| Higher | 30(88.2) | 4(11.8) | |
| **Employment status** | | | |
| Unemployed | 38(55.1) | 31(44.9) | <0.001 |
| Self-employed | 62(82.7) | 13(17.3) | |
| Employed | 63(88.7) | 8(11.3) | |
| **Gestational age** | | | |
| <37 weeks(preterm) | 2(7.1) | 26(92.9) | <0.001 |
| 37 weeks and above (term) | 161(86.1) | 26(13.9) | |
| **Number of antenatal visits** | | | |
| Less than 8 visit | 86(64.2) | 48(35.8) | <0.001 |
| More than 8 visits | 77(95.1) | 4(4.9) | |
| **Staff who reviewed last ANC visit** | | | |
| Nurse | 87(65.9) | 45(34.1) | <0.001 |
| Clinical officer | 5(62.5) | 3(37.5) | |
| Doctor | 37(94.9) | 2(5.1) | |
| Specialist | 34(94.4) | 2(5.6) | |
| **Health facility attended for ANC** | | | |
| Dispensary | 25(56.8) | 19(43.2) | <0.001 |
| Health Centre | 51(71.8) | 20(28.2) | |
| District Hospital | 25(73.5) | 9(26.5) | |
| Regional Hospital | 38(95.0) | 2(5.0) | |
| Specialized clinic | 24(92.3 | 2(7.7) | |
| **Antepartum haemorrhage** | | | |
| Yes | 26(47.30 | 29(52.7) | <0.001 |
| No | 137(85.60 | 23(14.4) | |
| **Ultrasound performed after 28 weeks gestation** | | | |
| Yes | 105(91.3) | 10(8.7) | <0.001 |

**Table 4. Continue**

| | | | |
|---|---|---|---|
| No | 58(58.0) | 42(42.0) | |
| **Interval from last CS** | | | |
| Short interval (<24 months) | 27(50.9) | 26(49.1) | <0.001 |
| Normal interval (24 months and more) | 136(84.0) | 26(16.0) | |
| **Complication in previous CS** | | | |
| Yes | 27(48.2) | 29(51.8) | <0.001 |
| No | 136(85.5) | 23(14.5) | |
| **Urgency of surgery** | | | |
| Elective | 101(95.3) | 5(4.7) | <0.001 |
| Emergence | 62(56.9) | 47(43.1) | |
| **Delay** | | | |
| Delay to seek care | 39(54.9) | 32(45.1) | <0.001 |
| Delay in transport | 16(66.7) | 8(33.3) | |
| Delay to receive care | 32(94.1) | 2(5.9) | |
| No delay | 76(88.4) | 10(11.6) | |
| **Where last delivery was done** | | | |
| Health Centre | 29(82.9) | 6(17.1) | 0.012 |
| District Hospital | 50(63.3) | 29(36.7) | |
| Regional Hospital | 61(81.3) | 14(18.7) | |
| Zonal/ National Hospital | 22(88.0) | 3(12.0) | |

In multivariable analysis, the biggest predictor of adverse maternal outcome was the urgency of the previous CS (OR 34.4, 95% CI 7.9-151.1, p value<0.001). Also significant were complications such as delayed wound healing in the previous CS (OR 9.1, 95% CI 4.1-19.9, p value<0.001), delay to seek care (OR 6.57, 95% CI 2.50-17.31, p-value <0.001) and lack of third trimester ultrasound (OR 4.66, 95% CI 1.66-13.14, p-value 0.004) (Table 5).

Regarding foetal outcomes, in multivariable regression it was found that the biggest predictor of adverse outcomes was a delay to seek care (OR 4.84, CI 2.04-11.48, p-value <0.001). Other significant predictors were lack of third trimester ultrasound (OR 3.92, 95% CI 1.68-9.14, p-value 0.002) and preterm delivery (OR 3.63, 95% CI 1.26-10.48, p-value 0.017) (Table 6).

## Discussion

Prevalence of adverse obstetric outcomes was 31.6% for maternal and 24.2% for foetal outcomes in this study. Significant predictors for adverse outcomes were a lack of third trimester ultrasound, first delay (delay to seek care), preterm delivery (for foetal outcome) and complications or urgency of the previous CS (for maternal outcome). More adverse outcomes were observed in this study than those in Kenya[7] and Turkey[8] because of lack of third trimester ultrasound to the placentation site.

The prevalences of adverse maternal and foetal outcomes were in line with a study done in Turkey, which reported an increased rate of adverse outcomes among women with multiple CS.[9]

The findings of increased adverse maternal and foetal outcomes concurred with several studies from Turkey,[8] Saudi Arabia[10] and China.[11] A study in Turkey showed an increase of adverse maternal outcomes with the number of CS.[9]

These risks escalate dramatically, particularly after the third procedure.[10] However, there is no significant trend in adverse foetal outcomes. Our findings were contrary to the study done in China, which reported that an increased number of multiple CS did not predict increased delivery complications.[11]

In this study, a significant number of mothers (28.4%) required blood transfusions due to PPH, which is in line with another study done in Iringa, which showed PPH at 26.4%.[12]

Adverse foetal and maternal outcomes are higher in mothers with multiple CS, even after adjusting for other risk factors.[13] A study done in the United Arab Emirates observed that multiple CS was associated with more maternal complications specifically increased dense adhesions.[14,15]

Foetal outcomes were significantly worsened by preterm delivery and low birth weight.[17,18] This study, with others, suggests that reducing complications from CS would reduce the prevalence of adverse maternal outcomes. Also, special care needs to be taken with preterm and low birth weight babies. Both individual and health system factors need to be considered to reduce delays in seeking care and uptake of third trimester ultrasounds.[19,20]

### Predictors of adverse outcomes among women with multiple CS

In this study, lack of an ultrasound examination in the third trimester could have led to missed detection of critical complications such as placenta praevia, placental

**Table 5. Univariable and multivariable logistic regression of potential predictors of adverse maternal outcomes**

| Variable | Maternal outcomes | | Univariable regression | | Multivariable regression | |
|---|---|---|---|---|---|---|
| | Good n (%) | Adverse n (%) | COR (95% CI) | p-value | AOR (95% CI) | p-value |
| **Ultrasound check-up** | | | | | | |
| Yes | 100(87.0) | 15(13.0) | Ref | | | |
| No | 47(47.0) | 53(53.0) | 7.52(3.85-14.69) | <0.001 | 4.66(1.66-13.14) | 0.004 |
| **Complication in previous CS** | | | | | | |
| No | 129(81.1) | 30(18.9) | Ref | | | |
| Yes | 18(32.1) | 38(67.9) | 9.1(4.6-18.1) | <0.001 | 9.1(4.1-19.9) | <0.001 |
| **Urgency of previous CS** | | | | | | |
| Elective | 101(95.3) | 5(4.7) | Ref | | | |
| Emergency | 46(42.2) | 63(57.8) | 27.7(10.4-73.4) | <0.001 | 34.4(7.9-151.1) | <0.001 |
| **Delay** | | | | | | |
| No delay | 72(82.8) | 15(17.2) | Ref | | | |
| Delay to seek care | 29(40.8) | 42(59.2) | 42.4(12.3-146.8) | <0.001 | 6.57(2.50-17.31) | <0.001 |
| Delay in transport | 14(60.9) | 9(39.1) | 14.2(3.4- 58.8) | <0.001 | 3.40(0.93-12.39) | 0.064 |
| Delay to receive care | 32(94.1) | 2(5.9) | 2.96(0.63-13.99) | 0.171 | 0.25(0.04-1.46) | 0.124 |
| **Total** | 147(68.4) | 68(31.6) | | | | |

**Table 6. Univariable and multivariable logistic regression of potential predictors of adverse foetal outcomes**

| Variable | Foetal outcomes | | Univariable regression | | Multivariable regression | |
|---|---|---|---|---|---|---|
| | Good n (%) | Adverse n (%) | COR (95% CI) | p-value | AOR (95% CI) | p-value |
| **Gestation age** | | | | | | |
| Term | 158(81.8) | 34(18.2) | | Ref | | |
| Preterm | 10(35.7) | 18(64.3) | 7.24(2.99-17.51) | <0.001 | 3.63(1.26-10.48) | 0.017 |
| **Ultrasound check** | | | | | | |
| Yes | 105(91.3) | 10(8.7) | | Ref | | |
| No | 58(58.0) | 42(42.0) | 7.60(3.55-16.27) | <0.001 | 3.92(1.68-9.14) | 0.002 |
| **Delay** | | | | | | |
| No delay | 73(83.9) | 14(16.1) | | Ref | | |
| Delay to seek care | 41(57.7) | 30(42.3) | 6.95(3.35-14.43) | <0.001 | 4.84(2.04-11.48) | <0.001 |
| Delay in transport | 16(69.6) | 7(30.4) | 3.09(1.13-8.43) | 0.028 | 2.85(0.89-9.10) | 0.077 |
| Delay to receive care | 33(97.1) | 1(2.9) | 0.30(0.07-1.39) | 0.124 | 0.33(0.06-1.68) | 0.181` |
| **Total** | 163(75.8) | 52(24.2) | | | | |

abruption, and foetal growth restrictions, which are more common in women with multiple CS.[14,15,16]

Another predictor of adverse obstetric outcomes was complications in previous CS. The complexity during surgery not only increases the immediate risks during the CS but also leads to severe postoperative complications and prolonged recovery times.[16] Scarring of the uterus from complicated previous surgery can compromise its integrity, leading to complications like dehiscence, which may lead to preterm birth and low Apgar scores.[18]

Also, this study has found that women who underwent emergency CS had about 34 times greater odds of adverse outcomes compared to elective CS, findings similar to those in sub-Saharan Africa.[19,20,21]

When women with multiple CS experience delay seeking medical care, this leads to more complex emergencies. [22,23,24]

## Conclusion

This study has found that the prevalence of adverse outcomes among women with multiple CS deliveries is high in our setting. Third trimester ultrasound is important in detecting risks of adverse obstetric outcomes.

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**Conflict of interest:** None

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# Reasons and contributing factors for low health facility delivery in Bor, South Sudan

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## ABSTRACT

**Introduction:** South Sudan has one of the highest maternal mortality ratios globally, at 692 deaths per 100,000 live births in 2023. The key contributors include infection, haemorrhage, and obstructed labour. Delivery in a health facility attended by skilled birth attendants can reduce the high maternal mortality. This study investigated the reasons for the low health facility delivery in Bor town in South Sudan.

**Method:** Qualitative and quantitative methods were used. Data were collected using a structured questionnaire designed to capture socio-demographic characteristics and other relevant data. Key informant interview data were transcribed, coded, and thematically analyzed to extract key themes and patterns.

**Results:** Of the 70 participants enrolled, 90% had given birth, with the majority delivering in non-health facilities (60.3%). The primary reasons for not giving birth at a health facility include the distance or transportation issues (65.8%), facility closure at the time of delivery (21%), and financial constraints (13.2%). Some of the proposed solutions for better services include food for patients, establishing more facilities near the communities, and employing more SBA.

**Conclusion:** Despite the commitment made by the Ministry of Health and its partners to reduce maternal mortality by three-quarters in 2015, deaths of women during labour remain a significant problem. Collaboration among various stakeholders is key to addressing this trend.

**Keywords:** maternal health, facility delivery, maternal mortality, South Sudan

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## Introduction

South Sudan has one of the highest maternal mortality ratios globally at 692 deaths per 100,000 live births in 2023.[1] Key contributors include infection, haemorrhage, and obstructed labour. Delivery in a health facility attended by skilled birth attendants (SBAs) can reduce the high maternal mortality. Poor perception of childbirth risks and entrenched social norms have hindered the use of SBAs and the overall health facility delivery rates among mothers in the region.

Efforts led by organisations such as USAID, UNICEF, and the UK's Foreign,

Commonwealth and Development Office have fostered significant advances over the past decade.[2,3] The proportion of mothers delivering in health facilities has increased from 16.2% to 41.8%, alongside a rise in deliveries attended by skilled health personnel from 22.1%to 39.8% between 2011 and 2020.[2] These improvements stand in stark contrast to the ongoing dire circumstances for mothers and children in South Sudan. Contributing factors include low female literacy rates, high instances of gender-based violence, and limited access to quality healthcare.[3] It is imperative that every mother and child not only survive but also thrive in this challenging environment.[4,5,6]

The primary objective of this study is to examine the reasons for low health facility delivery for women of reproductive age in Bor Town and its surrounding villages, identify barriers that restrict access to skilled care, and propose strategies to increase health facility deliveries.

## Method

This research employed qualitative and quantitative methodologies. It was conducted in five residential areas within Bor: Total, Langbaar, Tharagok, Pakuau, and Kondai. These were selected due to their rural characteristics and population density, representing the demographics of the five Payams in Bor County. As of 2010, it was estimated that there were approximately 27,314 women of childbearing age in this area. Quantitative data were collected using a structured questionnaire designed to capture socio-demographic characteristics and other relevant data.

A sample size of 139 was calculated using the Kish Leslie formula. However, considering the limited budget, time, and resources, the sample size was adjusted to 70. Questionnaires were distributed randomly among women of various reproductive ages in the selected areas. Data was analysed using SPSS software.

In-depth interviews were conducted with key informants to explore their perspectives on the barriers and identify possible solutions. Qualitative data were transcribed, coded, and thematically analyzed to extract key themes and patterns.

All participants provided informed consent.

## Results

The majority (80.0%) were married (polygamous or monogamous), signalling enrolment of a population with significant birth experiences; 15.7% were widowed while only 4.3% were never married.

A significant portion of the participants (71.4%) had no formal education, while smaller proportions had attained primary (20.0%), secondary (7.1%), and university (1.4%) levels of education.

Most (90.0%, n=63) (Table 2) of the respondents reported having given birth before, indicating prior experiences that could influence their current birthing decisions. In contrast, only 10.0% (n=7) had not given birth. Additionally, a high proportion of deliveries took place outside of health facilities, with 39.7% (n=25) of women delivering at health facilities compared to 60.3% (n=38) who delivered in non-health facilities.

Among those who delivered outside of health facilities, accessibility emerged as the main reason cited by 65.8%

**Table 1. Population demographic characteristics (N=70)**

| Characteristics | | n (%) |
|---|---|---|
| Age (years) | 15-19 | 5(7.1 |
| | 20-24 | 15(21.4) |
| | 25-29 | 11(15.7) |
| | 30-34 | 9(12.9) |
| | 35-39 | 11(15.7) |
| | 40-44 | 3(5.7) |
| | 45-49 | 3(4.3) |
| | 50 and over | 12(17.1) |
| Marital status | Single | 3(4.3) |
| | Married | 56(80.0) |
| | Widowed | 11(15.7) |
| Educational level | None | 50(71.4) |
| | Primary | 14(20.0) |
| | Secondary | 5(7.1) |
| | Tertiary | 1(1.4) |
| Occupation | Farming | 30(42.9) |
| | Housewife | 28(40.0) |
| | Business | 7(10.0) |
| | Military service | 2(2.9) |
| | Professional skills | 2(2.9) |
| | Other occupations | 1(1.4) |

**Table 2. Relation between women's past birth experiences and their decision on delivery options (N=70)**

| Past birth experience | | n (%) |
|---|---|---|
| Having given birth before | Yes | 63(90.0) |
| | No | 7(10.0) |
| Delivery location if delivered previously | Health facility | 25(39.7) |
| | Non-health facility | 38(60.3) |
| Reason for non-health facility delivery if delivered previously | Accessibility | 25(65.8) |
| | Hospital closure | 8(21.0) |
| | Financial constraints | 5(13.2) |
| Belief in culture that promotes non health facility delivery | Yes | 8(11.4) |
| | No | 62(88.6) |
| Relationship between health-care provider and women of childbearing age | Very Good | 24(34.3) |
| | Good | 25(35.7) |
| | Not Good | 21(30.0) |
| Risk associated with non-health facility delivery | Infections | 31(47.7) |
| | Newborn problem | 3(4.6) |
| | Bleeding | 20(30.8) |
| | Obstetric labour | 11(16.9) |

**Table 3. Suggested solutions to increase delivery in a health facility (N=70)**

| Solutions | n (%) |
|---|---|
| Removal of delivery fees | 4(5.7) |
| Training of TBAs & health education programs | 3(4.3) |
| Establishment of more health facilities | 11(15.7) |
| Need for mobile health facilities (HFs) | 2(2.9) |
| Opening or rehabilitation of roads in rural areas | 7(10.0) |
| Better services at HFs: more medicines, feedings for patients, sanitation and hygiene | 19(27.1) |
| Employ more health workers and motivate them well | 7(10.0) |
| Peace, security, and development | 5(7.1) |
| More screening services | 3(4.3) |
| Establish blood banks | 3(4.3) |
| Better attention at HFs | 1(1.4) |
| Provide women with grants or loans to start micro-businesses | 2(2.9) |
| Establish free hotlines for expectant mothers to seek obstetric care | 2(2.9) |
| Stop early and forced marriages | 1(1.4) |

(n=25). Other factors included hospital closure reported by 21.0% (n=8) and financial constraints mentioned by 13.2% (n=5).

