




# Empowering Catchment Health Center to Deliver Comprehensive and Safe Obstetric Care Near Clients' Home: An Institutional Experience in Ethiopia

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**Background:** Three-quarters of maternal deaths can be prevented by proper emergency referral procedures, early recognition of obstetric complications, and timely and adequate care. Nonetheless, lots of women still experience difficulties getting the life-saving emergency obstetric interventions they need promptly.

**Aim:** Aim to improve maternal service delivery at the highest referring catchment health center to a tertiary teaching hospital through establishing a comprehensive obstetric care from December 2020 to April 2022.

**Methods:** A pre and post-intervention follow-up study design was employed to evaluate the impact of a quality improvement project at a health center on the access and quality of maternal service. After identifying a highly referring catchment health center, we established a multidisciplinary team responsible for preparing a readiness plan, facilitating staff training on obstetric care, resource mobilization, and continuous supportive supervision.

**Results:** Caesarian section delivery, holistic obstetric ultrasound service, and comprehensive abortion care were started at the catchment health center. The total monthly delivery at the health center almost quadrupled from 94 to an average of 334, referral out decreased from 156 mothers to a median of 12, and maternal emergency referral-in to the health center from the surrounding health centers increased from zero to a median of 44 mothers. The total number of deliveries at the tertiary hospital decreased from a monthly average of 902 to 827.

**Conclusion:** Delivering comprehensive obstetric care near the client's home by empowering the catchment health center has a significant role in reducing unnecessary referrals and costs, overcrowding of tertiary hospitals, and increasing antenatal and postnatal care attendance and institutional delivery.

**Strengths and Limitations:** Meticulous application of the science of improvement, data interpretation and analysis, and data driven decision-making are the strengths. Being tested in a single health center might make its generalizability questionable and needs further testing on a larger scale.

**Keywords:** maternal service, cesarean section, comprehensive obstetric care, referral system, catchment health center, prevention of obstetric complications, LMICs

## Introduction

Ethiopia has a three-tier healthcare system that categorizes healthcare facilities based on the services it provide and the healthcare facilities are interlinked with a referral system to maintain efficient, timely, safe, effective, equitable, and person-centered care.<sup>1</sup>

Delivering primary health care is one of the basic and priority areas of focus by healthcare facilities. In low-income countries, improving primary health care is essential to enhance access and quality of health care service delivery.<sup>2</sup> Maternal and neonatal services are one of the primary health care services being delivered in health centers and hospitals.<sup>3</sup>

Between 2000 and 2017 the global maternal mortality ratio decreased by 38%.<sup>4</sup> However, hundreds of thousands of mothers are still dying from easily preventable causes.<sup>5</sup> Ethiopia has also reduced maternal death from 871 to 412 between 2000 and 2016.<sup>6</sup> The reduction of maternal, neonatal, infant, and under-five mortality rates is by large attributable to the utilization of promotive, preventive, and curative primary health care interventions.<sup>7</sup> According to a 2019 Ethiopian demographic health survey, coverage of Antenatal Care (ANC) more than four visits was 43%, and delivery by a skilled birth attendant was 50%.<sup>8</sup> One of the key strategies encouraged to reduce maternal mortality in low and middle-income countries (LMIC) is timely access to Comprehensive Emergency Obstetric and Newborn Care (CEmONC).<sup>9</sup>

