

BMJ Open Estimating the met need for emergency obstetric care (EmOC) services in three payams of Torit County, South Sudan: a facility-based, retrospective cross-sectional study

Pontius Bayo,^{1,2} Imose Itua,³ Suzie Paul Francis,² Kofi Boateng,⁴ Elijo Omoro Tahir,⁵ Abdulmumini Usman⁶

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¹Department of Obstetrics and Gynecology, St Mary's Hospital Lacor, Gulu, Uganda

²Department of Maternal and Child Health, WHO, Juba, South Sudan

³School of Public Health, University of Liverpool, Liverpool, UK

⁴EPI Department, WHO, Juba, South Sudan

⁵Department of Pharmaceuticals, Torit State Hospital, Torit, South Sudan

⁶Department of Administration, WHO, Juba, South Sudan

Correspondence to

Dr Pontius Bayo;
pontiusby@gmail.com

ABSTRACT

Objective To determine the met need for emergency obstetric care (EmOC) services in three Payams of Torit County, South Sudan in 2015 and to determine the frequency of each major obstetric complication.

Design This was a retrospective cross-sectional study.

Setting Four primary healthcare centres (PHCCs) and one state hospital in three payams (administrative areas that form a county) in Torit County, South Sudan.

Participants All admissions in the obstetrics and gynaecology wards (a total of 2466 patient admission files) in 2015 in all the facilities designated to conduct deliveries in the study area were reviewed to identify obstetric complications.

Primary and secondary outcome measures The primary outcome was met need for EmOC, which was defined as the proportion of all women with direct major obstetric complications in 2015 treated in health facilities providing EmOC services. The frequency of each complication and the interventions for treatment were the secondary outcomes.

Results Two hundred and fifty four major obstetric complications were admitted in 2015 out of 390 expected from 2602 pregnancies, representing 65.13% met need. The met need was highest (88%) for Nyong Payam, an urban area, compared with the other two rural payams, and 98.8% of the complications were treated from the hospital, while no complications were treated from three PHCCs. The most common obstetric complications were abortions (45.7%), prolonged obstructed labour (23.2%) and haemorrhage (16.5%). Evacuation of the uterus for retained products (42.5%), caesarean sections (32.7%) and administration of oxytocin for treatment of postpartum haemorrhage (13.3%) were the most common interventions.

Conclusion The met need for EmOC in Torit County is low, with 35% of women with major obstetric complications not accessing care, and there is disparity with Nyong Payam having a higher met need. We suggest more support supervision to the PHCCs to increase access for the rural population.

INTRODUCTION

Timely access to quality emergency obstetric care (EmOC) services by women who develop

Strengths and limitations of this study

- In this study, we reviewed all records of admissions in 2015 in obstetrics and gynaecology wards of all emergency obstetric care (EmOC) health facilities in three payams of Torit County, South Sudan, to identify women treated for major direct obstetric complications in that year, and estimated the met need for EmOC for the first time in a setting that has suffered several decades of civil conflict.
- The study offered an opportunity to examine the health system performance in delivering EmOC services, which is of public health interest as it strikes the balance between demand for and access to these services.
- The tool used in this study to review the cases of obstetric complications was pretested in a pilot study.
- There were limitations in this study; for example, the estimated population used to calculate the met EmOC need was a projection from the 2008 census, with an assumption that there were no significant population movements. We also assumed the national crude birth rate to estimate the expected number of births in the study setting.
- The obstetric complications were identified retrospectively, limiting the researchers to what was indicated in the records without a chance to probe or validate information.

major direct obstetric complications can avert most maternal deaths.¹ These complications include haemorrhage (which can occur during antepartum, intrapartum or postpartum periods), prolonged obstructed labour, abortion complications, postpartum sepsis, severe pre-eclampsia/eclampsia, ruptured uterus and ectopic pregnancy.² The proportion of all women with major direct obstetric complications in a given population treated in EmOC facilities in a defined time

period refers to the met need for EmOC for that population.³ The target is to have 100% of women with these complications treated in EmOC facilities.⁴