The data revealed that cultural beliefs play a minimal role in hindering health facility deliveries, with only 11.4% (n=8) of respondents affirming a cultural belief that promotes non-health facility delivery.

The quality of the relationship between health care providers and women of, and above, childbearing age varied. Responses indicated that 35.7% (n=25) rated their relationship as good, 34.3% (n=24) as very good, while 30.0% (n=21) described it as not good, affecting women's willingness to seek care at health facilities.

Participants identified various negative health outcomes linked to non-health facility deliveries, with infections cited as the most common concern by 47.7% (n=31). Other reported outcomes included bleeding (30.8%, n=20), obstetric labour complications (16.9%, n=11), and newborn problems (4.6%, n=3).

Most, 63 (90%) of the respondents, said that they were willing to participate in awareness campaigns or programmes to promote health facility delivery. The small number not willing to participate cited older age or being too busy.

Respondents suggested a variety of solutions for increasing health facility delivery (Table 3).

## Discussion

Our cohort was predominantly young. Almost a fifth (17.1%) were aged 50 and above, suggesting varied reproductive experiences. Age distribution of the participants influenced their utilisation of health facility delivery services and subsequent maternal and neonatal outcomes.

A study in sub-Sahara Africa among reproductive-age women showed that probability of health facility delivery declined with increasing age, with women aged 20-24 years commonly delivering at health facilities (67.9%).[7] Marital status influenced decision-making around seeking healthcare services, as well as the potential impact of

social and familial dynamics on maternal and neonatal outcomes. Women's choice of health facility delivery relies partly on permission being granted by their partners.[7] A concerning 71.4% had no formal education, which likely influenced health-seeking behaviours. Education level impacts the understanding of maternal and neonatal health issues, and ability to navigate healthcare systems and make informed decisions.

These findings align with previous studies putting illiteracy rates among the adult South Sudanese population at 65% with enrolment at primary, secondary, and university levels of education alarmingly low.[8] The probability of delivering at a health facility increases with a higher level of education.[9]

Alarmingly, 60.3% of women reported delivering outside health facilities. This is similar to a value from Chad at 77%.[7] According to the World Health Organization, Chad and South Sudan are the most dangerous places for a woman to give birth in sub-Saharan Africa.[10] In a 2007 South Sudan household survey, most births (81%) occurred at home, with only 11.5% of deliveries taking place at health facilities.[3]

The low utilisation of a health facility for delivery is a trend linked to a lack of access due to distance or transportation issues (65.8%), facility closure at the time of delivery (21%), and financial constraints (13.2%). These factors can lead to a preference for home births or deliveries in traditional birth attendants' care, which are often cheaper alternatives.[10] Another report in sub-Sahara Africa found that women who did not have a major problem, in terms of the distance to the health facility (72.9%) and financial difficulties for treatment (71.9%), often preferred a health facility delivery.[7]

A large proportion of women (60.3%) delivered in non-health facilities, indicating a need to address accessibility and quality of health services. Non-health facility deliveries pose serious risks, as the majority of respondents pointed to infections (47.7%) and other complications such as bleeding (30.8%) as significant concerns. Findings from a Kenyan study emphasized the necessity for health facilities to be properly equipped for emergency obstetric care.[9] Without such infrastructure, the reduction of maternal mortality rates remains elusive.

Additionally, the quality of relationships between healthcare providers and women is a crucial determinant of delivery location. In this study, only 35.7% of respondents reported having a "good" relationship with healthcare providers, while 30% rated the relationship as "not good". This highlights the importance and impact of healthcare provider attitudes on women's willingness to seek institutional care. A WHO study[10] found that women are often deterred from seeking care due to fear of abuse or medicalization. A supportive and respectful approach can alter this perception and encourage women to seek professional assistance during childbirth.[10]

The most frequently suggested strategy (27.1% - see Table 3) is better services at health facilities, including more medicines, improved sanitation, and nutrition. This finding suggests that women are not simply resistant to facility births; rather, they face tangible structural barriers that compel them to seek alternatives. Health facilities must not only be accessible but must also provide a satisfactory level of care to attract expectant mothers.

The findings also indicate a demand for the establishment of more health facilities (15.7%). This is supported by a study indicating that community mobilisation and reduced health costs are essential for enhancing facility deliveries.[7] As evidenced by the current study, women are eager for systemic changes that will facilitate their access to safe and effective maternal healthcare.

The data reveal that other crucial factors, such as economic considerations, contribute significantly to a woman's decision-making process regarding where to deliver. With 42.9% of respondents identifying farming as their occupation and 40% being housewives, the financial burden associated with healthcare can be a barrier to accessing obstetric services. Grants or loans for micro-businesses may improve women's economic status and contribute indirectly to better maternal health outcomes.

The need for mobile health facilities (2.9%), Table 3) and road improvements in rural areas (10.0%, Table 3) underscores the geographical accessibility issues that many women face. In line with a 2016 study, the introduction of antenatal services can play a crucial role in bridging the gap between women and healthcare providers, thereby increasing the likelihood of professional assistance during childbirth.[10]

A minority (11.4%) of participants reported that they were influenced by cultural beliefs or practices. A specific example is "Cuier" namely the belief that touching the blood of a woman who has miscarried could lead to miscarriage by the person who touched the blood. Cultural beliefs and practices are widely recognised as a hinderance to a woman's choice of health facility for delivery.

Most of the pregnant women reported having a good

or very good relationship with healthcare providers, suggesting a supportive healthcare environment for maternal care in Bor. The healthcare environment influences a woman's choice of a delivery location. It was found that some women preferred home delivery using Traditional Birth Attendants (TBAs) because TBAs were considered as being more friendly and caring than skilled birth attendants (SBAs).[7]

Further research in other counties or states could explore the reasons and impact of low health facility delivery, highlighting differences that could inform the development of targeted interventions.[11] By addressing these areas, the Ministry of Health can gain valuable insights to improve maternal and neonatal outcomes among reproductive age women in low health facility delivery settings.

## Conclusion

The findings from Bor reflect one of the lowest rates of health facility deliveries in South Sudan, contributing to a high maternal and neonatal morbidity and mortality. This crisis necessitates a collaborative approach involving community education, active engagement of healthcare workers, and supportive policy-making to promote facility-based deliveries. By implementing comprehensive strategies focused on education and cultural transformation, South Sudan can make significant strides toward reducing maternal morbidity and mortality and improving overall health outcomes for women.

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Research Article

# Infant oral mutilation at Bor State Referral Hospital, Bor, South Sudan

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## ABSTRACT

**Introduction:** Infant Oral Mutilation (IOM) is a traditional practice involving the extraction of unerupted teeth in young infants. Tooth swellings are mistaken for the cause of diarrhoea and fever. The practice is performed across East Africa and is highly dangerous due to the risk of blood-borne diseases, blood loss, anaemia, septicaemia, and death. The objective of this survey was to describe the practice of IOM, locally known as Hooth, in the population in and around Bor town, South Sudan.

**Method:** The mothers of 150 children aged under six months admitted to the Paediatric or Maternity wards of Bor State Referral Hospital with a history of fever, poor feeding, and/or convulsions were administered a structured questionnaire to determine their attitudes towards and practices of Hooth. A focused group discussion was conducted in the community to find out the general opinion about Hooth.

**Results:** Most of the mothers were young with low literacy. The commonest symptom of the children on admission was fever, and the commonest diagnosis was malaria. 86% of the children had undergone Hooth seven days before admission. All, except one, of the mothers thought that Hooth was not harmful and was performed to treat the fever associated with teething. Teeth were extracted using unsterile instruments, mostly by traditional healers. The group discussion revealed that the practice is not indigenous to the Dinka tribe and likely originated from multiple sources.

**Conclusion:** IOM is common among children under 6 months of age admitted to the hospital with fever, feeding problems, or convulsions. The dangers of IOM are widely known, and health care workers should be advised to examine for Hooth in children aged under six months admitted with fever. It is recommended that IOM be banned and that mothers be taught how to manage fever and teething problems.

**Key words:** oral mutilation, infants, traditional healers, Bor, South Sudan

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## Introduction

Infant Oral Mutilation (IOM) is a traditional practice involving the gouging out of an infant`s healthy primary tooth germs. This can lead to transmission of blood-borne diseases such as HIV/AIDS, septicaemia, and death; other complications include eradication and/or malformation of the child`s permanent dentition.[1]

The tooth swellings are mistaken for being the cause of diarrhoea and fever. In contrast to female genital mutilation (FGM), many governments and organizations are not aware of the consequences of IOM. It is practiced in many parts of Africa with reported prevalence rates of 22% in Sudan, 17.2% in Uganda, 37.4% in Tanzania and 30% in Ethiopia.[2] There are few published reports on this practice in South Sudan, although a 2018 article[3] implied that IOM was practiced in South Sudan and Uganda. Health care workers and communities report that IOM is found in South Sudan, and that the Dinka people near Bor, Jonglei State, call it 'Hooth'.

In 2018, key players agreed that the eradication of IOM in East Africa was urgent;[2] however, it is first essential to explore where and how IOM is practiced. So, the aim of this study was to investigate the practice of IOM in a town in South Sudan.

## Method

The research was conducted in 2021 at Bor State Referral Hospital, in Bor town, the capital of Jonglei State, where the main tribe is the Dinka.

After the research proposal was approved by Jonglei Health Sciences Institute, the Research Ethics Board issued a letter of introduction which gave the researcher access to Bor State Hospital and the community for the group discussion. The methods used were quantitative (a descriptive observational cross-sectional study) and qualitative (focused group discussions).

The study population was the 150 children aged 0 days to 6 months who were admitted to the maternity or paediatric wards with complaints of fever, convulsions and/or feeding problems between 1st July and 30th December 2021.

The 150 infants with fever or convulsions and/or feeding problems were first screened. After explaining the study's purpose and obtaining the caregiver's consent, a structured questionnaire was administered in a one-on-one interview with the caretakers, and the case sheets/charts were reviewed. All responses were anonymised. A focused group discussion was conducted with five members of the community. The quantitative data were analysed using Microsoft Excel version 2013.

## Results

All the caretakers were mothers, 83% were aged less than 30 years, and 61% were illiterate. All were from a Christian background and 99% belonged to the Dinka tribe. Of the 150 children in the study, 19 (13%) were aged 0-28 days and 131 (87%) were aged one to six months. There were 86 (57%) boys and 64 (43%) girls.

Most (144, 96%) were admitted with fever, four (3%) with convulsions, and two (1%) with feeding problems.

The preliminary diagnosis was made by clinicians in the emergency ward before admission to the maternity or paediatrics wards; 35% were diagnosed with malaria, 34% with pneumonia and 22% with sepsis. All 19 (13%) neonates were diagnosed with neonatal sepsis. Most of the children were discharged, but four died, giving a mortality rate of 2.7%. All died of pneumonia and had had IOM conducted.

The main treatments received by the children (according to the case files) were classified as antimalarial and antibiotic drugs. Some children received only analgesics as symptomatic treatment because of drug shortages.

### Details of the IOM

IOM had been performed on 129 (86%) of the children.

Table 1 shows that 95 (73.6%) of the 129 children who underwent IOM had the procedure performed within seven days prior to admission. In the rest, it had been done more than seven days beforehand, with nine (7%) of these done more than 28 days prior to admission.

Most (94 or 73%) of Hooth had been performed by traditional healers, otherwise by the mother or a relative. It had been performed using nails (71%) or a bicycle spoke (29%) to remove all the canines.

### Interview with the mothers

All the 129 mothers whose children had undergone IOM said they did the procedure after symptoms of fever appeared. One mother said she was forced to take her baby for Hooth; 99% said they practiced IOM willingly,

**Table 1. Population demographic characteristics (N=70)**

| Time interval | n (%) |
|---|---|
| 1-7 days | 95 (73.6) |
| 8-14 days | 12 (9.3) |
| 15-21 days | 8 (6.2) |
| 22-28 days | 5 (3.9) |
| Beyond 28 days | 9 (7.0) |

because everyone in the community was using it to solve fever and teething problems. Most (95%) mothers believed that Hooth was not harmful, although 5% thought it was.

**Results from the group discussion**

Data were collected from three traditional healers, as well as two other women who practice what the Dinka Bor call "Ger" – which is gum cutting to cause minor bleeding in between the unerupted teeth.

A 50-year-old traditional healer and a mother of six, said she started the practice of Hooth and Ger 28 years ago after she came to live in Bor. She had learnt the practice from her mother, who had lost two children due to "Lech" or teething problems. She added that the practice of IOM has its roots from the Acholi tribe before the Lango tribe in Uganda adopted it and it finally came to the Dinka tribe. The other traditional healers said they borrowed the culture of IOM from the Shiluk tribe, which is part of the Upper Nile region under which Dinka Bor falls.

The practice of tooth extraction is reported to be done:

1. During infancy - as a treatment for fever related to teething.[1]
2. Around 13-14 years of age - as part of the initiation ritual of passage from childhood to adulthood, when mandibular canines and incisors are removed.[4]

Asked to give details of the procedure, one traditional healer said, "I burn the nail and then sharpen it with a grinding stone to make sure it does not transmit germs before conducting "Hooth" or "Ger". Some of the group said they earn an income from IOM; others said they practice it to prevent babies from dying from teething problems.

## Discussion

The prevalence of IOM was 86% among babies of the 150 mothers interviewed in the hospital. This compares to 72%-87% among Kenyan Maasai in 1995.[5] The prevalence of missing or damaged primary canines among children of immigrant Ethiopians in Israel in 2013 was 60%.[6] These were community-based studies.

We used mothers' occupations as an indicator of socio-economic status - being a housewife with a high illiteracy level representing lower socio-economic status. Among the 129 mothers of children who underwent Hooth, the percentage of housewives was higher (96.2%) than among those in paid employment (3.8%). In Gulu District, Uganda, IOM is also associated with a lower level of education.[7] Rasmussen et al in 1992[8] reported that 22% of the 398 urban children studied in Sudan had undergone IOM and the prevalence was higher in the lower socio-economic group.

We believe that in some places male children are treated better than females, including parental health-seeking behaviour. This study found no significant difference in the sex of the 129 babies with IOM; 56.6% were males and 43.4% were females, similar to that found in Uganda.[7]

In our study, 94% of Hooths were performed by traditional healers. Similarly, in Uganda.[7] All the mothers said they took their babies for IOM due to fever, which is similar to results from Uganda, Kenya, Tanzania and Ethiopia.[9]

In our study, a nail (71%) or a bicycle spoke (29%) was used to perform Hooth. The traditional healers had incomplete knowledge about sterilizing as they sharpened the instruments with soil or stone after heating them on the flame. They do not know that normal flora in the mouth could become pathogenic from dead/necrotic tissue caused by Hooth. In Uganda, the practice is reported to be done by traditional herbalists using bicycle spokes, knives or fingernails.[7]

All the mothers of children who had undergone Hooth believe that IOM is beneficial because it relieves pain related to fever and 99% believe that it has no harmful effects.