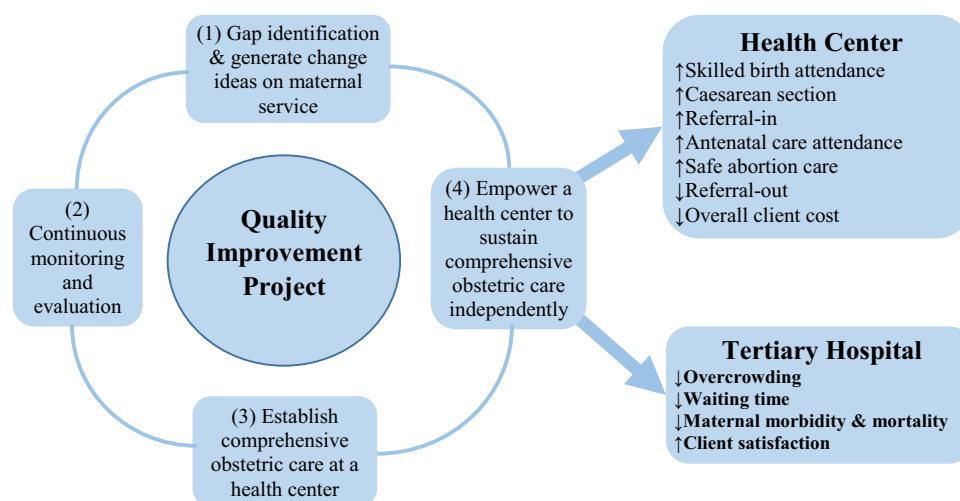
In 2012, the Federal Ministry of Health took steps to strengthen Addis Ababa's healthcare system, not only to meet current needs but also to prepare for future demand. This guideline split the cities and surrounding areas into eight hospital-health center referral networks, each with one comprehensive specialized hospital and 7 to 10 nearby health centers, to ensure optimal use of limited healthcare resources.<sup>10</sup> The hospital-health center referral networks were organized with the fact that; the majority of deliveries are low-risk and should take place in health centers, while pregnant women who are high-risk and develop complications should be referred to give birth in tertiary hospitals.<sup>11</sup> Bypassing the lower levels of health facilities makes an enormous number of patients spend longer waiting time in the hospitals and it also results in inefficient use of highly trained health professionals and resources.<sup>12</sup>

Government health officials hoped this organization would create efficient use of health services, unburdening the highly accessed specialized hospitals, and increasing the utilization of health centers. Despite the reorganization, cases that could be managed in primary healthcare facilities are being referred to tertiary care facilities leading to suboptimal care in these facilities due to overcrowding.<sup>13</sup>

Collaboration between facilities within the referral network in terms of human resources, supply, finance, and capacity building can improve the quality of care, patient and staff satisfaction, overall patient cost reduction, and reduction of preventable morbidity and mortality from unnecessary referrals. In addition, continuous follow-up of maternal service in the hospitals showed the need to design a quality improvement project that can enhance the access and quality of maternal service in highly referring low-level referral network facilities. Enabling health centers to deliver comprehensive obstetric care will improve the quality of maternal service delivery by referring selected high-risk patients to tertiary healthcare facilities as shown in Figure 1. Based on our maternal referral audit, health centers located in Burayu town are the leading referring health facilities.

## Aim

This project aims to improve maternal service delivery by establishing and sustaining comprehensive emergency obstetric care at the highest referring catchment health center to SPHMMC from December 2020 to April 2022.



**Figure 1** Conceptual framework showing how an improvement science result in an improvement in maternal service delivery by empowering a health center.

## Method

The project was conducted by SPHMMC, a tertiary teaching hospital located in Addis Ababa, Ethiopia. Following the maternal service referral audit at SPHMMC, it was found that four health centers located in Burayu town were found to be the leading referral catchment health centers. The project was implemented at Anne Dimma health center, one of the health centers located in Burayu town in collaboration with the SPHMMC quality improvement and clinical governance directorate, and the department of Obstetrics and Gynecology from 1 December 2020 to 30 April 2022.

A multidisciplinary team from the senior management team, quality improvement and clinical governance directorate, obstetrics and gynecology department, anesthesia, liaison, biomedical engineering units, and Anne Dimma health center management team was established to cascade the establishment of a comprehensive obstetric care at Anne Dimma health center. The team is responsible for the identification of gaps, devising solutions, preparation of documents, and follow-up on the performance of the service delivery.

A pre and post-intervention study design was employed to evaluate the impact of establishing and supporting a health center on the access and quality of maternal service.

## Project Strategy and Implementation

This project had four phases; initiation, implementation, monitoring and evaluation, and sustainability.

### Phase One

In the initiation phase, the project proposal was first presented to the SPHMMC senior management team followed by a project site visit by the senior management team with subsequent approval. Later, a memorandum of understanding between SPHMMC and Anne Dimma health center was signed and a cascade of decisions was made by a multi-disciplinary team (Table 1).

### Phase Two

Phase two of the project mainly focuses on capacity building, mobilizing required equipment, and installation of operation theatre for Cesarean Section (C/S). After service area redesign and human resources deployment, the project was inaugurated on May 17, 2021 (Table 2).

### Phase Three and Four

The third phase of the project is monitoring and evaluation of the implementation of the project through continuous supportive supervision and clinical audit. The final phase of the project is to fully make the health center independent of support in terms of supply and human resource exit plan strategy preparation (Table 3).