EmOC facilities are of two types: basic and comprehensive.³ A health facility is identified as a basic EmOC facility if it provides the following EmOC services: administration of parenteral antibiotics for treating sepsis, administration of parenteral oxytocin for treatment of postpartum haemorrhage, administration of parenteral anticonvulsants for treatment of severe pre-eclampsia and eclampsia, assisted vaginal delivery, manual removal of the placenta, removal of retained products of conception, and newborn resuscitation. A facility is identified as a comprehensive EmOC facility if it provides all the basic functions above, plus blood transfusion and caesarean section and/or laparotomy.³ This identification of facilities is important to define a clear continuum of care from primary health-care centres to the secondary care facilities as this relates to the availability of medical commodities and staff with skills to manage the complications.

South Sudan has been in civil war for more than two decades,⁵ which has destroyed social community structures and health infrastructure.⁶ With 81% of mothers delivering at their homes and only 10% of deliveries occurring under the care of skilled personnel,⁷ access to EmOC services is poor in South Sudan. As in other low-income/middle-income countries, this access is not only poor but also inequitable, favouring those women in better social class.^{8–10} Women living in urban areas are twice more likely to receive any form of skilled assistance at delivery compared with those living in rural areas. Women who are formally educated to at least secondary level are five times more likely to receive this assistance compared with their counterparts with no formal education, while the richest ones have four times more chance than the poorest in the wealth index.¹¹ This polarised access to maternal health services is worrying as most of the population is disadvantaged, with 51% living below the national poverty line (\$1 per day); 83% of the population is rural, and 73% of men and 84% of women are illiterate.¹¹ Health information management systems are currently under development and are not able to launch an effective monitoring and evaluation processes for maternal health indicators.⁶ Although it has been stated that at least 50% of the population in Torit County live within 5 km of a public health facility and at least 50% of the population are within 1-hour walking time to the nearest public health facility,¹² it is not clear whether the people who really need the healthcare services are accessing it. As such, evidence about met need for EmOC, nature of obstetric complications and associated interventions in Torit County is lacking, hence affecting priority strategies for improving maternal and neonatal outcomes.

This study aimed to estimate the met need for EmOC services in three payams of Torit County and to disaggregate it by geographical location to help guide interventions by development partners who are currently

implementing health services in the area under Health Pool Fund (HPF) to improve maternal health.¹³

METHODS

Study design

We conducted a retrospective cross-sectional study of women who had been treated for major direct obstetric complications from five EmOC facilities in three payams of Torit County in 2015.

Study setting

This study was conducted in health facilities located in three payams of Torit County in the former Eastern Equatoria state, Republic of South Sudan—Kudo, Nyong and Himodonge—with a total projected population of 72 071 in 2015.¹⁴ Payams in South Sudan are administrative areas that constitute a county, which in turn constitutes a state. Nyong Payam (also called Torit Payam) in which the state capital, Torit, is located was the most populated with 47 253 inhabitants, while Kudo Payam had 13 461 and Himodonge Payam had 11 357.

The public healthcare system in South Sudan is structured into five levels: the primary healthcare units (PHCUs), the primary healthcare centres (PHCCs), the county hospitals (CHs), the state hospitals (SHs) and the teaching hospitals (THs).¹² PHCUs are the lowest level facilities that provide preventive, promotional and curative services aimed to serve a population of 15 000 people, while PHCCs act as immediate referral points for the PHCUs and aimed to serve a population of 50 000 people with all the services offered in a PHCU, plus diagnostic laboratory, and maternity and inpatient care services. The CHs meant to serve 300 000 people and SHs to serve 500 000 people, act as secondary care units while the THs provide tertiary care.