In Uganda,[7] canine teeth are thought to cause fever, diarrhoea and vomiting in infants. In Tanzania, parents often consulted traditional healers after visits to a government health facility had not provided relief for their child.[10]

Most (96%) children were admitted with fever, but we were unable to find out if this was due to the primary disease or IOM. However, as 74% of the children who underwent Hooth had had it done within one week of admission, it may be the cause of the fever. This could mean that the normal flora present in the oral cavity is likely to be responsible for infection of the injured gum, therefore serving as an entry point for pathogens, leading to fever.

Malaria was the leading diagnosis (35%), followed by pneumonia (34%), sepsis (22%), and other diseases (9%). Of the 33 children diagnosed with septicaemia, 19 were neonates and 14 out of these had undergone IOM and are likely to have had septicaemia due to the procedure.

Comments from the discussion group suggest that the

culture of Hooth is not an original tradition of the Dinka tribe and is from more than one source.

Caretakers usually mistake malaria, pneumonia, and other fever-causing illnesses for teething problems. Most babies were brought to the hospital after Hooth failed to improve the condition. Although 73.6% brought within seven days of the onset of symptoms, 26.4% came after seven days which probably led to a worsening of the condition. Because Hooth had been performed caretakers thought children were receiving appropriate treatment and so delayed coming to hospital.

In the hospital the commonest diagnosis made was malaria. This could also cause a delay in giving appropriate treatment if the health care professional was not looking for Hooth.

**Limitations:** This was a hospital-based study, so it may not be representative of the situation in the community. The admission and death registers in the wards were incomplete, with no mention of the cause of death. Only some of the mothers allowed the researcher to view the IOM scars.

## Conclusion

This hospital-based study indicates that the practice of Hooth is common among children aged under 6 months admitted with fever, feeding problems or convulsions; the practice is mainly carried out by traditional healers using unsterile instruments in order to prevent fever caused by teething problem (Lech).

It is recommended that:

- Further research is done at community level to find out the prevalence and the harmful effects of IOM in South Sudan.
- Health personnel teach mothers how to manage fever and teething problems.
- The Ministry of Health encourages communities to stop practicing IOM.
- IOM be banned through legislation.

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Research Article

# Knowledge of diabetes mellitus among adults in Umualika Eberi community, Rivers State, Nigeria

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## ABSTRACT

**Introduction:** Diabetes mellitus is a significant public health issue globally. The burden is particularly severe in low- and middle-income countries in sub-Saharan Africa. A lack of knowledge about diabetes exacerbates its impact, leading to late diagnosis, poor management, and increased complications. This study examined the knowledge of signs and symptoms, risk factors, control, management, and complications of diabetes mellitus among adults in the Umualika Eberi community, Rivers State, Nigeria.

**Method:** This descriptive study involved 240 of the 600 adult residents of Umualika Eberi community, men and women aged 20 years and above. A structured questionnaire was administered to every second adult. Data analysis was done using frequency tables and percentages.

**Results:** The findings revealed that the level of knowledge about diabetes mellitus among the adults in the Umualika Eberi community was generally low. Respondents demonstrated limited awareness of the signs, symptoms, risk factors, and effective management of diabetes.

**Conclusion:** The study recommends that the health sector prioritize public education initiatives and provide practical tools for diabetes prevention and management.

**Keywords:** diabetes mellitus, type 2 diabetes knowledge, risk factors, Nigeria

## Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia. It may be due to impaired insulin secretion, resistance to peripheral actions of insulin, or both.[1] It is a significant public health issue globally, with an estimated 537 million adults aged 20–79 years living with diabetes as of 2021, and this number is projected to rise to 643 million by 2030 and 783 million by 2045.[2,3] Diabetes is one of the top 10 causes of death globally. Together with cardiovascular disease, cancer, and respiratory disease, these conditions account for over 80% of all premature noncommunicable disease (NCD) deaths.[4] The

Lancet Commission on Diabetes published in 2020 highlights the unequal burden of the disease on people in low-income and middle-income countries (LMICs), reporting that 80% of diabetes cases occur in LMICs.[5,6] In the WHO African Region, the prevalence of diabetes among adults aged 18 and above has surged from 6.4% in 1990 to a staggering 10.5% in 2022, nearly doubling in just over three decades.[7,8,9] Currently, over 24,6 million Africans live with diabetes, a number projected to increase to 59,5 million by 2050.[10] The global diabetes burden has far-reaching implications for sub-Saharan Africa, where the prevalence of the disease is increasing at an alarming rate. In Nigeria, the International Diabetes Federation (IDF) estimates that approximately 3.6 million adults are living with diabetes, and many more remain undiagnosed due to limited awareness and inadequate healthcare infrastructure.[3]

Multiple studies have shown that awareness among diabetics regarding diabetes is poor. This lack of knowledge can lead to poor outcomes for the patients as they are unaware of how to optimize their health and avoid potential complications.[11] Diabetes self-care activities refer to the behaviours that people with or at risk of DM follow to effectively self-manage their disease. Inadequate self-care in diabetics is a major problem, which health care providers encounter. The results of various studies indicate that diabetics often lack suitable self-care practices and do not participate in their day-to-day care, even though the effectiveness of diabetes treatment heavily relies on self-care conditions[12] - which include healthy eating, being physically active, monitoring of blood sugar, compliance with medications and risk-reduction behaviours.

The mortality pattern at Nigerian tertiary hospitals further underscores the need for community-level interventions. Henshaw Uchechi Okoroiwuhi (2020) found that 3.6% of all autopsies in southern Nigeria in a study population involved patients with diabetes, emphasizing the disease's substantial contribution to preventable deaths.[13]

This study seeks to bridge this gap by assessing the knowledge of DM among adults in Umualika Eberi. Specifically, it aims to evaluate their understanding of the signs and symptoms, risk factors, complications, and management strategies associated with the disease.

## Method

A descriptive cross-sectional design was used to conduct this study. It provides an efficient and effective means of assessing the knowledge of respondents about DM at a specific point in time. The study was conducted in Umualika village, located in the Eberi community of Omuma Local Government Area (LGA) in Rivers State, Nigeria. This area has recorded cases of deaths linked to DM. Notably, the population in this community traditionally checked glycaemic control by tasting urine or observing ants' attraction to urine on the ground, highlighting a significant knowledge gap about DM and its management.

**Population:** The study targeted adult males and females aged 20 years and above in Umualika village, with a total population of 600 adults.

**Study Instrument:** A structured questionnaire was developed and administered by the researchers. The questionnaire comprised 20 questions designed to assess respondents' knowledge of DM, with response options of "YES," "NO," and "DON'T KNOW." A total of 240 questionnaires were distributed among 600 adult residents of the Umualika Eberi community. The questionnaires were given to every second adult, and 200 were successfully retrieved, yielding an 83% response rate. This method minimized challenges associated with recording responses and ensured comprehensive data collection.

**Validity and Reliability of the Questionnaire:** Its content was reviewed by experts in public health and diabetes research to confirm that it accurately measured knowledge of DM. A pilot test was conducted with a sample of 20 adults from a neighbouring community to evaluate the clarity, relevance, and comprehensiveness of the questions. The reliability of the questionnaire was assessed using Cronbach's alpha, which yielded a reliability coefficient of 0.82, indicating a high level of internal consistency. This ensured that the questionnaire reliably captured the intended information.

**Data Analysis:** The collected data were analyzed using statistical methods, including frequency tables and percentages, to summarize respondents' demographic characteristics and their knowledge of DM.

**Ethical Considerations:** Ethical approval for the study was obtained from the appropriate ethics review board. Participants were informed about the purpose of the study and their role in it. Informed consent was obtained from all respondents before administering the questionnaire.

## Results

The demographic data of respondents showed a diverse group of respondents with a notable representation of

**Table 1. Management, control, and complications of diabetes mellitus (N = 200)**

| Items | Yes | No | Total |
|---|---|---|---|
| Physical activities and exercise are important in managing diabetes. | 45% | 55% | 100% |
| Taking insulin injections helps in the control and management of DM. | 70% | 30% | 100% |
| Going for a medical checkup is good for diabetes? | 75% | 25% | 100% |
| In untreated diabetes the sugar in the blood increases. | 58% | 42% | 100% |
| Can diabetes lead to another sickness?? | 47% | 53% | 100% |
| Will diabetes affect the kidney if not treated? | 35% | 65% | 100% |
| Can diabetes lead to stroke and heart failure?? | 80% | 20% | 100% |

older individuals (31% of respondents), a slight female majority (55%), a high percentage of married individuals (50%), and a predominance with primary education (44%). The data collected revealed that most respondents (90%) reported having heard of DM, while 10% demonstrated limited knowledge. This level of awareness was unexpected, as most residents attributed signs and symptoms of diabetes to other conditions, reflecting a superficial understanding of the disease. Additionally, the high incidence of diabetes in the study area suggests that preventive and control measures are not widely practiced.

The management, control, and complications of DM are in Table 1.

A chi-square test was conducted to evaluate the relationship between educational level and knowledge of diabetes risk factors. The results showed a significant association ($\chi^2$=15.3, p<0.05 / $\chi^2$= 15.3, p < 0.05 /$\chi^2$=15.3, p<0.05), indicating that respondents with higher educational levels (secondary: 26%, tertiary: 10%) were more likely to identify diabetes risk factors compared to those with primary or no formal education.

Regarding complications, 80% of respondents know that diabetes can lead to stroke and heart failure, while 65 % of respondents do not agree that diabetes affects the kidneys if not treated. A correlation analysis revealed a moderate positive relationship (r=0.47, p<0.01) between respondents' level of education and their knowledge of diabetes complications. This suggests that educational interventions could improve awareness of complications such as kidney damage, stroke, and heart failure.

In terms of management, 55% of respondents did not agree that exercise and diet are essential, suggesting limited awareness of control measures. This lack of knowledge aligns with data from Olalekan Isaac Olatunde (2025), who reported poor diabetes management practices in Nigerian communities due to inadequate awareness.[14]

## Discussion

The findings highlight a significant knowledge gap in understanding DM among the adult population of Umualika. While general awareness of diabetes is relatively high, detailed knowledge about risk factors, complications, and management strategies remains limited.

To address these gaps, the study recommends:

- Health Education Campaigns: Focused on risk factors, complications, and management, tailored to various educational levels.
- Community Engagement: Collaboration with local health authorities to implement diabetes prevention programs.
- Policy Development: National health bodies should develop and disseminate guidelines for diabetes prevention and management.
- Capacity Building: Training healthcare providers to deliver effective education on diabetes control and prevention.

## Conclusion

The adult population in Umualika exhibited limited knowledge of DM, particularly regarding risk factors, complications, and management. Educational level was significantly associated with knowledge, underscoring the importance of targeted health education initiatives.

Comparing these findings with global studies, such as those by the International Diabetes Federation (2021), highlights that poor diabetes awareness is a common issue in LMICs. The global state of diabetes management highlights the urgent need for a comprehensive intervention strategy, especially for diabetes control.

Proper health education, integrated into national health policies, is essential to equip individuals with the knowledge necessary to prevent diabetes, manage its complications, and adopt healthier lifestyles. By addressing these gaps, the community can reduce the burden of DM and improve overall health outcomes.

**Conflict of Interest:** none

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Review Article

# A review of recent publications on haematolymphoid neoplasms in the head and neck region

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## ABSTRACT

Head and neck haematolymphoid neoplasms are a heterogeneous group of malignancies that pose diagnostic and therapeutic challenges. They consist of a range of lymphomas, leukaemias, plasmacytomas, and histiocytic disorders that occur in such sites as the oral mucosa, oropharynx, cervical lymph nodes, and jawbones. This systematic review describes the epidemiology, clinical presentation, histopathology, diagnostic methods, and treatment of haematolymphoid neoplasms of this region. A systematic literature search of relevant databases was conducted to evaluate current knowledge and recent advances. The review highlights the current subtypes, the diagnostic utility of histopathology and molecular markers, and the evolving pattern of targeted and immunotherapeutic approaches.

**Keywords:** haematolymphoid neoplasms, malignancies, head and neck, review

## Introduction

Haematolymphoid neoplasms are a heterogeneous collection of neoplasms of lymphoid and myeloid cell origin, which commonly present in the head and neck regions. The tumours involve organs and tissues like lymph nodes, oropharynx, and oral cavity. Their unpredictable clinical behaviour, which tends to overlap with other neoplastic and non-neoplastic conditions, poses enormous diagnostic challenges. Early and clear diagnosis is essential in order to provide suitable treatment and better outcomes.[1]

Major head and neck haematolymphoid malignancies are extranodal natural killer (NK)/T-cell lymphoma, diffuse large B-cell lymphoma (DLBCL), classical and nodular lymphocyte-predominant Hodgkin's lymphoma, Burkitt lymphoma, follicular lymphoma, mantle cell lymphoma, and marginal zone (MALT) lymphoma. Some unusual conditions such as follicular dendritic cell sarcoma, plasmablastic lymphoma, Langerhans cell histiocytosis, and extramedullary myeloid sarcoma also contribute to diagnostic as well as therapeutic difficulty.[2]

Advances in histopathological and molecular diagnosis have improved diagnostic precision, enabling better classification and prognostic assessment. The combination of imaging modalities such as PET-CT and MRI has also been helpful in staging and surveillance of disease. Targeted therapies and immunotherapeutic modalities have also altered therapeutic paradigms, improving survival in aggressive and indolent haematolymphoid malignancies.[3] This review describes the epidemiology, clinical presentation, diagnostic workup, and treatment modalities for haematolymphoid neoplasms of the head and neck.

## Method

A systematic literature search was conducted across the following databases: PubMed, Scopus, Embase, Web of Science, and Cochrane Library, covering publications from January 2000 to 2024.

Search terms included combinations of: "head and neck," "haematolymphoid neoplasms," "lymphoma," "leukaemia," "plasmacytoma," "histiocytic disorders," "oral cavity," "oropharynx," "cervical lymph nodes," "jawbone," "histopathology," "immunohistochemistry," "molecular markers," "treatment," "epidemiology," "clinical presentation."

Boolean operators (AND/OR) and Medical Subject Headings (MeSH) were used to refine the search.

### Inclusion Criteria

Studies were included if they met the following criteria:

- Population: Human subjects diagnosed with haematolymphoid neoplasms localized in the head and neck region (oral cavity, oropharynx, salivary glands, cervical lymph nodes, jawbones).
- Study focus: Addressed epidemiology, clinical presentation, diagnostic methods, histopathology, immunophenotyping, molecular diagnostics, or treatment (including chemotherapy, immunotherapy, radiotherapy, or targeted therapy).
- Study design: Original research articles, retrospective/prospective cohort studies, case series (≥5 cases), and systematic reviews.
- Language: Published in English.
- Time frame: Published between January 2000 and May 2025.
- Availability: Full-text accessible.

### Exclusion Criteria

Studies were excluded if they met any of the following:

- Focused solely on non-head and neck haematolymphoid neoplasms or metastatic lesions from other sites.
- Case reports (<5 cases), editorials, letters to the editor, abstracts only, conference proceedings, or opinion pieces.
- Animal studies or in vitro studies without clinical correlation.
- Studies lacking clear diagnostic criteria or without histopathologic or molecular confirmation of diagnosis.
- Articles not published in English or without full-text availability.

## Results

See details in the table 1.

