

Care Behavior, Impact and Acceptability of Focused scope, Structured Point of care obstetric ultrasound (SPOUS) provided at facility of practice in Selected Rural Primary care setups in Ethiopia

Tadele Dana Darebo^{*1}, Berhanetsehay Teklewold¹, Ishmael Shemsedin¹, Ermias Abate¹, Zekarias Seife¹, Bethelihem Abegaz¹, Amanuel Girum¹, Hayat Abdi¹, Merry Miressa¹, and Dr. Abayneh Kedir¹ and Dr. Bontu Abera¹ are part of this working group.
¹Healthcare System Impact Syndicate Africa, Addis Ababa, Ethiopia

INTRODUCTION

- Research indicates that women in low-resource settings and rural regions, where higher maternal and fetal mortality rates are prevalent, often do not receive this essential care (1, 2)
- Despite recent reductions in the cost of ultrasound machines, patients often travel long distances to receive basic ultrasound scanning (3)
- Point-of-care ultrasound (POCUS), addresses these challenges by putting portable, inexpensive, and user-friendly ultrasound equipment directly in the hands of healthcare providers (4, 5)
- A significant challenge in implementing POCUS is developing the necessary ultrasound skills among providers (5)
- There is no definitive evidence that pinpointed the minimum training time required for POCUS, however, it is recommended for midlevel healthcare providers should ideally use a longitudinal approach with direct coaching from one to five weeks (3, 6)
- This paper describes the implementation of a structured point-of-care ultrasound (SPOUS) training program for antenatal health providers in primary healthcare settings in rural Ethiopia
- SPOUS is a competency-based, limited-scope ultrasound training program designed for general practitioners and midwives. It includes one week of intensive training with demonstrations, teach-back, and guided iterative practice, followed by five weeks of workplace coaching by a certified obstetrician and gynecologist. This coaching occurs at the trainee's health institution to ensure service initiation and contextual fidelity.
- The SPOUS was implemented in three regions of Ethiopia: Amhara, Oromia, and Afar.
- We measured the outcomes using the Kirkpatrick model, a recognized tool for evaluating training programs (7)

METHODS

Study Settings

The study was conducted in three regions of Ethiopia: Amhara, Oromia, and Afar

SPOUS Protocol Development

- To develop the SPOUS course, we reviewed literature on protocol structure, delivery methodology, course duration, assessment, sustainability of quality service, and the safety of task-shifting ultrasound skills to mid-level SRH professionals.
- Following the desk review, a development team comprising eight obstetricians, one feto-maternal specialist, and three health system experts brainstormed virtually to create the course modules.
- The design of the course material was guided by the following principles:
 - Safety First
 - Clinical Relevance
 - Referral and Communication
 - Scope
 - Delivery Methodology

SPOUS Implementation/Training

The training integrated:

- A focused scope with structured intensive skill transfer over five days.
- A continuation phase of five weeks in primary healthcare settings, including skills practice and SPOUS system management.
- An additional three months of in-house support to reinforce skill penetration and allow those needing more time to achieve competency milestones.

Data Collection and Analysis

- Data collection occurred in three stages, using a pragmatic approach to measure different levels of training outcomes.
- We collected data based on Kirkpatrick's Four-Level Training Evaluation Model to analyze reaction, learning, behavior, and results of the SPOUS training during
- For level one and level two assessment, all participants were included. However, to measure level 3 and level four, we took a sufficient representative sample of facilities
- Outcome Measures** were as follows
 - Level 1 - Reaction:** a 20-item questionnaire using the five-point Likert scale immediately after the training
 - Level 2 - Learning:** measured twice. 1. at the end of the five-day intensive training and a second time after five weeks of onsite hands-on training; using a modified Objective Structured Assessment of Ultrasound (OSAUS) scale. The assessment categorized trainees into three milestone levels (M-1 showing fail; M-2: More coaching Required; and M-3: Pass) based on 8 pre-set criteria. If a trainee is rated as M-1 on more than four parameters, or on two of the first four key parameters, they must repeat the entire course. Otherwise, additional coaching and reexamination opportunities are provided.
 - Levels 3 - Behavior:** practical application of competencies were measures; number of SPOUS scans conducted
 - Level 4 - Results:** we measured facility level maternal service utilization; specifically, changed in referral for ultrasound, number of ANC visits, and changes in total delivery, using run charts