There are a total of 11 public health facilities in the study area, including one SH located in Nyong Payam, which acts as a referral centre. Out of the 11 health facilities, only 5 including Torit State Hospital (TSH) can conduct deliveries and are designated as EmOC facilities; four are basic EmOC facilities, each with six-bed capacity, and one hospital, which is a comprehensive EmOC facility with 22-bed capacity dedicated to obstetric cases. Health service delivery in these facilities is supported by implementing partners under the HPF grant: Save the Children International for the PHCCs and Catholic Organization for Relief and Development Aid for TSH. These partners recruit the necessary human resource and provide the medical supplies, while the government does supportive supervision. The other six public facilities are PHCUs, and together with the private facilities composed mainly of small clinics and drug shops neither conduct deliveries nor admit patients with major direct obstetric complications.

Study population

All women admitted with major direct obstetric complications in any of the five facilities in the study area between

1 January and 31 December 2015 were included in this study. The admission records of women who were not residents in the study areas were excluded as they were assumed to represent a demand for EmOC services from elsewhere.

Sampling

The population projection for 2015 in this study area was calculated from the 2008 census to be 72 071. Assuming the same crude birth rate for South Sudan of 36.1/1000 population,¹⁵ a total of 2602 births were expected in 2015. According to the WHO, an estimated 15% (390) of these were expected to get major obstetric complications.³ Using OpenEpi V.3 for sample size calculation for the proportion who get EmOC services from the facilities and assuming a population size (for finite population correction factor) of 390, a met need of 38.3%±5 for the population is hypothesised, assuming the results of an assessment in Yirol County, Lakes State of South Sudan,¹⁶ and design effect (for cluster surveys)=1; allowing 10% for missing data, a sample size of 208 was enough for a 95% confidence level.

Data collection

All the admission records in the obstetrics and gynaecology wards of the health facilities between 1 January and 31 December 2015 were reviewed by one of the researchers (PB) to identify cases of major direct obstetric complications, the interventions used for treatment and the outcomes of treatment. All records had been kept in paper form and written in English. The information collected included the date of admission, and demographic data such as age, parity, ethnic group and the payam of residence. The direct obstetric complications for which the patient was admitted were recorded, and according to WHO these complications include haemorrhage, prolonged or obstructed labour, abortion complications, postpartum sepsis, pre-eclampsia/eclampsia, ruptured uterus and ectopic pregnancy.³ Information was also collected about the pregnancy outcomes at the end of the admission, which included spontaneous vaginal delivery, instrumental vaginal delivery, caesarean section, complete abortion, evacuation of the uterus for retained products of conception, laparotomy for ruptured uterus, laparotomy for ectopic pregnancy, and/or if the woman died or was discharged or escaped from the facility while still pregnant. Maternal and neonatal outcomes during the admission were noted: whether dead or alive, and for the alive neonates whether they required resuscitation at birth. Information was further collected about the other interventions for other obstetric complications, such as administration of parenteral oxytocin, repair of genital tract tears and hysterectomy for postpartum haemorrhage, administration of magnesium sulfate for severe pre-eclampsia and/or eclampsia, administration of parenteral antibiotics for puerperal sepsis, manual removal of the placenta, and blood transfusion for severe haemorrhage.

Main outcome measures of study

The primary outcome in this study was the met need for EmOC, which was defined as the proportion of all women with major direct obstetric complications in the population treated in the health facilities between 1 January and 31 December 2015. The frequency of each complication and the appropriate interventions to treat them are reported as secondary outcomes.

Statistical analysis

Data were checked, coded, entered and analysed using SPSS V.21. Frequency tables were used to present descriptive statistics such as the number of direct obstetric complications admitted from each payam and treated in each facility, the interventions used for treating the complications, pregnancy outcomes after the admission, as well as maternal and fetal outcomes of the complication.