## Discussion

### Epidemiology

Haematolymphoid neoplasms are responsible for a considerable percentage of head and neck cancers. Of these, non-Hodgkin's lymphoma (NHL), with a predominance of DLBCL, represents most of the cases. Hodgkin lymphoma is less common but should be considered in a differential diagnosis in young adults who present with cervical lymphadenopathy. Zheng et al. (2023) [12] compared the distribution and survival of primary haematolymphoid neoplasms in elderly patients using a population-based study, with a focus on the dominance of NHL, most notably DLBCL. Their results stressed the impact of patient age, comorbidities, and treatment types on survival outcomes. The survival rate was compromised among elderly patients with aggressive histologic subtypes, underscoring the importance of appropriate individualized therapeutic strategies in accordance with age-related factors and general health status.

### Clinical Presentation

Symptoms depend on the location. Painless cervical lymphadenopathy, masses in the oral or oropharynx,

**Table 1. An overview of recent publications on haematolymphoid neoplasms**

| Author | Journal | Study Topic | Sample Size | Key Findings |
|---|---|---|---|---|
| Iguchi et al. (2012)[4] | Acta Oto-Laryngologica | Anatomic distribution of haematolymphoid malignancies in the head and neck: 7 years of experience with 122 patients in a single institution. | 122 | Predominance of NHL in oropharynx and nasopharynx; 80% B-cell lymphomas, mostly DLBCL; male:female ratio 2.3:1; median age 66 years; common sites: oropharynx (36.1%), cervical lymph nodes (34.4%) |
| Takano et al. (2015)[5] | Acta Oto-Laryngologica | Site-specific analysis of B-cell non-Hodgkin's lymphomas of the head and neck: A retrospective 10-year observation. | 153 | B-NHL most commonly affects oropharynx (40.5%) and cervical lymph nodes (33.3%); 71.9% were DLBCL; median age 68 years; male:female ratio 1.64:1 |
| Seo et al. (2023)[6] | Journal of Rhinology | A case of extramedullary plasmacytoma in both maxillary sinuses. | 1 (Case Study) | EMP involving both maxillary sinuses; post-MM complete remission; treated successfully with radiotherapy (50 Gy); no recurrence after 12 months |
| Kusuke et al. (2019)[7] | European Archives of Oto-Rhino-Laryngology | Oral lesion as the primary diagnosis of non-Hodgkin's lymphoma: a 20-year experience from an oral pathology service and review of the literature. | 98 | Oral NHLs accounted for 0.1% of biopsies; mean age 47 years; most common types were DLBCL (42%) and plasmablastic lymphoma (24%); nodular lesions frequent (54.9%); pain in 47.1% of cases |
| Werder et al. (2010)[3] | Quintessence International | Non-Hodgkin lymphoma of the Waldeyer's ring: clinicopathologic and therapeutic issues. | - | Commonest histology was DLBCL; high association with gastrointestinal involvement; combined chemotherapy and radiotherapy improved survival outcomes |
| Wang et al. (2013)[9] | The Journal of Laryngology & Otology | Characteristics and prognostic factors for head and neck non-Hodgkin's lymphoma in Chinese patients. | 102 | DLBCL most common subtype; high incidence of T-cell lymphomas; tonsil most frequent site; rituximab with chemotherapy improved survival; prognosis linked to International Prognostic Index and histological subtype |
| Lee et al. (2014)[10] | The Korean Journal of Internal Medicine | Consortium for Improving Survival of Lymphoma. Clinical characteristics, pathological distribution, and prognostic factors in non-Hodgkin lymphoma of Waldeyer's ring: nationwide Korean study. | 328 | DLBCL most common subtype (73.2%); tonsils were most frequently involved; T-cell subtype, age ≥ 62, and failure to achieve complete remission were significant poor prognostic factors |
| Lv et al. (2024)[11] | Aging | Clinical characteristics and prognostic analysis of primary extranodal non-Hodgkin's lymphoma of the head and neck. | 74 | Waldeyer's ring most common site; DLBCL most prevalent subtype; radiotherapy + chemotherapy more effective than chemotherapy alone; prognosis linked to ECOG score, Ann Arbor stage, and IPI risk stratification |

nasal obstruction, and systemic B symptoms (fever, night sweats, and loss of weight) are common presentations. Su et al. (2023)[13] reviewed 369 cases of oral and maxillofacial NHL, describing clinicopathological features and their influence on prognosis. The findings supported that early detection and histopathologic examination significantly increased survival. The aggressive subtypes of patients, for example, plasmablastic lymphoma, had unfavourable outcomes. This follows the overall evidence that the aggressive histological subtypes are the ones requiring rigorous therapeutic regimes and vigilant monitoring to achieve maximum prognosis. Moreover, their conclusion promotes the integration of molecular diagnosis with imaging technology for early detection and personalized management practices.

### Histopathology and Immunophenotyping

Diagnosis is based on histopathological investigation supported by immunohistochemical staining for lineage-restricted markers (e.g., CD20 for B-cell neoplasms, CD3 for T-cell neoplasms). Molecular analysis, including fluorescence in situ hybridization (FISH) and polymerase chain reaction (PCR), assists in the identification of genetic abnormalities important for risk stratification. Iguchi et al. (2012)[4] and Takano et al. (2015)[5] carried out site-specific investigations of haematolymphoid malignancies, demonstrating that oropharynx and nasopharynx were the most affected sites, largely impacted by B-cell NHL, especially DLBCL. Their results highlighted the importance of anatomical site specificity in making prognostication and treatment planning.

### Imaging and Diagnostic Modalities

Imaging procedures like PET-CT and MRI have pivotal roles in the staging of diseases and in monitoring treatment response. PET-CT is especially useful in differentiating true lymphomatous involvement from reactive lymphadenopathy. Seo et al. (2023)[6] documented a case of extramedullary plasmacytoma involving both maxillary sinuses, highlighting the vital role played by PET-CT in separating true lymphomatous involvement from reactive change. Their investigation further proved that a successful outcome after early diagnosis by proper radiotherapy resulted in no recurrence upon follow-up for 12 months.

### Current Management Strategies

- **Chemotherapy:** R-CHOP continues to be the first-line regimen for aggressive B-cell lymphomas, whereas ABVD is the first-line regimen for Hodgkin's lymphoma. Laskar et al. (2008)[8] and Wang et al. (2013)[9] evaluated prognostic indicators in head and neck NHL. Laskar et al.[8] concluded that the combination of chemotherapy and radiotherapy provided improved survival rates compared with monotherapy. Wang et al.[9] documented rituximab combined with chemotherapy to improve dramatically survival rates, with prognosis having a close relationship with International Prognostic Index scores and histological subtypes.
- **Radiotherapy:** Often employed in localised disease or as an adjuvant therapy with chemotherapy.
- **Targeted Immunotherapy:** Rituximab and monoclonal antibodies have given improved outcomes in B-cell lymphomas. CAR-T cell therapy and checkpoint inhibitors are revolutionizing the treatment in refractory disease. Lee et al. (2014)[10] had retrospectively examined 328 NHL cases of Waldeyer's ring and observed advanced age, failure to achieve complete remission, and T-cell subtype to be independent factors of poor prognosis. Their findings indicate the importance of precise histopathological study and individualized treatment.
- **Surgical Intervention:** Surgical options are constrained by the availability of specialized surgeons and facilities. In cases where surgery is feasible, it is primarily used for diagnostic biopsies or debulking of tumours. Comprehensive surgical management is often not possible due to infrastructural limitations.

### Diagnostic Challenges

Accurate diagnosis is hindered by limited access to advanced diagnostic tools such as immunohistochemistry and molecular testing. This often leads to misdiagnosis or delayed diagnosis, adversely affecting treatment outcomes. Efforts are being made to improve diagnostic capabilities through telepathology and training programmes.[14]

### Supportive Care and Multidisciplinary Approach

Supportive care services, including nutritional support and psychosocial counselling, are minimal. The implementation of multidisciplinary teams, which is standard in high-resource settings, is challenging due to staffing shortages and lack of coordinated care pathways. Nonetheless, there is a growing recognition of the importance of such approaches, and initiatives are underway to establish tumour boards and collaborative care models.

**Challenges and Opportunities**

- Late Presentation: Patients often present with advanced-stage disease due to lack of awareness and limited access to healthcare facilities.
- Resource Constraints: Financial limitations affect both the healthcare system's capacity and patients' ability to afford treatment, leading to suboptimal care.
- Training and Retention: There is a need for training programs to build local expertise and retain healthcare professionals in the region.
- Policy Development: Establishing national cancer control programs can provide a framework for improving cancer care services.[15]

## Conclusion

Haematolymphoid neoplasms of the head and neck pose special diagnostic and therapeutic challenges. Rapid progress in molecular pathology, imaging studies, and targeted therapy has significantly enhanced patient outcome, but continued investigation is necessary to enhance treatment algorithms. Multidisciplinary management is essential for maximizing disease control and prognosis.

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# South World Refugee Day - Delivering Malaria Prevention to Displaced People in South Sudan

Each year on 20 June, World Refugee Day offers the chance to reflect on the experiences of those forced to flee their homes because of war, violence or persecution. In South Sudan, renewed conflict in neighbouring Sudan in 2023 has led to a sharp increase in the number of people crossing the border, many of whom are now living in remote areas with limited access to essential services.

…

As part of this effort, Malaria Consortium has worked closely with the Ministry of Health and partners to support malaria prevention in hard-to-reach areas, including refugee and internally displaced person (IDP) settlements. In 2023, during a round of SMC in one of the implementing counties, adaptations were made to ensure 500 children in a refugee camp could safely receive life-saving antimalarial treatment. This included strengthened security measures, close collaboration with the National Malaria Control Programme, UNHCR and community leaders, and the use of community-based approaches to maintain trust and ensure safe, timely delivery.

For more see: https://allafrica.com/stories/202506200385.html?utm_campaign=daily-headlines&utm_medium=email&utm_source=newsletter&utm_content=aans-view-link

And

https://www.malariaconsortium.org/blog/world-refugee-day-bringing-malaria-prevention-to-displaced-people-in-south-sudan/

Review Article

# Scaling up human resources for health in South Sudan: A strategic imperative for achieving universal health coverage

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## ABSTRACT

South Sudan remains critically underserved in its health workforce, with only 7.6 skilled health workers per 10,000 population—far below the WHO-recommended threshold of 45.5 needed to attain Universal Health Coverage (UHC). This commentary outlines the strategic efforts, led by the Ministry of Health, to close this gap through investments in health worker training, specialist education, and systems strengthening. Over 1,000 mid-level health professionals graduate annually from 37 national training institutes, out of which the United Nations Population Fund (UNFPA) supports 13. In parallel, international postgraduate training programmes in Ethiopia and other countries are building a source of specialised cadres in priority disciplines. To sustain momentum, the Ministry has developed a 10-year Human Resources for Health (HRH) Strategic Plan focused on legislation, education, governance, and retention. Achieving UHC by 2035 will require doubling current training capacity and securing greater financial and technical commitment. This article calls on government leadership and partner alignment to ensure South Sudan builds a resilient, skilled, and equitably distributed health workforce to meet the health needs of her people.

**Keywords:** Human Resources for Health, Universal Health Coverage, health workforce, strategic planning, health training, health system strengthening, South Sudan

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## Introduction

South Sudan faces one of the most acute shortages of skilled health personnel in the region. The current density of core health professionals—doctors, nurses, and midwives—stands at approximately 7.6 per 10,000 population,[1] far below the World Health Organization's (WHO) recommended threshold of 45.5 per 10,000 required to attain Universal Health Coverage (UHC).[2] See Table 1. This gap presents a formidable barrier to delivering essential health services and responding to public health emergencies. Addressing it demands a bold, strategic, and sustained investment in the health workforce.

**Table 1. Health workforce data for East African countries 2018 data[1]**

| Country | Medical doctors/ 10,000 population | Nursing and midwifery personnel/ 10,000 population | Dentists/10,000 population | Pharmacists/ 10,000 population | WHO index threshold for doctors, nurses, midwives / 10,000 population |
|---|---|---|---|---|---|
| Kenya | 1.61 | 11.991 | 0.168 | 0.193 | 44.5/10,000 doctors, nurses and midwives |
| Uganda | 4.14 | 12.744 | 0.006 | 0.078 | |
| Tanzania | 0.497 | 5.498 | 0.117 | 0.318 | |
| Rwanda | 1.315 | 11.823 | 0.182 | 0.707 | |
| South Sudan | 0.39 | 7.2 | 0.036 | 0.164 | |
| Somalia | 0.395 | 1.129 | | | |
| DR Congo | 3.622 | 10.716 | 0.046 | 0.194 | |

## Accelerating the production of mid-level health workers

In recent years, the Ministry of Health, with the support of partners, has made commendable efforts to scale up the training of various cadres. Currently, 37 health sciences training institutes (HSTIs) operate nationwide, comprising public, private, and faith-based institutions. With critical support from UNFPA and the Government of Canada, 13 HSTIs receive targeted assistance, graduating over 1,000 mid-level professionals annually. These professionals include nurses, midwives, clinical officers, and allied health workers, all of whom play a crucial role in the healthcare system. While this is a significant achievement, it remains insufficient relative to national needs.

## Building a source of specialists through regional partnerships

The Ministry has also prioritised the training of specialised medical professionals. A key initiative is the 'Training Programme for South Sudanese Specialised Health Cadres,' established in collaboration with the Federal Ministry of Health of Ethiopia. This programme supports postgraduate medical education emphasising priority areas such as maternal and child health, surgery, and internal medicine. Currently, 117 South Sudanese doctors are undergoing specialist training in Ethiopia, with over 100 having completed training and returned to contribute within state-level health systems. Additional specialists are being trained in Egypt, Kenya, Tanzania, Uganda, and South Africa.

### International Partnerships

In terms of international support for training of healthcare professionals in South Sudan, it is only the UNFPA (United Nations Population Fund) which is consistently supporting the training of nurses, midwives and clinical officers. Other organizations, such as the Japan International Cooperation Agency (JICA), supported the Ministry of Health few years ago in developing policies and related guidelines on management and monitoring of HRH. Other NGOs do sometimes get involved in short term training within the framework of "capacity building" which hardly achieve the intended purpose. The Government of South Sudan must consistently allocate funds to increase capacity and improve quality of training of healthcare professionals at all levels of healthcare service delivery (primary, secondary and tertiary). The current scenario of entirely depending on external support will only postpone meaningful progress towards achieving the UHC. Although the Federal Ministry of Health of Ethiopia do grant 30 slots annually for training South Sudanese doctors at postgraduate level and there are a few training in Kenya, Tanzania, Uganda and South Africa, establishment of postgraduate medical education within the country is the only cost effective and sustainable approach for South Sudan. It is therefore mandatory that the leadership of the Ministry of Health revitalize an (unpublished) initiative which was developed by Dr Eluzai Hakim almost ten years ago for the establishment of postgraduate medical education in the country.

With the implementation of the proposal developed by Dr Eluzai Hakim for postgraduate medical education,

the Republic of South Sudan will be able to influence the existing colleges of training within the region and beyond for expansion and improvement of its postgraduate medical education.

The establishment of postgraduate medical education within the country is a noble task that must be pursued if people of South Sudan are to have to access to quality healthcare services within the country and achieve UHC. The success of postgraduate medical education will depend on provision of adequate and consistent funding of all the key pillars of training, including development and accreditation of selected hospitals for training. It is therefore crucial that the government of the Republic of South Sudan is the primary source of funding, then influence on the good will of the international community to mobilize additional funding for the training. That is the only road for achieving UHC.

## A ten-year strategic vision for HRH development

Despite these gains, the path to UHC remains long and uncertain unless investments are significantly scaled up. Projections indicate that South Sudan could meet UHC goals within the next decade but only if the current health workforce training capacity is at least doubled. Otherwise, achieving UHC may be delayed by another two decades—a timeline the country cannot afford.