RESULTS

Level-1 Participant's Reactions

- On the 5-point Likert scale, 5 indicating the highest satisfaction, the mean satisfaction score immediately after the training was 4.77 ± 0.1
- Participants were especially satisfied when asked about their motivation to apply the knowledge and skills gained through the SPOUS training in practical settings, with a mean score of 4.96.
- compared to other parameters, trainees were less satisfied with the time allocated for the overall training and the balance of instruction and interactive learning, which received mean scores of 4.56 and 4.6, respectively

Level-2 Learning Milestones

- Learning milestone assessment was measured twice using the modified OSAUS competency milestone scale
- During the initial intensive training period, 27 out of 70 students (38.6%) successfully reached M-3
- Recognizing the need for additional practice, the students then underwent five weeks of onsite SPOUS training. After this extended practice, 52 out of the 70 students (74%) achieved M-3 milestones.
- Students who did not initially achieve the milestone, 18 (25.7%) entered a two-week supervision program, 12 of which reached M-3 competency after additional support.
- Six students (8.6%) remained unable to achieve the required milestone for graduating

Level-3 Behavior

- Within six months post-training, a total of 9,341 SPOUS scans were conducted across nine rural facilities. (Fig. A)
- These scans identified 24 cases of anencephaly and 9 cases of placenta previa.
- Emergency SPOUS practice detected 9 cases of ectopic pregnancy and 214 cases of retained products of conception.
- Additionally, non-reassuring fetal heart rates were identified in 194 cases, and 481 malpresentations were detected, leading to further care for these pregnant mothers.