The crude birth rate for the population was used to calculate the expected number of deliveries in a year; 15% of these were assumed to have gotten major obstetric complications.³ The proportion of the complications treated in the facilities was calculated to represent the met need for EmOC services, and the 95% CIs were calculated using the formula for single population proportions.¹⁷ The age and parity differences among patients admitted with major obstetric complications from the three payams were compared using analysis of variance (ANOVA). The corresponding CIs and P values were presented in a table format. All significance levels were set at $P \leq 0.05$.

Ethical issues

A waiver of consent for the medical record reviews was obtained. Written consent was obtained from the facility in-charge to review the facility records after giving them written information about the study.

Each complicated case reviewed was assigned a unique study number. The data collected from questionnaires were stored under lock and key, and were entered into SPSS in a computer that was password-protected and only accessed by the researchers.

RESULTS

A total of 2466 patient admissions were reviewed in all the facilities; 352 of these admissions were for major obstetric complications. Ninety of the patients admitted with major obstetric complications in TSH were not residents of the study areas, while information on residency was lacking for eight patients; these were excluded from the final analysis. A total of 254 admissions for major obstetric complications were therefore included in the analysis to determine the met need for EmOC in the study area. This was slightly more than the calculated sample size of 208 participants. It is important to note that several patients had more than one complication for which they received different interventions. However, only the primary complication was recorded for each of these patients,

while all the interventions were taken note of. Therefore, the number of interventions was not equal to 254.

Descriptive information of participants included in the analysis

Table 1 shows the descriptive information for the cases of major obstetric complications from Kudo, Nyong and Himodonge payams treated in the facilities within these areas. The mean age of women admitted with major obstetric complications was 24.8 ± 6.68 years and ranged between 15 and 43 years. The mean parity was 2.6 ± 2.56 and ranged from 0 to 10; the median parity was 2. Most of the cases were from Nyong Payam (227, 89.4%); only 15 (5.9%) were from Himodonge Payam, while 12 (4.7%) were from Kudo Payam.

The most common obstetric complication leading to admission was complicated abortions (45.7%), followed by prolonged obstructed labour (23.2%) and haemorrhage (16.5%). Evacuation of the uterus for retained products (42.5%), caesarean sections (32.7%) and administration of oxytocin for treatment of postpartum haemorrhage (13.3%) were the most common interventions for treating the complications.

The met EmOC need for the three payams in Torit County

Table 2 shows the met need for EmOC services in the three payams. Out of the 390 major obstetric complications expected in 2015 from the three payams (including 61 from Himodonge Payam, 73 from Kudo Payam and 256 from Nyong Payam), 254 cases were admitted and treated, giving a met EmOC need of 65.13% (95% CI 60.40 to 69.86) for the whole population in the three payams.

The met EmOC need was highest for the population residing in Nyong Payam (88.67%; 95% CI 85.01 to 92.33), while it was only 24.59% (95% CI 13.78 to 35.40) and 16.44% (95% CI 7.94 to 24.94) for the populations of Himodonge and Kudo Payams, respectively.

Comparison of the characteristics of patients with major direct obstetric complications by the payam of residence

There was no statistical difference in the mean age of the patients admitted from the three payams, with the 95% CIs for mean overlapping among the three groups using one-way ANOVA ($P=0.818$) (see table 3). The same test applied on the mean parity also showed no significant difference among the three groups, with the 95% CIs for mean overlapping as well ($P=0.165$).

In summary, the results indicated a met EmOC service need of 65.13% for the population in the three payams in Torit County. The met need for the population in Nyong Payam was significantly higher than the population in the other two payams.

DISCUSSION

In this study, the proportion of women with major obstetric complications in three payams in Torit County in 2015 who

were treated in the health facilities in the study area was calculated as the met EmOC need based on the United Nations guidelines for process indicators for EmOC.³ The study revealed a 65.13% met need for EmOC in the three payams; Nyong Payam had the highest met need of 88.67%, while Kudo and Himodonge had only 16.44% and 24.59%, respectively. It means that about 35% of women with obstetric complications who needed emergency care in these settings did not access it, and this figure was high in Kudo (83.56%) and Himodonge (75.41%) payams.