To guide this acceleration, the Ministry of Health has developed a ten-year Human Resources for Health (HRH) Strategic Plan focused on four priority outcomes:[3,4]

1. Strengthened HRH Legislation, Planning, and Partnerships
2. Improved Health Workforce Education and Training
3. Enhanced Leadership, Governance, and Management Practices
4. Optimised Utilisation, Retention, and Performance of the Health Workforce

## The way forward: a call to action

South Sudan's journey towards UHC hinges on a transformative expansion of its health workforce. The government must lead from the front—through policy leadership, increased financing, and institutional stewardship. But this cannot be achieved in isolation. We must galvanise support across the health ecosystem, including development partners, private sector actors, and international academic institutions.

In a country with vast health needs and a limited professional base , investing in human resources is not merely a technical priority—it is a moral imperative. Let this be the decade in which South Sudan closes the health workforce gap and decisively moves toward health for all.

*Dr Gabriel Loi is the Director General, Directorate of Training and Professional Development at the Ministry of Health, Republic of South Sudan.*

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# Eyes in the sky: Considerations for a tele-ophthalmology service in South Sudan

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## ABSTRACT

Telehealth services employ telecommunication technology to provide scarce specialist care to the multitude across the geographical divided and hard to reach areas. The Aravind Eye Care System in India has a successful tele-ophthalmology model that services poor households and could be adopted in impoverished settings such as South Sudan. Evolving technological changes in South Sudan, including provisional approval of Starlink, improve the feasibility of telehealth services. However, realizing intended benefits at minimal cost require careful consideration of multiple factors across demography, infrastructure, and governance. This article reflects on a previous evaluation project aimed at extending this model to other settings and makes recommendations for South Sudan.

**Keywords:** telehealth, eyecare, healthcare innovation, digital health, South Sudan

## Introduction

Wholesale adoption of healthcare models is uncommon. Yet, nascent health systems like South Sudan's could benefit from proven models. The Aravind Eye Care System's (AECS) tele-ophthalmology model helped curb blindness in India [1,2] and could help other poor settings. In South Sudan, 1.5%[3] to 7.7%[4] of the population is blind or visually impaired, mainly due to cataract (30-50%), trachoma (35.3-58.1%), onchocerciasis (35%), and refractive errors.[3-5] These are exacerbated by poor socioeconomic conditions[5] and poor access to eyecare.[3]

South Sudan's strategy for self-sufficiency in eyecare is constrained by infrastructure and workforce.[3] It could benefit from Aravind's innovations, including the use of Wi-Fi technology, cheap intraocular lenses, a paraprofessional workforce, standard management systems and processes, and outreach programmes.[6] These approaches circumvent constraints. However, wholesale domestication has yet to be explored.

Evolving technological changes, including approval of Starlink in South Sudan,[7] improve feasibility of telehealth services. Telehealth avails scarce specialist care to many across geographical divide. However, reproducing outcomes from proven models requires contextual considerations.

This article reflects on an evaluation project completed at Lions Aravind

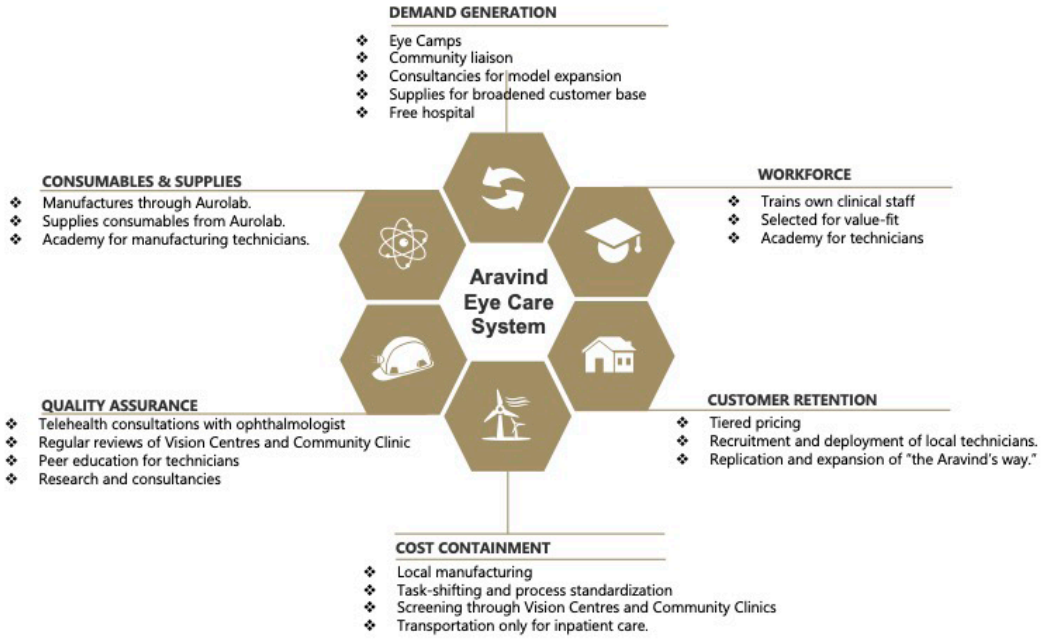


Figure 1. The Aravind Eye Care System's business model

Institute of Community Ophthalmology (LAICO) in Madurai, India, between 2017 and 2018. The project examined the effectiveness of Aravind's eyecare model with a view to scaling it. The article uses insights from fieldwork and administrative data to demonstrate key elements of the model and inform considerations for South Sudan. First, it delineates Aravind's approach to the global scourge of needless blindness and expounds on its elements of sustainability and quality assurance. Second, it considers constraints and opportunities for scaling the model to South Sudan. The article then concludes with recommendations.

## The Aravind Eye Care System

The AECS is a primary eyecare service that operates across over 100 sites that are digitally connected to a base hospital in Madurai. Its critical elements include training of clinical staff, acquiring staff, eye camps, vision centres (VCs) and community clinics (CCs), telehealth specialist reviews, standardized and high-throughput surgical care processes, and tiered pricing for equitable access (Diagram 1). VCs are community-based eyecare units staffed with skilled eyecare service providers. These offer comprehensive eye examinations, refraction, blood sugar test, blood pressure monitoring, a teleconsultation with an ophthalmologist, eye health education, and glasses and medicines dispensing services.[2]

Although VCs are low-cost and critical to the Aravind's model, they incur set-up costs and overheads, basic necessary investments, and recurring expenditure (Table 1).

The AECS uses high-throughput surgery with a large volume of patients to generate sufficient revenue to offset operating and establishment costs at VCs and community clinics (Table 2).

The AECS's sustainability and brand recognition hinge on multiple approaches, encompassing a business model which is tailored to the poor, standardized processes for cost containment and quality assurance, volume-driven growth, emphasizing organizational culture when recruiting, and locally-embedded management practices and technological innovation (Table 3).

## Considerations for South Sudan

### Resistance to innovation

Healthcare innovation is fraught with risk-aversion: the health sector prizes evidence over logical argumentation, which results in a long lead time for translation.[8]

Technology transfer often induces the fear of change and threat to vested interests.[9] Factors which are critical to technology transfer include favourable governance and business conditions, supportive financial ecosystem and technological literacy.[10] Nonetheless, even after the adoption, many innovations in healthcare fail for reasons including organizational, technological, and political complexities.[11]

The Aravind's model has been externally inspired but locally championed.[2] Leadership is essential for demystifying innovation and its mainstreaming.[9] Regulatory hurdles and competition against existing products are potential barriers that require experienced entrepreneurs to scout innovations and invest for production.[12,13]

**Table 1. Investments per vision centre**

| CAPITAL COST | USD | INR |
|---|---|---|
| Ophthalmic equipment | 6,100 | 400,000 |
| Computer accessories | 2,000 | 132,000 |
| Instruments (including sphygmomanometer, needle sterilizer.) | 75 | 5000 |
| Eye glass dispensing unit | 350 | 23,100 |
| Set up cost (promotion, furniture, invertor) | 3,300 | 217,800 |
| Overhead/ Incidental | 600 | 40,000 |
| Total investment cost | 12,425 | 820,050 |
| Recurring expenditure per month (workers, rent, maintenance, etc.) | 600 | 40,000 |

### Politics of metrics

The burden of eye diseases should be a political priority. Policy designers need to translate epidemiological evidence into political priorities. For India, 'Vision 2020: The Right to Sight' helped to target funding to eye health services.[6,14,15]

Eye health metrics also need to track quality of care. In Aravind's practice, this includes supply chain management, evaluation of care processes, and clinical outcomes. This also evaluates satisfaction rates and assesses care effectiveness.

### Governance

Governance is an important factor in scaling social impact.[16] Autonomous decision-making is essential for low-resourced contexts, and governance determines organizational values which are difficult to replicate. Moreover, taxation, trade, and technology policies impact technology transfer.[17] While the requisite set of policies are contested,[18,19] technology policies are often considered within other priorities, including implications for national security, economic benefits, and rarely, health implications. Aravind's eyecare model thrives on cheap technology which resulted from favourable governance frameworks. These include the decision to despatch and repatriate engineers after training in USA, the choice of procured technology and its indigenization, subsidies which make technology affordable, establishment of local training institutes for a tailored skilled workforce, development of factories for consumables, and promotion of customised adoption of existing technologies. Similarly,

**Table 2. Economic profile of vision centre and community clinic**

| | VISION CENTRE | COMMUNITY CLINIC (with transportation) | COMMUNITY CLINIC (without transportation) |
|---|---|---|---|
| | n=5 | n=4 | n=4 |
| Break Even Visits/Day | 8.85 | 20.82 | 13.29 |
| Break Even Visits/Year | 2,717.82 | 6,392.14 | 4,080.68 |
| Fixed Cost/Visit | 47.65 INR | 58.44 INR | 37.41 INR |
| Full Cost/Visit | 52.37 INR | 62.91 INR | 41.27 INR |
| Full Cost/Cataract Surgery | 1,425.89 INR | 1,979.44 INR | 1,297.84 INR |
| Full Cost/Spectacle Sold | 337.64 INR | 419.19 INR | 274.84 INR |
| Total Fixed Cost | 343,490.17 INR | 1,211,427.76 INR | 775,163.88 INR |
| Full Cost | 377,148.17 INR | 1,303,458.26 INR | 854,624.38 INR |

**Table 3. Key tenets of the Aravind Eye Care System (AECS)**

| SOCIAL ENTERPRISE | PROCESS STANDARDIZATION | ORGANIZATIONAL CULTURE | SUPPLY-DRIVEN DEMAND | MANAGEMENT & TECHNOLOGY |
|---|---|---|---|---|
| • Leverages large consumer base, product and process innovation, and tiered pricing to service the low-income population.<br>• Creates jobs for the community, including high school graduates, and offers training and integration into the workforce.<br>• Redistributes wealth and tackles child marriage by recruiting young women with limited education opportunities and employing them after a cadetship as eyecare technicians or manufacturing staff. | • Site selection based on population and distance from the transport network.<br>• Standard infrastructure, layout, workforce, and operations.<br>• Eyecare technicians used for task-shifting.<br>• Reproducible management and control structures in teleconsultation and referrals.<br>• Managerial support and quarterly reviews for supplies and quality assurance.<br>• Standardized training facilities, electronic medical records, and teleconsultation systems. | • Recruitment with the aim of community ownership.<br>• Recruits with emphasis on organization culture over clinical competency, because it could teach the latter.<br>• Instils the "Aravind way" in the training programme, thereby enhancing community acceptance and branding itself for competition on quality and compatibility.<br>• Eye health fieldworkers build community relations, disseminate information, and support referrals and community-based follow-up. | • Enlarges volume of service through community outreach, including eye camps, door-to-door visits, and school screening programme.<br>• Improves access through service availability for 6 days per week.<br>• Referrals and follow-up at base hospital supports volume expansion by improving trust in primary care centres and reduce shunting to alternatives.<br>• Health education and eye health promotion generate demand while enhancing brand recognition. | • Embedded management systems contain costs and inform technology transfer, including local manufacturing, which reduced the cost of intraocular lens (IOL) from $200 to $10.<br>• Aurolab, AECS's manufacturing arm, reduces the cost of consumables and positions AECS as net exporter of IOLs.<br>• Managerial reviews informed investment in Wi-Fi technology, which supports teleconsultations.<br>• Consultancy through LAICO supports the Aravind model's adopters and extends Aurolab's market. |

its domestication of manufacturing capabilities benefited from trade, taxation, and technology policies within India's overarching foreign policy.

In addition, India's populous jurisdictions are consequential for the economies of scale realized at Aravind. Success elsewhere would depend on governance frameworks which pool a critical mass under a policy jurisdiction. By contrast, decentralization may limit economies of scale where jurisdictions are small and the adopting organization is compelled to engage policymakers across multiple jurisdictions. Calls for federalism in South Sudan are requests for further devolution, despite current incapacitation.[20] While this could promote innovation, it may deprive volume-dependent services of requisite scale.

Furthermore, the financial ecosystem and government capabilities are consequential. Restricted fiscal space

necessitates public-private partnerships as the most viable vehicle for technology transfer. In this respect, government guarantees for private investors are instrumental for de-risking innovation. Preservation of public value in such partnerships also depends on capabilities in government and these are relevant for healthcare technology.

### Technology

Cheap and accessible technology is essential for telehealth. The AECS uses Wi-Fi across its network,[1,6] which enables real-time specialist input. This inspires confidence in quality of service while also acting as force-multiplier. The increasing affordability of Internet, computers, and mobile phone-supported fundoscopy, improve global feasibility of telehealth services. Nonetheless, local policies will be consequential. Policies aimed at cybersecurity or social moderation over the Internet, for instance, may constrain telehealth.

Furthermore, managerial practices and operations need to be adapted to local realities. The AECS invests in feedback systems, learns from its operations, and manufactures such as to contain costs and customise technology. Tailored approaches are pertinent, because technologies built for rich economies increasingly adopt razor-and-blade model. These target consumers with high purchasing power and aim to profit from consumables or the 'blades,' rather than the often-donated implement or the 'razor.' So, their maintenance costs are often prohibitive, requiring consumables which are either expensive or difficult to procure.

### Ethics

Optimization of operations at the AECS resolves backlog in outpatient reviews, minimizes unnecessary transfers, lowers labour cost, and minimizes downtime for surgeons and operating theatres. The latter involves task-shifting, with paraprofessional staff assessing patients and supporting perioperative care, including preparing the next patient on adjacent operating table while the surgeon is operating. This allows the surgeon to simply rotate around the operating microscope and minimise time between cases.[21] Although the AECS monitors and witnesses high quality outcomes and low complication rates, replicating its theatre processes would be subject to standards in other jurisdictions and cultures.

## Conclusion

The AECS is a successful social enterprise. It operates a high-volume telehealth model which could be adopted for other impoverished settings. However, it is important that critical aspects of its operation are understood such as the associated benefits to be achieved at minimal cost. The foregoing analysis underscores the significance of systemic analysis when scaling care models. It demonstrates that factors particular to settings, including population, infrastructure and governance frameworks, are consequential. Tele-ophthalmology models such as Aravind's could improve eye health in South Sudan. But wholesale adoption requires all the foregoing considerations.

### Declarations

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# Ectopic gestational-sac encapsulated in an ovarian cyst: A case report

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## ABSTRACT

Ovarian pregnancy is a rare and life-threatening condition accounting for 0.63% of all ectopic gravidae. In this case report, we present a 30-year-old woman with gravida 3; para 2 + 0 (2 alive) who attended our facility for a routine ultrasound scan. She complained of non-acute abdominal pain with no vaginal bleeding; she had a positive β -HCG test (Beta Human Chorionic Gonadotropin). Ultrasonography revealed a huge left ovarian mass 49mm in diameter, with an embedded decidua of a gestational sac 20mm, and a live foetal pole with a Crown-Rump Length (CRL) of 11mm corresponding to 7weeks + 1-day gestational age. Oophorectomy later confirmed the ultrasonographic diagnosis of ovarian pregnancy. Ovarian pregnancy is an uncommon but serious condition that requires fast intervention to prevent rupture and massive haemorrhage. This case shows that early diagnosis, ectopic-variation awareness, intervention and patient counselling would ultimately improve maternal health outcomes in women of reproductive age.