**Table 1** Phase One - Initiation of the Project

Phase	Milestone	Time Frame
<b>Phase-I: Initiation</b>	Based on the catchment health center referral audit, a project to capacitate one of the highest-referring health centers was planned	December 1, 2020
	The project proposal was developed and presented to the senior management team of SPHMMC	December 5, 2020
	Senior management team with the quality team visited Anne Dimma health center	December 7, 2020
	The senior management team approved the project proposal	December 9, 2020
	MOU between SPHMMC and Anne Dimma health center was signed	December 10, 2020
	A multi-disciplinary team from the Senior management team, Quality improvement and clinical governance directorate, Obstetrics and gynecology and Anesthesiology department, Engineering unit, and Anne Dimma health center was established	December 12, 2020
	The multi-disciplinary team visited Anne Dimma health center	December 13, 2020
	An action plan by a multi-disciplinary team was developed	December 16, 2020

**Abbreviations:** MOU, Memorandum of Understanding; SPHMMC, St. Paul's Hospital Millennium Medical College.

**Table 2** Phase Two - Implementation Strategy of the Project

Phase	Milestone	Time Frame
<b>Phase-2: Implementation</b>	After workforce analysis was done, the required human resources and necessary equipment were quantified by a multi-disciplinary team	December 20, 2020
	The senior management team approved the plan	December 22, 2020
	Required equipment mobilized (operation table, anesthesia machine, operation light, cesarean section set, delivery set, drape set, scrub gowns, beds, portable oxygen, and ultrasound machine)	Dec 22–30, 2021
	Training on comprehensive maternal and neonatal care for health officers, midwives, and nurses working at Anne Dimma health center was given	January 02, 2021- March 25, 2021
	Facility redesign was done by the SPHMMC engineering team	Jan 3-Feb 30, 2021
	C/S operating theater equipment was installed by the biomedical engineering team	Jan 1-March 25, 2021
	Facility preparedness and readiness assessed by the Quality improvement and clinical governance directorate from SPHMMC	April 10–13, 2021
	Facility preparedness and readiness assessment was presented to the senior management team of SPHMMC	April 15, 2021
	The senior management team and multi-disciplinary team revisited Anne Dimma health center and feedback was given	April 16, 2021
	Representatives from MOH and the Oromia regional health bureau visited Anne Dimma health center and feedback was given	April 21, 2021
	Comprehensive obstetric care service started at Anne Dimma health center	May 17, 2021

**Table 3** Phase Three and Four – Monitoring & Evaluation and Sustainability Plan

Phase	Milestone	Time Frame
<b>Phase-3: Monitoring &amp; Evaluation</b>	A clinical audit was done on a monthly basis	June 2, 2021-January 30, 2022
	Supportive supervision was done every two months by the SPHMMC quality and clinical governance directorate	
	Supportive supervision result was presented to the senior management team and feedback was given	
	The senior management team revisited the project site two times	
<b>Phase-4: Sustainability</b>	A sustainability and exit plan were prepared and a discussion was held with the Oromia regional health bureau	January 20, 2022

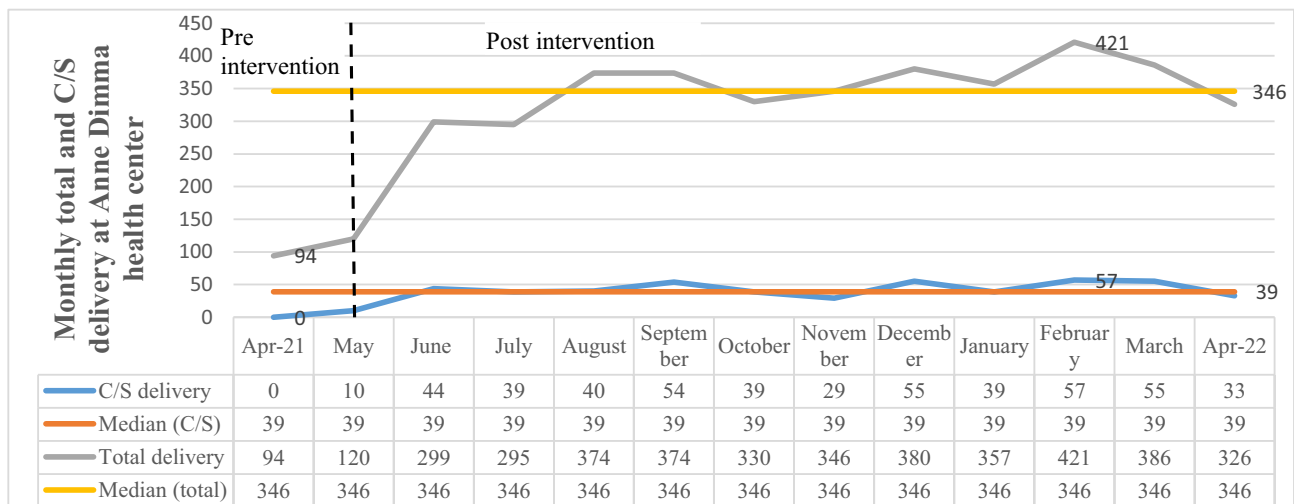
**Abbreviations:** SPHMMC, St. Paul's Hospital Millennium Medical College.