Our findings indicate a high met need for EmOC in Torit compared with what has been reported previously in other parts of South Sudan. In 2005, Pearson and Shoo reported a 2.1% met need for EmOC in Yambio and 5% in Rumbek.¹⁸ However, this study was more than a decade ago, when South Sudan had not signed the Comprehensive Peace Agreement with Sudan.¹⁹ At that time and as reported by the authors, the coverage of EmOC facilities was very low: less than one comprehensive EmOC centre per 500 000 people and no basic EmOC centre in Yambio, and only 0.5 per 500 000 people in Rumbek. Such a low met need for EmOC was therefore expected. Another study conducted in 2012 in Yirol County just a year after South Sudan got independence showed a much higher met need for EmOC (38.3%). However, this study was an intervention study where an active hospital ambulance system was implemented.¹⁶ Our study was conducted at a time when several humanitarian partners are in the country to support the health system. Perhaps the higher met need for EmOC in this study is a result of these efforts,²⁰ but the low figures for the two rural payams (Kudo and Himodonge) still raise concerns. The met need for EmOC obtained here for Nyong Payam is similar to what was reported for Malindi District in neighbouring Kenya, although that study only concentrated on comprehensive EmOC facilities and included only complications that required major surgical interventions.²¹

This current study was not designed to assess the various factors that may affect the met need for EmOC,^{22 23} but it has brought to light important facts that should draw the attention of the state government and its partners working in Torit County. First, most cases of obstetric complications in this study were from one particular payam (Nyong Payam; 89.4%), and the met need was therefore highest in this payam (88.13%). Torit town, the state capital, is located in Nyong Payam, and the only hospital in this study area is also located in this payam, and by the standards in this state Nyong Payam is considered to be an urban area. With a population more than that of the other two payams combined, perhaps it was not surprising that most of the obstetric complications were from Nyong Payam and were treated from TSH. These findings are similar to those shown in a study from Uganda, where maternal healthcare service utilisation was greater among the residents of the capital city of Kampala and reduced significantly among women living in the rural areas.²⁴ There is evidence elsewhere indicating a direct link between wealth and utilisation of obstetric services. For example, a multicountry

Table 1 Frequency table for descriptive information on the participants to measure the met EmOC needs in three payams in Torit County

Factors	n (%)	95% CI
Age (years)		
≤20	87 (34.3)	29.6 to 41.3
21–30	120 (47.2)	42.1 to 55.1
>30	40 (15.7)	11.7 to 21.1
Missing	7 (2.8)	
Mean age	24.8 (SD=6.68)	
Range	15–43	
Parity		
0–1	107 (42.1)	37.1 to 49.6
2–5	98 (38.6)	33.9 to 46.0
>5	43 (16.9)	12.9 to 22.2
Missing	6 (2.4)	
Mean	2.6 (SD=2.56)	
Range	0–10	
	n (%)	
Payam of residence		
Nyong	227 (89.4)	85 to 92.9
Himodonge	15 (5.9)	3.1 to 9.1
Kudo	12 (4.7)	2.4 to 7.5
Admissions per facility		
Torit State Hospital	251 (98.8)	97.1 to 100
Himodonge PHCC	3 (1.2)	0.0 to 2.9
Kudo PHCC	0 (0)	
Nyong PHCC	0 (0)	
Lowoi PHCC	0 (0)	
Complication for which the patient was admitted		
Haemorrhage	42 (16.5)	12.4 to 22.0
Pre-eclampsia/eclampsia	4 (1.6)	0.4 to 3.7
Sepsis	8 (3.1)	0.8 to 4.6
Prolonged or obstructed labour	59 (23.2)	17.4 to 28.2
Ruptured uterus	3 (1.2)	0.0 to 2.9
Ectopic pregnancy	3 (1.2)	0.0 to 2.9
Complicated abortion	116 (45.7)	37.8 to 51.5
Others	19 (7.6)	2.9 to 8.7
Interventions for treatment of the complications (n=254)		
Caesarean section	83 (32.7)	
Evacuation of uterus for retained products of conception	108 (42.5)	
Laparotomy for ectopic pregnancy	2 (0.8)	
Laparotomy for ruptured uterus plus hysterectomy	3 (1.2)	
Manual removal of the placenta	8 (3.1)	