**Keywords:** ectopic, ovarian, pregnancy, ultrasound, women, Rwanda

## Introduction

Ovarian pregnancy is a rare form of ectopic gravidae. Incidence ranges from 0.6% to 1% of all reported ectopic gestations or 1 in 8,000 to 40,000 live births.[1] Diagnosis is based on histopathological, radiologic and surgical records.[1] Common risk factors for ectopic pregnancy are previous hormonal treatment, Assisted Reproductive Techniques (ART) and Intra Uterine Device (IUD) use.[2] In most cases, ovarian pregnancies 'self-terminate' with a rupture in the first trimester, and risk of a life threatening massive internal haemorrhage.[3]

Ultrasonography is vital for supporting the diagnosis through the detailed analysis of the anatomy of organs or visceral-region involved. However, some conditions require increased attention. For instance, foetal euthyroid goitre, can unusually present as a homogenous anterior neck mass in a 34-week pregnancy as discussed by Neto et al.,[4] or in the case of a ruptured advanced tubal ectopic pregnancy which rarely presents as a foetus floating in a fluid collection in the left adnexal region.[5] Therefore, the accurate location and nature of an ectopic pregnancy, requires meticulous attention to detail, and an understanding of

normal anatomy visualized by ultrasound.

Tubal ectopic pregnancies are more frequent than mural or intrabdominal ectopic pregnancies.[6] Mural ectopic pregnancies are defined as an uncommon type of ectopic pregnancy where the embryo implants in the muscular wall of the uterine myometrium instead of the endometrial cavity. This condition is different from more common types of ectopic pregnancies such as tubal gravidae, where the embryo implants in a fallopian tube. Abdominal ectopic pregnancy is a dangerous and rare condition involving a fertilized egg implanted outside the uterus, within the abdominal cavity. This can be primary or secondary to a recent rupture; implantation sites include the mesentery, intestines and peritoneum. It carries a high risk of haemorrhage and maternal mortality.[6,17] Due to the location of tubal ectopic pregnancies, a patient may have symptoms mimicking other conditions like gastroenteritis or pathologic-cysts. In the literature,[7] there are reported unusual presentations of tubal ectopic pregnancies; just like gastroenteritis appearing similar to an adnexal mass in CT. Others are unilateral uterine bleeding prone to the 'pitfall' of wrong diagnosis of being an adnexal ectopic pregnancy.[8] Therefore, ectopic pregnancies may not only be confusing on ultrasound scans but also in their clinical presentation of signs and symptoms. They may mimic multiple diseases, such as echinococcal cysts, gastroenteritis or abnormal uterine bleeding with a halo.

Frequently, conditions may be undiagnosed because of unusual and misleading presentations. For instance, the detection of small, retained products-of-conception in miscarriages can be missed by ultrasound. In other cases, intrauterine pregnancies and ectopic pregnancies may be indistinguishable.[9] Ultrasonography is regarded the gold standard diagnostic tool for ectopic pregnancies and related conditions but nevertheless misdiagnoses still occur.[10] To reduce misdiagnoses, patient preparation is essential to improve the success rates in transabdominal and trans-pelvic ultrasound examinations.[11]

In addition to careful analysis of ultrasound images to avoid diagnostic errors in ectopic pregnancies, it is important to share clinical experiences of unusual presentations to increase awareness among clinicians and sonographers of atypical presentations.

## Case Report

A 30-year-old biparous woman came to our hospital complaining of pelvic pain with amenorrhoea for two months. Blood tests confirmed a positive pregnancy test, albeit with a lower level of serum β -HCG titres. Ultrasound examination revealed a gestational sac (GS) with a well-defined oval anechoic lesion with double hyperechoic walls and intrinsic echogenic content comprised of foetal parts (Figures 1a, 1b) and located within the left ovary.

The patient was referred to an obstetrician for surgery which was conducted the next day. We sought informed consent from the patient for the purposes of publishing this case report and received ethical approval from the Kampala International University Teaching Hospital, Uganda.

Figure 1a shows a transabdominal sonogram of the left ovary demonstrating the gestational sac (GS) as a well-defined round anechoic lesion. CRL= 11.0mm, GSD= 20mm, GA= 7weeks + 1 day. There are thick double hyperechoic walls with internal echogenic-parts determined as the foetal pole (FP) and located inside the large left ovarian cyst (CY), averaging 49mm in diameter. The foetal pole (FP) is viable with no evidence of bleeding or occurrence of Anembryonic Pregnancy (Blighted Ovum). It was noted that there was a thicker bilateral distance (between right and left sides) and a 'sunken' crown-rump tissue as opposed to being 'suspended'. Note that the ovarian stroma surrounding the ovarian cyst has a soft tissue echo-pattern. A second ultrasound scan before elective surgery confirmed this same diagnosis of cystic ectopic gravidae.

Figure 1b shows cystic ectopic pregnancy inside a cystic sac. This is the same sonogram (as Figure 1a) without the legends to clearly delineate the longitudinal anatomy.

Figure 2 shows a normal intra-uterine (UT) pregnancy; a pelvic sonogram shows an oval decidua gestational sac diameter (GSD) embedded with hyperechoic rim and a viable foetal pole. CRL of foetal pole is 20.7 mm corresponding to 8 weeks + 2 days / note foetal heart rate = 158bpm seen in the top left corner.

## Discussion

Ultrasonography for the identification of ectopic pregnancies is a cornerstone of obstetric practice. As highlighted in this case report of a 30-year-old woman with G3P2 + 0 (2 alive), the intricate nature of ultrasound imaging can yield both precise diagnoses (Figure 1a) and potential misinterpretations. Ectopic pregnancies, particularly those occurring in the adnexa, present diagnostic challenges due to their atypical presentations and the overlapping symptoms with other conditions,

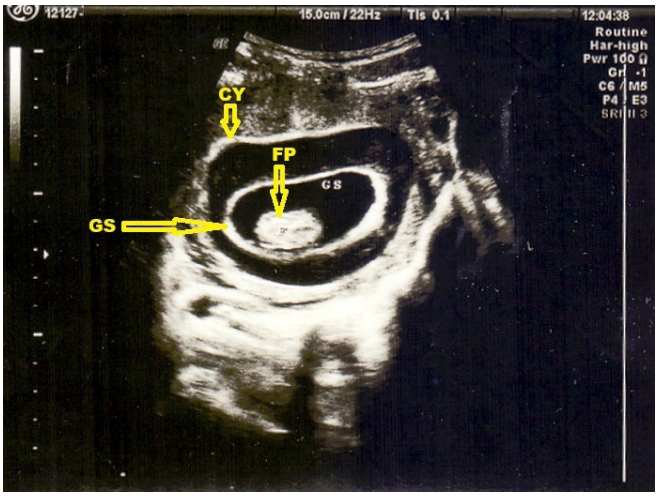


Figure 1a. Left ovarian ectopic pregnancy. Gray scale sonographic image showing clear evidence of left ovarian ectopic pregnancy. Visualization of the embryo in the ovary mimics a corpus luteum cyst. No perisac haemorrhage seen; the right adnexa appeared normal and otherwise unremarkable.

Figure 1b. Central anechoic gestational sac in the left ovary. Unlabelled mirror image of 1a; Note the central anechoic gestational sac of the left ovary measuring 52mm x 48mm in polar diameter. Observe the embedded intact gestational sac (20mm) containing a foetal pole. Ultrasound revealed a regular shaped and empty uterus (not shown).

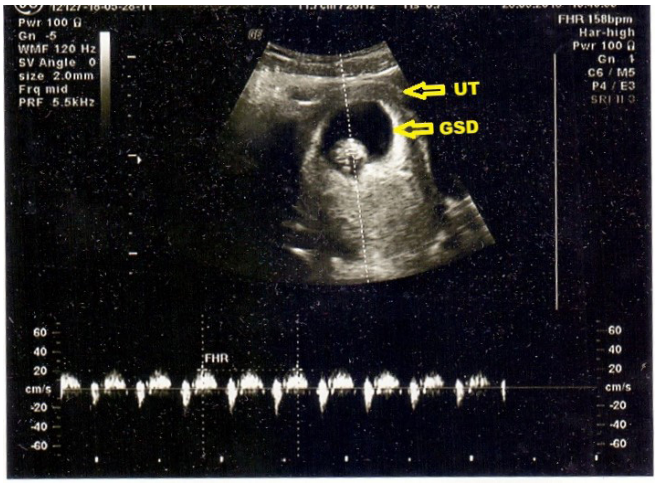


Figure 2. Normal ultrasound of a gravid uterus. Ultrasound image of a live foetal pole with cardiac activity. The Pouch of Douglas is free of fluid.

such as ovarian cysts or causes of acute abdominal pain.[12] This case highlights the complexities involved, as the ectopic pregnancy was identified within a large ovarian cyst, a scenario that is not commonly encountered.

Typically, ectopic pregnancies are associated with implantation within the fallopian tubes. However, they can also occur in the ovaries or abdominal cavity.[13] In this case (Figure 1a), the ultrasound findings revealed a gestational sac within an anechoic lesion in the left ovary. The presence of a well-defined oval anechoic lesion with double hyperechoic walls and intrinsic echogenic content shows a dual structural confluence between decidua tissue of the ectopic pregnancy and the ovarian cyst. Such complexities require a high level of ultrasonographic skill, particularly in distinguishing between a normal pregnancy and an ectopic one amidst confounding factors.[14] It can also be misdiagnosed as a cyst enveloping a foreign body.

Patients often present with symptoms that mimic other conditions, such as gastroenteritis or abnormal uterine bleeding, leading to clinical misdiagnosis.[7] The literature underscores the necessity for healthcare providers to maintain a high index of suspicion for ectopic pregnancies, especially in women of childbearing age presenting with abdominal pain and amenorrhoea. This case report serves as a reminder of the importance of thorough clinical evaluation and the need for practitioners and sonographers to remain vigilant in their assessments.

Patient preparation is an important aspect influencing the accuracy of ultrasound examinations, particularly in obstetric scans. For transvaginal sonography, a patient is advised to empty her bladder before the procedure to allow for optimal visualization of pelvic structures. For transabdominal sonography, patients are instructed to arrive with a full bladder, which helps to elevate the uterus and improve image quality. They may also be advised to avoid consuming certain foods that could cause gas,

as this can hinder the clarity of the ultrasound images. Inadequate patient preparation can lead to suboptimal imaging, thus hindering the diagnostic process.[15]

The complexity of diagnosing ectopic pregnancies is illustrated by various challenging scenarios. For instance, a 30-year-old woman presenting with an ovarian cyst had ultrasound imaging revealing a gestational sac within the cyst (Figures 1a & 1b), complicating the diagnosis as it could easily be misinterpreted as a simple cyst rather than an ovarian ectopic pregnancy. A normal intra-uterine gestation with viable foetal pole is shown in Figure 2. Another case report[7] was of a patient diagnosed initially with gastroenteritis. A CT scan revealed a ruptured ectopic pregnancy, underscoring the need for radiologic vigilance in women of reproductive age presenting with gastrointestinal symptoms. Additionally, ectopic pregnancies can mimic abnormal uterine bleeding, leading to a host of wrong conclusions such as complex-fibroids, dermoid-cysts, adnexal masses which delays appropriate treatment. These examples highlight the critical importance of thorough clinical evaluation and maintaining a high index of suspicion for ectopic pregnancies in atypical presentations.

Furthermore, our case indicates the need for continuing education and the review of case studies among ultrasound practitioners. Familiarity with a diverse range of presentations enhances diagnostic skills and reduces the likelihood of misinterpretation.[16] In agreement with a report from Ukwenya et al[17] ectopic gravidae (tubal, peritoneal or cystic) may be challenging to diagnose if the urinary bladder is flaccid. Documenting and sharing experiences contribute to the collective knowledge base, facilitating better recognition of atypical presentations in future clinical practice. Timely intervention is essential, as the risk of rupture increases with delayed diagnosis, potentially leading to life-threatening complications. Ambiguous ultrasound results, such as a gestational sac that does not clearly indicate whether it is intrauterine (Figure 2) or ectopic (Figure 1), necessitate advanced skills in image interpretation to avoid mismanagement.

## Conclusion

Ultrasound scanning remains the gold standard for diagnosing ectopic pregnancies, but it is fraught with challenges. The complexities involved in interpreting ultrasound images necessitate thorough clinical evaluation and a commitment to continuous learning. By fostering a culture of attention to detail and ongoing education, healthcare providers can significantly improve diagnostic accuracy, ultimately enhancing patient outcomes in cases of ectopic pregnancy.

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# Death due to ruptured tubal pregnancy: A case report

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## ABSTRACT

Ruptured tubal pregnancy is a life-threatening surgical emergency. It is the most common cause of first trimester morbidity, mortality and a major cause of early foetal wastage. Modern, improved diagnostic techniques and multimodality management have drastically reduced death from ruptured ectopic pregnancy. Postmortem examination was done on the body of a 29-year-old female with the history of sudden onset of acute severe abdominal pain, vomiting and missed period for five days. It revealed massive intraperitoneal haemorrhage and ruptured left fallopian tube. Microscopic examination of the ruptured segment of the fallopian tube confirmed ectopic implantation.

**Key words:** ruptured ectopic pregnancy, tubal pregnancy, intraperitoneal haemorrhage, postmortem diagnosis, first trimester mortality

## Introduction

Normal pregnancy begins with the fertilization of an egg by sperm followed by implantation of the fertilized egg in the uterine cavity. When a fertilized ovum becomes implanted and develops outside the uterus, it is known as ectopic pregnancy. The most common sites of ectopic pregnancy are the fallopian tubes, the other sites are the cervix, ovary, and abdominal region cavity. During the first three months of pregnancy, ectopic pregnancy is the leading cause of maternal death in industrialized nations, and possibly the second most frequent cause in developing countries.[1] Ectopic pregnancy is reported in one in every 100 to 150 pregnancies with major risk factors including age, infertility, smoking, previous ectopic pregnancy, intrauterine device usage, pelvic inflammatory diseases.[2] Ectopic pregnancy should be suspected when a woman presents with a history of abdominal pain, vaginal bleeding and a positive pregnancy test. Prompt diagnosis and timely management can be lifesaving. Unattended tubal pregnancy can rupture and ultimately result in fatality.[3]

## Case Report

A 29-year-old previously healthy female was brought dead to the casualty of our hospital. History from the husband revealed that she had abdominal pain

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over the last three days with vomiting around 4-5 times, prior to being brought to our hospital. She was under treatment by a private practitioner for abdominal pain and nausea. The practitioner advised some pain killers and an antiemetic. The next day she developed breathlessness, collapsed and died. A postmortem examination was conducted the next day.

**Postmortem findings**

The body was of a young adult female; rigor mortis was present only in the lower limbs with faint post mortem staining present and fixed over back. Eyes were closed, corneas were hazy, the conjunctivae were pale as was the body suggesting that death probably occurred a few hours prior to examination. Corneal haziness is a natural postmortem change that helps estimate the time since death, while closed eyes may indicate a peaceful death or postmortem handling. These signs, in the absence of trauma or manipulation, are consistent with early postmortem changes. No injuries were present. Internal examination showed about two litres of fluid blood and clotted blood in the peritoneal cavity and more clotted blood in the pelvic cavity (Figure 1). All internal organs were pale.

There was a rupture of the left fallopian tube with a rent of 2.7 x 1.4cm on the anterior surface of the isthmus region (Figure 2). A reddish mass measuring 1.4 x 0.7x 0.5 cm was seen (Figure 3). The right fallopian tube was patent. The uterus measured 9.3x7.5x3.5 cm (Figure 4). The left ovary showed a small cyst, and the right ovary was normal.