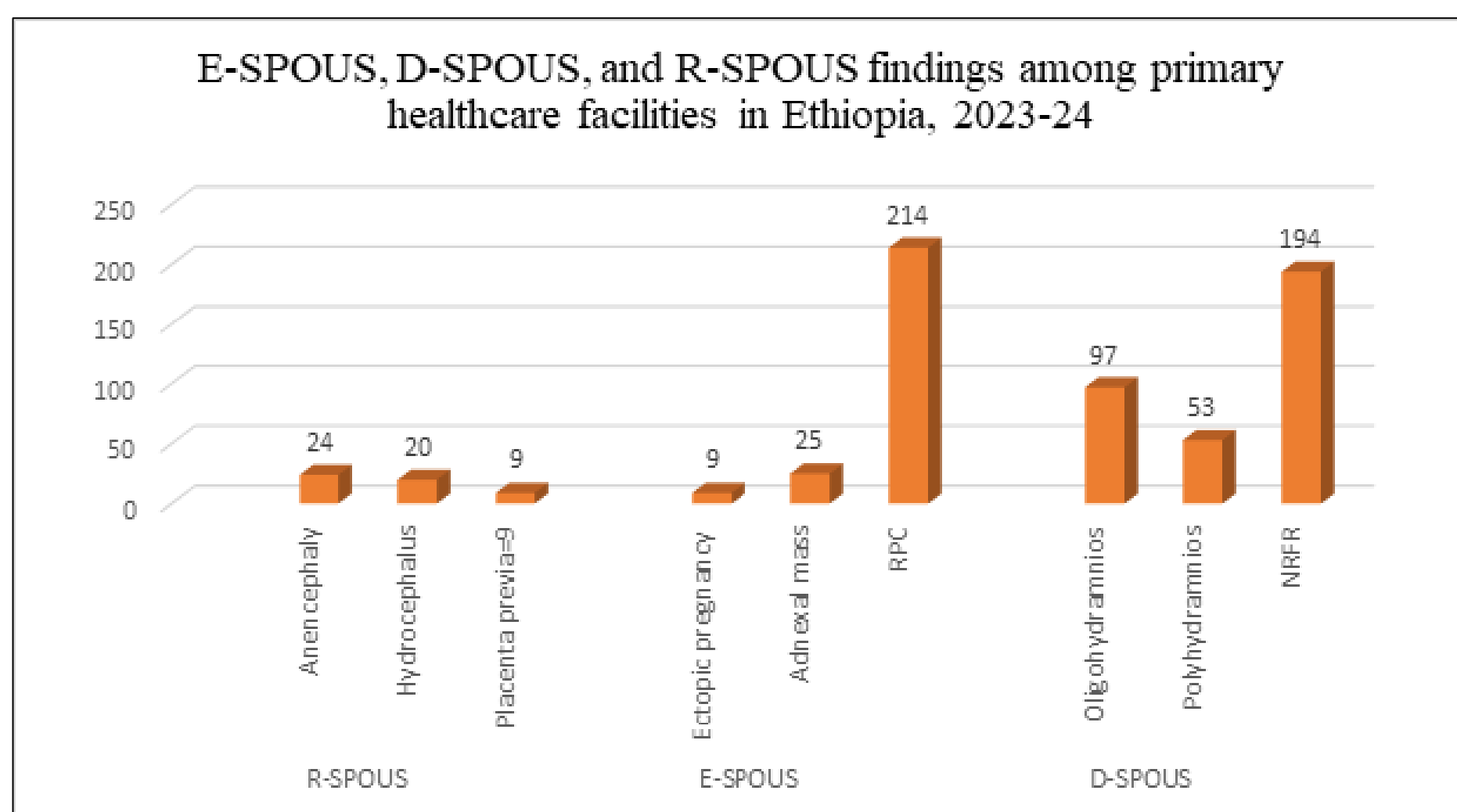


Fig. A

Level-4 - Results

- We measured changes in referral for ultrasound, antenatal care trends, delivery trends and medical abortion trends in 9 facilities in which SPOUS was implemented
- Maternal referral for ultrasound** decreased from a total of 467 pre-implementation to 173 six months after implementation (62.9% reduction) (Fig. B)
- Antenatal Care Visits** increased from 5,673 to 6,427 across the 9 facilities (13.3% increase)
- Total Delivery:** Out of 8,280 total deliveries, 4,526 occurred after the introduction of SPOUS. The median delivery trend over a two-week period was 332 (20.6% increase)
- Medical Abortion:** Following the implementation of SPOUS, a consistent and significant increase in medical abortions was observed, with a 24.8% rise in the trend over six months.