Continued

Table 1 Continued

Factors	n (%)	95% CI
Oxytocin for treatment of PPH	34 (13.4)	
Misoprostol for treatment of PPH	10 (3.9)	
Genital tract repairs for tears	6 (2.4)	
Magnesium sulfate	4 (1.6)	
Blood transfusion	15 (5.9)	
Parenteral antibiotics for sepsis	17 (6.7)	
Maternal outcomes of the complications		
Alive	251 (98.8)	98.4 to 100
Dead	1 (0.4)	0.0 to 1.6
Referred to a higher centre	2 (0.8)	
Fetal outcomes		
Live births	112 (44.1)	38.2 to 51.5
Stillbirths	17 (6.7)	4.1 to 10.4
Abortions	119 (46.9)	39.0 to 52.3
Unknown	6 (2.4)	0.8 to 4.6
If the live newborn was resuscitated (n=112)		
Yes	50 (44.6)	35.43 to 53.85
No	55 (49.1)	39.85 to 58.37
Unknown	7 (6.3)	1.77 to 10.73

EmOC, emergency obstetric care; PHCC, primary healthcare centre; PPH, postpartum haemorrhage.

cross-sectional study to determine the coverage, access and quality of EmOC services in Sub-Saharan Africa showed that both hospitals and health centres were used more by the women in the highest wealth quintile than the poorest women.⁸ In that study, 83% of women who had received EmOC services in Ethiopia were among the rich; this figure was 87% in Uganda and 77% in Tanzania.⁸ A population living in urban area is likely to be more educated and wealthier than that living in the rural areas. This current study shows a clear inequity between the different payams in terms of met obstetric need, with Nyong Payam being the better of the three payams, which obviously requires further examination to assess the differences in socio-economic status of the populations in these payams.

Second, there were very limited numbers of complications treated from the facilities located in the rural payams in this study. Apart from TSH, only Hileu PHCC admitted and treated three other cases, while the rest of the other three facilities did not treat any obstetric complication in 2015. These facilities did not refer any patients to a higher centre either. Perhaps because of the short distance between Nyong PHCC and TSH, women from Nyong Payam might have preferred to seek care from the hospital directly. Some authors have criticised WHO's method of identifying EmOC facilities based on the signal functions offered in

Table 2 Calculation of the met EmOC need for three payams in Torit County

Payam of residence	Population in 2015	Total births expected in 2015 using a crude birth rate of 36.1/1000 population	Expected obstetric complication (15% of expected births)	Obstetric complications actually treated in the facilities	Proportion of obstetric complications treated in the facilities (met need) (%)
Himodonge	13461	410	61	15	24.59
Kudo	11357	486	73	12	16.44
Nyong	47253	1706	256	227	88.67
Total	72071	2602	390	254	65.13

EmOC, emergency obstetric care.