Histopathology of the left fallopian tube showed trophoblast and haemorrhage in the wall confirming the tubal pregnancy (Figure 5). The left ovary showed a corpus luteum and cystic follicle. The uterus showed endometrial glands in the secretory phase, decidual changes in the stroma and foci of haemorrhage.

Figure 1. Massive intraperitoneal haemorrhage

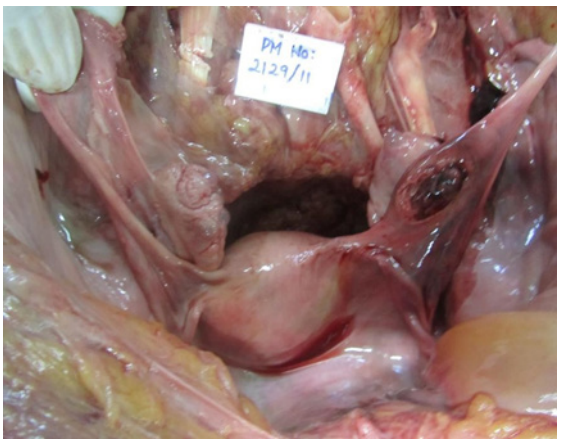

Figure 2. The anterior surface of the isthmus region

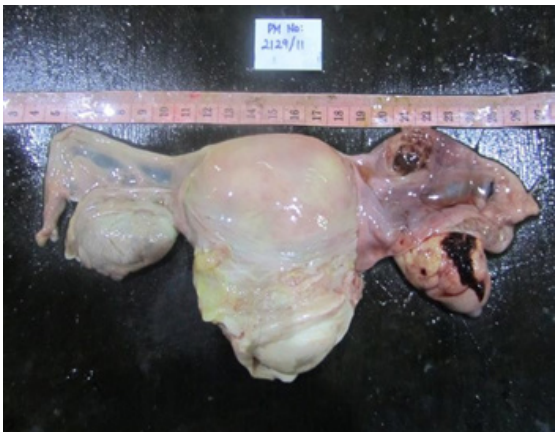

Figure 3. A reddish mass measuring 1.4 x 0.7x 0.5 cm

## Discussion

Ectopic pregnancy, where the fertilized egg implants outside the uterus (most commonly in the fallopian tube), is the most common cause of maternal death during the first trimester. It typically ruptures between 6 to 10 weeks of gestation, leading to severe internal bleeding and potentially death if not treated promptly. While rupture usually occurs spontaneously, it can also be precipitated by trauma, sexual intercourse, or pelvic examination.[4-9] The symptoms often mimic other abdominal conditions such as appendicitis or hernia, making diagnosis challenging.

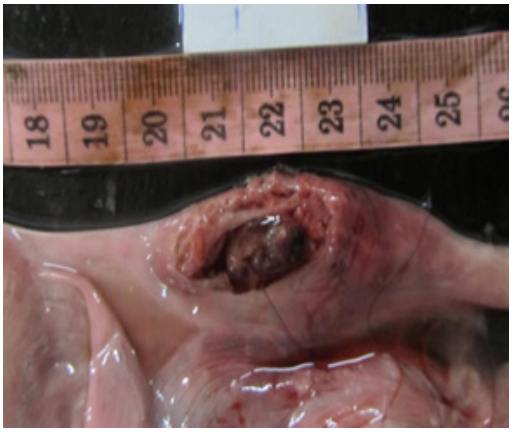


Figure 4. Uterus 9.3x7.5 x 3.5 cm with rupture of left fallopian tube

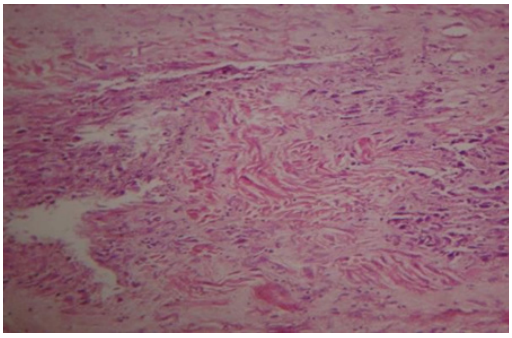

Figure 5. Histopathology of the left fallopian tube showed trophoblast and haemorrhage in the wall confirming the tubal pregnancy.

The global incidence ranges from 0.25% to 2%, with increasing trends due to rising rates of pelvic infections, tubal surgeries, and improved diagnostic capabilities. In India, ectopic pregnancies contribute to approximately 3.5%–7.1% of maternal deaths.[10-14] Despite a rise in cases, early detection has significantly reduced fatalities. Studies show that most affected women are between 20–30 years of age, the peak of reproductive activity.[15,16] Delayed presentation is often due to unawareness of pregnancy, misdiagnosis, or underestimation of symptoms. In the discussed case, a young married woman's sudden death was initially suspected to be unnatural.[17,18] However, a detailed autopsy revealed the cause as a ruptured tubal ectopic pregnancy, not related to any external trauma. Pregnancy was confirmed histologically, and no foul play was found. This case underscores the importance of early recognition of ectopic pregnancy symptoms and the critical role of detailed clinical and forensic evaluations in determining the true cause of death.

## Conclusion

The incidence of ectopic pregnancy is increasing and is high in developing countries due to late referral and diagnosis. A strong clinical suspicion in females of reproductive age with amenorrhoea, with investigations like abdominal and pelvic ultrasonography, can lead to early diagnosis of ectopic pregnancy. Early diagnosis and treatment of ectopic pregnancy provide an opportunity to prevent a ruptured fallopian tube.

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# Malnutrition crisis deepens for Sudan's children as war rages on

11 July 2025 Humanitarian Aid

Sudan's brutal civil war is pushing more children towards the brink of starvation, the UN Children's Fund (UNICEF) reported on Friday, highlighting a sharp and alarming rise in severe acute malnutrition (SAM) cases across the country.

Across the five states that make up Darfur, UNICEF data revealed a 46 per cent increase in the number of children treated for SAM in January to May 2025 compared to the same period last year.

The rate of acute malnutrition has surpassed emergency levels set by the World Health Organization (WHO) in 9 of the 13 localities across Darfur.

In North Darfur alone, over 40,000 children were admitted for SAM treatment in the first five months of the year – double the number from the same period last year.

https://news.un.org/en/story/2025/07/1165372?utm_source=UN+News+-+Newsletter&utm_campaign=65ef0385da-EMAIL_CAMPAIGN_2025_07_12_12_00&utm_medium=email&utm_term=0_fdbf1af606-65ef0385da-107573841

# ICU Squad: A possible solution for critical care service in low-resource areas

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## ABSTRACT

Delivering critical care in low-resource settings presents significant challenges, including limited infrastructure, trained personnel, and logistical barriers. Ad hoc multidisciplinary teams, such as ICU Squads, offer a promising solution to these challenges. This communication highlights the role of an ICU Squad in the management of a critically ill patient in a resource-limited environment.

**Keywords:** ICU squad, critical care, low-resource settings, ad hoc team, patient stabilization.

## Introduction

Delivering critical care in low-resource settings presents significant challenges due to limited infrastructure, trained personnel, and logistical barriers.[1] Ad hoc teams (ICU Squad)—temporary multidisciplinary groups formed to address specific emergencies—offer a promising solution to mitigate these challenges. This case highlights challenges encountered by ICU squad as a team approach, which enables the successful stabilization and management of a critically ill patient in a low resource area.

## Case presentation

A 65-year-old male with a 12-year history of diabetes mellitus managed on oral hypoglycaemic agents transfers from a field clinic because of an acute surgical abdomen and clinical deterioration. The patient, a senior engineer at an oil corporation, was considered high-profile. The referral letter indicated stabilization in Juba, South Sudan, with a recommendation for urgent evacuation to Kenya for advanced care. On arrival, the patient was confused, irritable, and visibly dehydrated. Vital signs revealed a heart rate of 118 beats per minute, blood pressure of 80/50 mmHg, and a respiratory rate of 32 breaths per minute. Oxygen saturation could not be measured, likely due to circulatory shock. He exhibited deep, laboured breathing, suggestive of metabolic acidosis. The abdomen was distended and tender, with generalized guarding indicative of peritonitis.

Laboratory results showed a white blood cell count of 17,400/mm$^3$, predominantly neutrophils. Serum urea was 92 mg/dL, creatinine 3.2 mg/dL, sodium 131 mEq/L, potassium 3.2 mEq/L, and blood glucose 482 mg/dL. Urinalysis revealed 3+ ketones. Arterial blood gas, serum acetone, and lactate levels were not available. A working diagnosis was made of an acute surgical abdomen with shock, diabetic ketoacidosis (DKA), acute kidney injury (AKI), and probable sepsis of intra-abdominal origin.

Both the surgeon and intensivist agreed on the urgency for resuscitation, broad-spectrum antibiotics, ICU care, and an immediate laparotomy. However, the hospital's ICU was non-functional due to a lack of trained staff, despite having the necessary equipment.

A significant conflict arose between the medical team, the patient's family and the company administration. They insisted on transferring the patient to Kenya for superior care. The patient was deemed too unstable for commercial flight, and the earliest available air ambulance would take 18 hours to arrive. This delay raised concerns about missing the critical window for intervention, potentially leading to further organ failure and irreversible damage.

**Intervention and team assembly (ICU Squad)**

Resuscitation and optimization efforts continued. A critical care team (ICU squad) was rapidly assembled, The intensivist, a Sudanese internist trained in the United States, had been practicing critical care in Sudan for the past 15 years. He was well-acquainted with many ICU residents and nurses—both from South Sudan and Sudan—who had previously worked in various intensive care units in Khartoum but had relocated to South Sudan due to the ongoing conflict. With the approval of the hospital administration, the intensivist took the lead in organizing the response. He appointed an ICU resident and a nurse to coordinate the work schedule. The team decided to operate in 12-hour shifts and committed to preparing a three-day schedule in advance. Simultaneously, they began creating a database of individuals with relevant experience who were interested in participating.

Although the team had not worked together before, they were led by the intensivist, who remained with the patient until stabilization and transfer to the operating room. Within three hours of intensive care, the patient's condition improved, and he regained consciousness, enabling him to participate in decision-making. After a thorough explanation of the risks and benefits, the patient and his family opted for surgery and local care using available resources.

**Surgical findings and postoperative course**

Exploratory laparotomy revealed mesenteric ischemia, and the affected bowel segment was resected with primary anastomosis. Postoperatively, the patient was transferred to the ICU, where he recovered smoothly over the next three days. The team demonstrated strong technical skills but faced logistical challenges in obtaining supplies, medications, and assembling and operating some of the equipment. Team dynamic and hierarchical behaviour of other consultants were a source of conflict. To address these issues, the following interventions were implemented:

1. A general nurse from the hospital was assigned as a logistics facilitator.
2. A biomedical engineer provided quick in-service training and remained on call as needed.
3. The intensivist remained on-site, conducting rounds every 3-6 hours and as needed.
4. All involved consultants agreed to deliver their orders and suggestions through the intensivist.
5. Team was instructed to update the sign out sheet and medication reconciliation sheet at the end of each shift.

## Discussion

This patient with severe sepsis and multiorgan failure was at risk of deterioration if source control would have been delayed. The severity of sepsis correlates with the number of failing organs, with mortality increasing substantially as more organs become dysfunctional.[2] The goals of managing this patient were to deliver appropriate organs support and source control. This required a functioning critical care team. There is no formal postgraduate critical or emergency medicine training for both doctors and nurses in South Sudan. This often leads to junior medical staff without formal residency training managing critically ill patients, underscoring the urgent need for targeted training and capacity-building initiatives.[3] For this patient, ICU Squad was assembled from doctors and nurses with previous ICU experience. The ICU Squad as an Ad hoc team is associated with many challenges. One of the problems was to coordinate the supply chains, since all of the staff were temporarily hired. This was overcome by signing one of the local staff as coordinator for medications, consumables, lab work and other hospital related troubleshooting.

One of the most significant challenges faced within the

ICU Squad was the misalignment in goal setting and decision-making between consultants and junior staff. This issue was previously recognized in open critical care models, where hierarchical dynamics often hindered effective collaboration. For instance, Bartlett et al reported that: a junior nurse with specialized expertise in ventilator management might refrain from offering valuable input due to perceived power imbalances or fear of overstepping boundaries.[4] To address this challenge, it was agreed on by all consultants to channel their suggestions and interventions through the intensivist. In addition to that, diverse professional backgrounds and the high-stress nature of critical care can lead to conflicts within the team. A study found, well-managed conflicts and disagreements facilitate critical thinking and generate new ideas.[5] Conversely, unresolved conflicts can reduce information sharing, hinder team relationships, and decrease psychological safety.[6] Psychological safety, which allows team members to express their ideas without fear of embarrassment or punishment, is essential for fostering collaboration and enhancing performance.[6]

ICU Squad was assembled from healthcare providers from different institutions, each with varying leadership styles and decision-making approaches. The absence of a designated leader can lead to power struggles and ambiguity in decision-making, which can negatively impact the team's responsiveness and efficiency. In emergency settings, unclear leadership can result in conflicts over authority and delays in critical decisions, ultimately compromising patient outcomes.[7] In resource-limited settings, the lack of experienced leaders and standardized leadership training further complicates coordination and task delegation.[8] In our ICU Squad, the intensivist provided leadership and facilitated coordination with other consultants. A senior nurse and a resident were appointed as charge officers with clear delegations and boundaries.

Transitions of care — defined as the movement of patients between healthcare settings or providers — represent a particularly vulnerable period in critical care. In the ICU squad model, these transitions often occur under suboptimal conditions, contributing to incomplete information exchange and increased risk of errors. Evidence indicates that 56% of patients are at risk of experiencing at least one medication discrepancy during these transitions, with 11–59% potentially facing harm.[9] To enhance medication safety during care transition, ICU Squad was instructed to cease and update medication reconciliation sheets at the end of each shift. It is well known that medication reconciliation can ensure transfer of accurate and complete medication information at care interfaces.[10]

Communication failures can lead to patient harm, especially in low-resource settings where team members may have limited training and experience. Implementing standardized communication frameworks, such as SBAR and I-PASS, has been shown to reduce miscommunication, improve clarity and enhance team coordination in a critical care setting.[11,12] In this ICU squad, the I-PASS (Patient summary, Action list, Situation awareness, Synthesis) method helped to improve communication and reduce discrepancies.

## Conclusion and long-term strategy

In the short term, ad hoc teams can provide temporary solutions for managing critically ill patients. To be a viable intervention, this requires the establishment of a comprehensive database of skilled personnel and reliable channels of communication. These professionals must be oriented to the local context and familiar with the hospital's environment and culture. Continuous professional development programs are essential to maintain and enhance their competencies.

Developing structured, long-term training programs for both nurses and doctors is crucial for sustainable capacity building. The implementation of the WHO Emergency Care Curriculum[13] in medical and nursing schools can significantly strengthen skills in emergency and critical care.

Forward-thinking by stakeholders, including setting clear milestones for the implementation of the WHO's 2023 initiative on Integrated Emergency, Critical, and Operative Care (ECO), represents a vital step toward systemic improvement. This aligns with the broader global movement[14] to strengthen health systems and improve outcomes for critically ill patients.

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Short Communication

# The role of government in advancing private hospitals to improve healthcare services in South Sudan

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## ABSTRACT

South Sudan's healthcare sector faces challenges such as limited infrastructure, shortage of healthcare professionals, and insufficient funding. Private hospitals have emerged as a vital component in addressing these issues, yet their potential remains constrained without adequate government support. This article examines the strategies through which the government can advance private hospitals, including policy formulation, financial incentives, public-private partnerships, and capacity building. By fostering collaboration with the private sector, the government can strengthen the healthcare system and improve service delivery across the country.