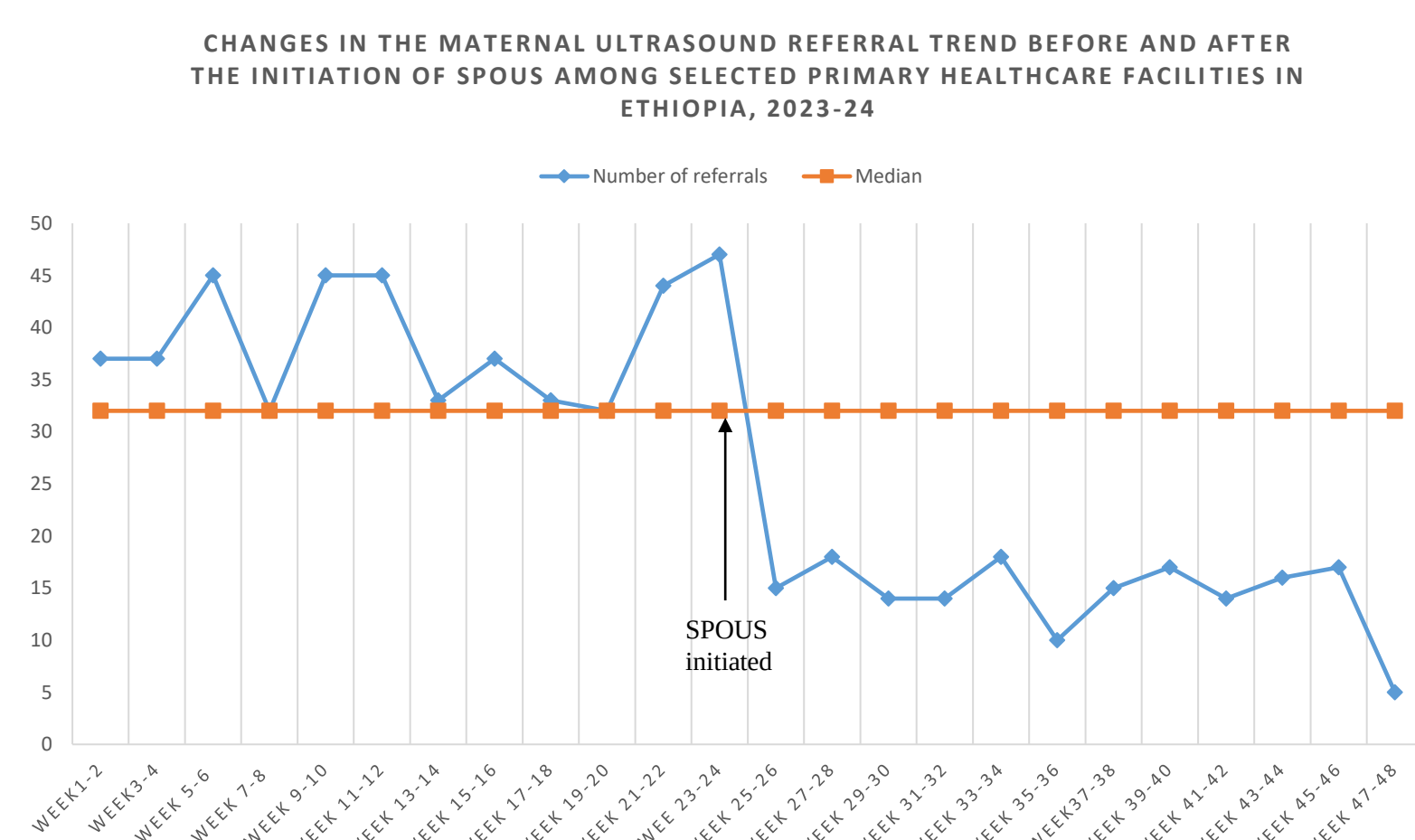


Fig. B

DISCUSSION

- Overall, our findings indicate high satisfaction with the training, improved competence within a given timeframe, adherence to practicing the skills, and enhanced maternal service utilization following the initiation of SPOUS. This suggests SPOUS can be effectively implemented in primary healthcare settings in Ethiopia and other similar contexts.
- Our findings regarding acceptability and effectiveness of one of intensive training followed by hand-on practice is consistent with other studies related with point of care ultrasound in low-resource settings (8-10)
- Nearly three-quarters of the trainees achieved the milestones after six weeks of training. This aligns with other studies, which have shown that with sufficient theoretical knowledge and hands-on practice, the majority of trainees can reach the required levels of competency and proficiency (10-12)
- Our trainees were able to effectively identify life-threatening emergencies, make informed decisions, and perform routine scans, highlighting the program's success in critical areas.
- Institutionally, consistent and significant increase was observed in maternal service utilization. Similar improvements have been reported in various settings following the introduction of point-of-care ultrasound, likely due to increased confidence in the health system and higher satisfaction with ultrasound care (13-15)

Strengths and Limitations

- Strengths:** a curriculum developed by a diverse team of experts, differentiated outcomes for Emergency (E-SPOUS), Decision-making (D-SPOUS) and Routine (R-SPOUS)
- Limitations:** potential for misdiagnosis and interpretation errors in scan findings; lack of control over the type of ultrasound equipment used across different settings

CONCLUSION

- In conclusion, the implementation of the Structured Point of Care Obstetric Ultrasound (SPOUS) program in three regions of Ethiopia has demonstrated significant benefits by improving SRH utilization such as ANC, delivery, medical abortion, and reduced unnecessary referrals.
- We have also been able to observe that the training has been highly accepted by participants.
- However, the program also highlights the need for standardized training and consistent competency assessments.
- For sustainability and continuous impact of such an implementation, particular attention should be given to providing and maintaining supplies.
- Furthermore, we recommend high-quality longitudinal studies with comparable evidence as they are necessary to shape policy guidelines and inform validated antenatal point of care ultrasound training programs, ensuring safe and effective implementation.

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Contact Information

- Tadele Dana Darebo – tadele.dana@acsisethiopia.org
- Berhanetsehay Teklewold, MD, MPH – berhanetsehay.teklewold@acsisethiopia.org
- ACSIS – info@acsisethiopia.org