the previous 3 months before an assessment, and advocated for extension of this period to 6 months to give chance to pick up those facilities with the capacity to provide these signal functions but have low case load.^{21 25 26} However, in this current study, facility records for a whole year were reviewed. The fact that no complications were treated in these facilities during this period requires a critical examination beyond a purported 'no indication' explanation. Perhaps this raises issues of access, but the quality of EmOC services and/or the capacity to offer one in the PHCCs in these areas have to be critically evaluated. Other than blood transfusion and caesarean section services, almost all the other signal functions of EmOC need to be available in the PHCCs. In qualitative studies in other parts of South Sudan and in rural Gambia, women reported reluctance to access healthcare because of unfavourable previous experience with the healthcare system, such as inconsistent availability of services, poor understanding of how the system operates and sometimes poor attitudes of the healthcare providers.²⁷⁻²⁹ Considering the lack of midwives and doctors in most facilities in South Sudan especially the PHCCs in rural areas, there are doubts about the real availability of the skills required to offer these signal functions for EmOC in the PHCCs in this study, and the community would be justified not to seek care from these facilities.³⁰ The undesirable impact of inequitable distribution of midwives among the facilities located in the rural areas on maternal and

neonatal health has been discussed in previous cross-sectional studies in similar countries.³¹⁻³³

In this study, several data sources were used during the facility record reviews for obstetric complications admitted in the facilities. All the medical records for patients admitted in the obstetrics and gynaecology units of the facilities in 2015 were reviewed carefully to ensure all cases of obstetric complications were identified. Any missing information was cross-checked in the registries on the wards and in the operating room. This has ensured the reliability of the data presented in this study. The analysis technique used here is also a standard method advised by WHO for monitoring the progress in EmOC services in a community.³ Since all admissions were reviewed and all major obstetric complications were included in the final analysis, this study had a heterogeneous population sample of participants, minimising selection bias and further increasing the external validity of the results.

However, there were limitations in this study. First the estimated population used to calculate the met need is a projection from the 2008 census, with an assumption that there were no significant population movements. However, South Sudan has been a war zone, with the most recent conflict that started in December 2013 displacing over 200 000 people internally and more than 40 000 into the neighbouring countries.³⁴ It is likely that some residents of these areas may have left out of fear and presented their

Table 3 Comparison of the characteristics of patients with major direct obstetric complications treated by payam of residence

	Nyong	Himodonge	Kudo	P value
Age (years)				
≤20	79	4	4	
21-30	108	5	7	
>30	33	6	7	0.125
Mean	24.65±6.61	27.23±7.24	24.08±6.19	0.818
Parity				
Primipara	95	5	7	
2-5	89	6	3	
>5	39	2	2	0.818
Mean	2.50±2.43	3.46±3.20	2.67±3.23	0.165

EmOC needs in another location, or some populations may have moved into this study area from the conflict areas. There was an attempt, however, to critically review several data sources in this study so as to identify and exclude cases from other locations. Further still, the crude birth rate used in estimating the expected births in this study is for the entire country, which may be different for the local population in the study setting. A second limitation was the retrospective nature in which the cases were identified as this only limited the researchers to what was indicated in the records without a chance to probe or validate information. This could have also affected the number of cases, especially if some cases were not recorded or records were lost, thus affecting the reliability of the data. The lack of a qualitative arm in this study was another limitation as this would have provided insights into the socioeconomic dimensions to access of healthcare services and community perceptions on poor utilisation of the services in the facilities, which seem to be available. However, the glaring gaps in the healthcare system have been clearly demonstrated in this study.

CONCLUSION

The key issues raised by this study are that there is low met need for EmOC services in Torit County, and that the met need is much lower for the populations living in the rural payams. Most major obstetric complications were admitted and treated only in TSH with no significant contribution of the PHCCs. The government partners working in these areas, therefore, need to earmark the seven signal functions of EmOC for regular monitoring and evaluation to assess the performance and utilisation of EmOC services in PHCCs in Torit. This will offer an opportunity to identify gaps in the healthcare system and to intervene appropriately to address inequities that may exist in the distribution of EmOC services.

This study also set a basis for a more robust prospective study involving a larger setting that should examine all the seven process indicators for EmOC and perhaps establish why there is a very high abortion rate. It also establishes the need for a qualitative study to explore perceptions that might explain the low met need for EmOC.

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