**Keywords:** public-private partnerships, private hospitals, strengthen the healthcare system, South Sudan.

## Introduction

Healthcare services in South Sudan are among the least developed globally, with over 70% of the population lacking access to basic medical care.[1,2,3] The public healthcare system is overstretched, underfunded, and unable to meet the growing demand for services. Private hospitals have emerged as critical players in filling these gaps. However, their growth is hindered by challenges such as high operational costs, inadequate infrastructure, and limited workforce availability. Government intervention is essential to create a conducive environment for private hospitals to thrive and contribute effectively to national healthcare delivery. Government intervention in support of private hospitals can be crucial in the following areas:

### 1. Policy framework and regulation

A robust policy environment can foster private sector participation in healthcare. Key government interventions include:

- **Healthcare policies:** Developing a national policy framework that integrates private hospitals into the broader healthcare system.
- **Regulatory standards:** Establishing clear regulations for licensing, service quality, and pricing to ensure accountability and patient safety.

- **Streamlined processes:** Reducing bureaucratic hurdles and expediting approval processes for private sector projects.

**Example:** Rwanda's regulatory reforms have encouraged private healthcare investment, leading to increased healthcare access in underserved regions.[4]

**2. Financial incentives and investments**

Private hospitals face significant financial challenges due to the high costs of medical equipment, infrastructure, and human resources. The government can address these issues through:

- **Tax relief:** Exemptions on medical equipment and construction materials for private hospitals.
- **Subsidies and grants:** Offering financial support for private hospitals operating in rural or underserved areas.
- **Public-Private Partnerships (PPPs):** Collaborating with private hospitals to fund and operate healthcare facilities, as demonstrated in Kenya's healthcare PPP initiatives.[4,5]

**3. Capacity building and human resource development**

South Sudan faces a severe shortage of healthcare professionals, with only 1.5 physicians per 10,000 people.[1,3] Government strategies should include:

- **Training programmes:** Partnering with private hospitals to establish continuous professional training centres for nurses, midwives, and doctors.
- **Scholarship schemes:** Providing scholarships for medical doctors committed to working in the country.
- **Knowledge exchange:** Facilitating exchange programmes between private and public sector professionals to enhance skills.

**4. Infrastructure development**

Inadequate infrastructure remains a major barrier to effective healthcare delivery. The government can support private hospitals by:

- **Improving accessibility:** Developing road networks and transportation services to connect hospitals with remote communities.
- **Reliable utilities:** Ensuring stable electricity, water, and internet services for healthcare facilities including private hospitals.
- **Health zones:** Establishing health clusters where public and private facilities share resources and infrastructure.

**Example:** The Ethiopian government's investment in rural healthcare infrastructure has significantly increased private sector involvement in the health system.[6]

**5. Strengthening public awareness and advocacy**

Collaboration between the government and private hospitals can improve public health outcomes through:

- **Health campaigns:** Jointly promoting awareness about maternal health, immunization, and disease prevention.
- **Community outreach:** Partnering on outreach programmes to provide mobile health services in underserved areas.

**6. Monitoring and accountability**

Effective oversight ensures that private hospitals adhere to high standards of care and ethical practices. The government can implement:

- **Audits:** Regular inspections of both public and private hospitals to monitor compliance with regulations.
- **Feedback mechanisms:** Establishing platforms for patient feedback to improve service delivery.
- **Performance indicators:** Using key metrics to evaluate the impact of private hospitals on public health outcomes.

## Case study: Public-Private Partnership in South Sudan

Dreams Medical Complex in Sherikat, along the Juba-Nimule highway, and St. Kizito Medical Center in Munuki adjacent to St. Kizito Parish demonstrate the potential of Public- Private Partnership in South Sudan. Both facilities provide a free expanded programme on immunization (EPI) services to both mothers and children through support from the State Ministry of Health of Central Equatoria. While both facilities provide free services to the clients, the state ministry of health provides them the needed EPI supplies, filling critical gaps in the public health services. With government support to more private hospitals in South Sudan, such collaboration could improve EPI services coverage across the country.

## Conclusion

The government of South Sudan has a crucial role in advancing private hospitals to enhance healthcare delivery. By implementing supportive policies, providing financial incentives, investing in infrastructure, and fostering collaboration through public-private partnerships, the government can create a sustainable and equitable healthcare system. Strengthening the private healthcare sector is not just a policy choice but a necessity to address the pressing health challenges facing the nation.

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# The New Male Contraceptive Shaking Up Conversations In Africa

Experts are optimistic about a new male contraceptive, especially in Africa, where family planning remains largely centered on women. The innovation, called Adam, is a water-soluble hydrogel injection effective for up to two years.

Developed by U.S.-based biotech company Contraline, the contraceptive is being hailed as a “reversible alternative” to condoms and vasectomy, which are currently the only mainstream methods available to men.

Analysts believe contraceptive use among men in Uganda, for instance, remains low, and vasectomy is often misunderstood, saying such a development could be a major shift: “A male contraceptive that is effective and reversible could finally bring men into the conversation more actively.”

https://allafrica.com/view/group/main/main/id/00093534.html?utm_campaign=daily-headlines&utm_medium=email&utm_source=newsletter&utm_content=group-view-link

## News from South Sudan

# 10th East African Health and Scientific Conference

Participants at the Conference (Credit: Office of the Vice President and Chair Service Delivery Cluster)

The conference, held in Juba from 25th to 27th June 2025 under the theme "Addressing Health Priorities and Advancing the East African Health Agenda," served as a regional platform for scientists, researchers, policymakers, and development partners to tackle pressing health challenges.

It was attended by over 300 participants from East African Community (EAC) member states and marked a significant step forward in strengthening regional health cooperation.

Her Excellency Josephine Lagu Yanga, Vice President and Chair of the Service Cluster, South Sudan emphasized the need to leverage the knowledge and discoveries from the conference. She highlighted their potential for vaccine development, enhanced disease detection, and improved supply chain management.

Vice President Yanga said the event aligned with the African Union's Agenda 2063, which aims to achieve universal healthcare across the continent; and she outlined efforts to strengthen South Sudan's health system, including training medical workers and expanding digital infrastructure, but noted that many citizens still face high healthcare costs due to limited access.

Hon. Minister Sarah Cleto Rial, Minister of Health of the Republic of South Sudan, said the event comes as the region grapples with outbreaks of Ebola and cholera and that it is crucial to share solutions to infectious diseases, maternal health, and climate-related health risks. She strongly advocated for investment in digital health innovations, strengthening outbreak detection frameworks, and boosting regional scientific research.

Hon. Minister and Chairperson of the EAC Council of Ministers, Beatrice Askul Moe, noted that the presence of numerous countries from the region at this event served as a testament to Juba's safety and its capability to host major international events. She added that Juba is ready for the world, and this conference truly showcased the spirit of regional cooperation and collective commitment to achieving global health targets.

It is planned to publish abstracts and papers from this conference in a future issue of the South Sudan Medical Journal.

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# Self-medication: A public health threat hiding in South Sudan

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Dear Editor,

Self-medication is a public health concern in South Sudan. The public see it as a health right, and the national public health regulators view it as a trivial public health issue. As such, it is a "public health threat in hiding."

Self-medication claimed 96,000 lives globally between March 2020 and March 2021.[1] Research indicates that self-treatment with medications is highly prevalent in African countries. However, I have found no documented epidemiological data about the prevalence and mortality rates of self-medication in rural and urban South Sudan. Nonetheless, my educated guess is that the figures for our country could be staggering.

Dealing with self-mediation is not a big deal as it mainly requires simple approaches including consulting with a healthcare professional, following dosage instructions, reading medication labels, avoiding mixing medications, educating oneself, considering non-pharmacological options, and being mindful of internet resources.[2]

Self-medication is the use of medicines to treat self-diagnosed diseases or symptoms.[3] It is obtaining and consuming drugs without a physician's advice, either for diagnosis, prescription, or surveillance of treatment. It is also re-submitting old prescriptions to purchase medicines in drugstores, sharing medicines with relatives or friends, or using the stored-at-home leftover medicines,[4] or continued use of out-dated medication prescribed by a physician for chronic or recurrent diseases or symptoms.[5]

Medicines must be used with care because many medicines are dangerous when used unsuitably. Most importantly, the best state of health is always medication-free. Instead, it is advisable to have healthy lifestyle by eating a good diet, taking plenty of exercise, and having good sleep.

Not every illness needs medication. For instance, the common cold or upper respiratory tract infection, does not need antibiotic treatment because it is a non-bacterial infection commonly caused by viruses or allergies. Administration of an antibiotic precipitates medical complications, prolongs the illness, and can lead to the emergence of bacterial resistance.

In my many professional encounters with patients and acquaintances, antibiotics are the most commonly self-medicated drug group. Those topping the list include amoxicillin, amoxicillin, clavulonate, azithromycin, cefixime, benzyl penicillin, and ciprofloxacin. The users invariably attribute any symptoms they experience to a bacterial infection.

Self-medication occurs for many reasons:

First, a lack of control over the sale of drugs without a prescription. A person who feels sick may go to a pharmacy or drugstore for a drug to relieve the symptoms. A drug seller, or an inexperienced pharmacy technician, often gives the drug. Prescription medications should not be dispensed without a doctor's prescription.

Second, poor drug regulation. Pharmaceutical regulations in South Sudan have numerous challenges. One is the limited resources available for regulatory authorities such as lack of budgetary funds and lack of trained personnel. The nation faces a critical shortage of qualified professionals equipped with the necessary skills and knowledge to assess drug safety and efficacy. This can lead to insufficient oversight in the distribution and use of pharmaceuticals, making it challenging to uphold regulations.[6]

Third, disagreement with a doctor's interpretation of a patient's medical condition. Before a patient repudiates a doctor's judgement, he/she is supposed to know that he/she is coming with a medical condition, not an economic or legal condition. Who is supposed to address such a problem? Without explanation, everyone can agree with me that it is a medical doctor. I suggest he/she should see another doctor if an element of mistrust exists between the two.

Fourth, avoidance of healthcare bills. This is the commonest reason why many patients self-medicate. They fear medical bills, including consultation and testing. Hence, going to the pharmacy straightaway is their shortcut to getting medical treatment.

Fifth, lack of knowledge on the adverse effects of medications. Most patients who self-medicate do not completely know the possible harmful effects of the drugs they buy. This is why it is important to seek medical advice and follow the recommendations of a medical doctor.

Inappropriate self-medication can result in serious health consequences such as:

1. A delay in diagnosis. The more a person wastes time on self-medication, the more the risk that the medical problem may get worse, and the person may show up in the hospital with complications.
2. Incorrect treatment and dosage. As the real medical problem remains unidentified, the drugs from the store may not solve it. The doses given will not relieve the problem. They may possibly fail to treat the underlying problem, exacerbate the problem, or may insidiously hamper one's health if administered in high dosages.
3. Drug toxicities. Certain overdosed drugs have a harmful impact on the body's organs. To be specific, drugs having a bad side-effects may damage the liver, kidneys, or the bone marrow. There are many chronic drug-induced diseases such as aplastic anaemia from chronic and irrational administration of chloramphenicol; drug-induced gastritis and peptic ulceration resulting from aspirin intake; and osteoporosis, resulting from the prolonged use of glucocorticoid drugs.[4]
4. Antimicrobial resistance. Irrational use of antimicrobials can result in a serious problem of antimicrobial resistance. For example, typhoid fever, which in earlier days was easily treated with short courses of chloramphenicol, ampicillin, and cotrimoxazole. Currently, with the misuse of these antibiotics, typhoid bacillus has developed resistance, making such antibiotics ineffective against typhoid fever.[4]

However, *appropriate* self-medication has many potential benefits including increased access to effective treatment, and a reduction in the number of visits to physicians, which alleviates pressure on healthcare services, and reduces costs to third-party payers, such as government or insurance companies.[7]

To prevent inappropriate self-medication, I strongly recommend the avoidance of self-medication of prescription drugs; implementation of strict government-led pharmaceutical regulations in markets; improvement of pharmacies' responses to patients demanding drugs without a doctor's prescription note; and patient education on the rational use of medicines.

As a final point, self-medication is a public health problem in hiding in South Sudan. It is our collective responsibility to champion prevention of inappropriate self-medication by changing people's perception about drugs through health education and increased consultation with medical practitioners when one is sick.

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# Dr Abdu Mohammed Abdudrbo Gilo

## 01 January 1983 – 2 April 2025

Dr Abdu Mohammed Abdudrbo Gilo was born in 1983 to Mohammed Abdudrbo Gilo and Gian Nyort Mormoti in Pochalla, within the Greater Pibor Administrative Area (GPAA), South Sudan.

He began his early education in 1993 at White Nile Primary School. He later attended Abu Said Secondary School in Sudan and completed his secondary education at Supiri Secondary School in Juba, South Sudan, between 2000 and 2005. Driven by a deep desire to serve his community through medicine, Dr Abdu pursued medical studies at Upper Nile University's College of Medicine (2006–2011) and completed his Bachelor of Medicine and Surgery (MB,BS) degree at Bahri University in Khartoum, Sudan, in 2015.

Throughout his career, Dr Abdu served in several key healthcare roles. He worked with Médecins Sans Frontières (MSF) Belgium from 2018 to 2020, and with JAM International from 2012 to 2022. His leadership qualities earned him appointments as County Health Department Head in GPAA (2022–2023) and later as Director General of the State Ministry of Health (2022–2023).

Dr Abdu was known for his exceptional work ethic, strong sense of duty, and genuine compassion for those he served. He built positive relationships with people of all ages and backgrounds, often acting as a bridge between communities. Colleagues admired his humility, collaborative spirit, and willingness to listen. He believed in teamwork and inspired others through his calm demeanor, patience, and optimism even in challenging circumstances.

Beyond medicine, he was passionate about sports — especially football — and was a talented player himself. He also enjoyed reading and was always ready to offer help to those in need.

Dr Abdu passed away on 2 April 2025. He is survived by his beloved wife and two children. He will be deeply missed.

# Dr Baba Allan Ngachigoi Lanyanga

## 01 January 1983 - 22 May 2025

Dr Baba was born on 1st January 1983 in Pibor, in the Greater Pibor Administrative Area (GPAA), South Sudan, to Allan Ngachigoi Lanyanga and Sira Monotho. He began his early education at Abu Baker Primary School in Khartoum, Sudan, and continued at Sheikh Lotfi Boys High School in Rufa, Sudan. A dedicated and ambitious student, Dr Baba pursued higher education in medicine and graduated from the College of Medicine at Upper Nile University in 2009.

In 2010, he joined the South Sudan Medical Corps, where he completed his training and graduated in 2011 with the rank of captain. Between 2011 and 2013, Dr Baba worked in various private hospitals, where he earned a reputation as a compassionate and committed physician. From 2015 until his passing in 2025, he served at Pibor Hospital, providing essential medical services to his community with unwavering dedication.

Dr Baba was known for his calm demeanor, integrity, and tireless work ethic. He approached every task — no matter how challenging — with a sense of responsibility and care. He often worked long hours in resource-limited settings without complaint, and was always the first to respond during medical emergencies. He took personal ownership of his patients' outcomes, often following up on cases long after his official duties had ended. He was meticulous in his approach, valuing precision and thoroughness, and consistently encouraged his peers to uphold high standards of medical ethics and practice.

Beyond his technical abilities, Dr Baba excelled in building trust with patients and colleagues alike. His humility, reliability, and willingness to listen made him both a beloved caregiver and a respected team member. He also mentored junior staff, sharing knowledge generously and instilling confidence in others.

Dr Baba passed away at Juba Military Hospital on 22 May 2025. He is deeply mourned by his family, friends, and the broader community. He is survived by his beloved wife and five children — three daughters and two sons — who carry forward his legacy of service, compassion, and resilience.

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