## Result

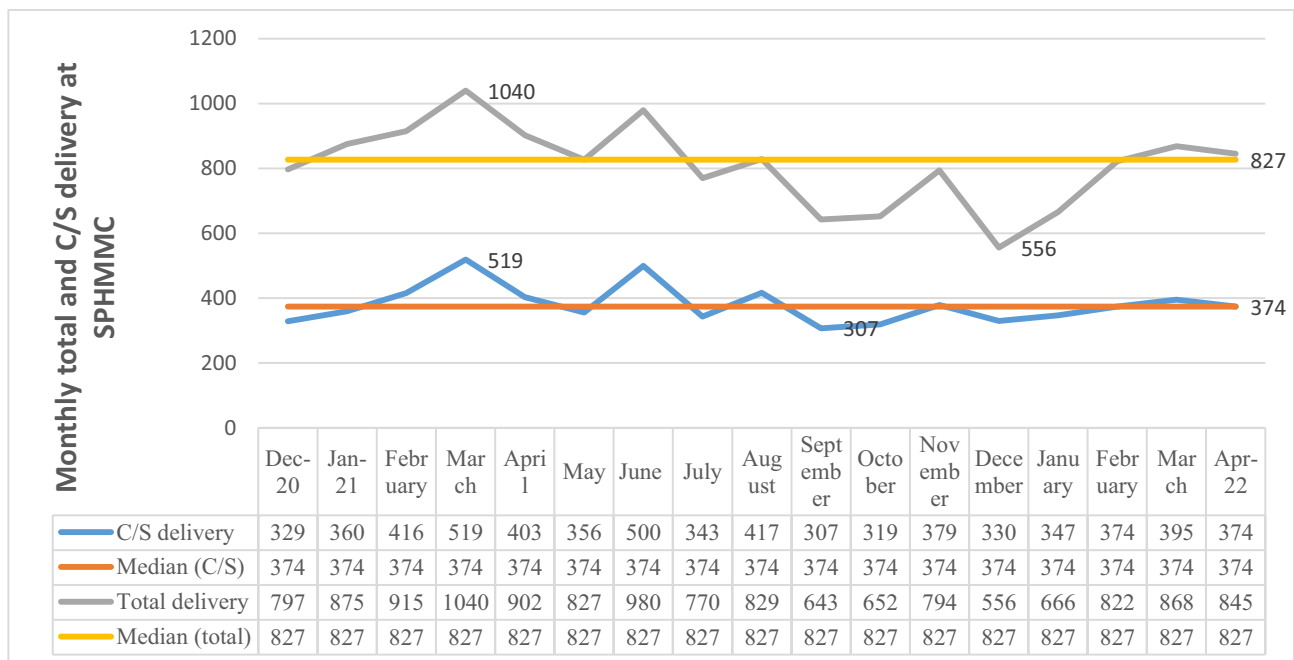
Anne Dimma health center's total number of monthly deliveries became 347 from a baseline of 95 while the monthly C/S deliveries became 39 from a baseline of zero after the launching of this project in May 2021 (Figure 2).

SPHMMC's total number of monthly deliveries and C/S deliveries five months prior to the initiation of this project were 902 and 405 respectively. Following the initiation of the project, the average overall monthly and C/S deliveries became 827 and 374, respectively (Figure 3).

Anne Dimma health center's referral out has decreased to a median of 12 from the baseline of 156 while its emergency maternal referral-in from neighboring health centers has increased to 44 from nil on a monthly basis after the launching of this project in May 2021 (Figure 4).



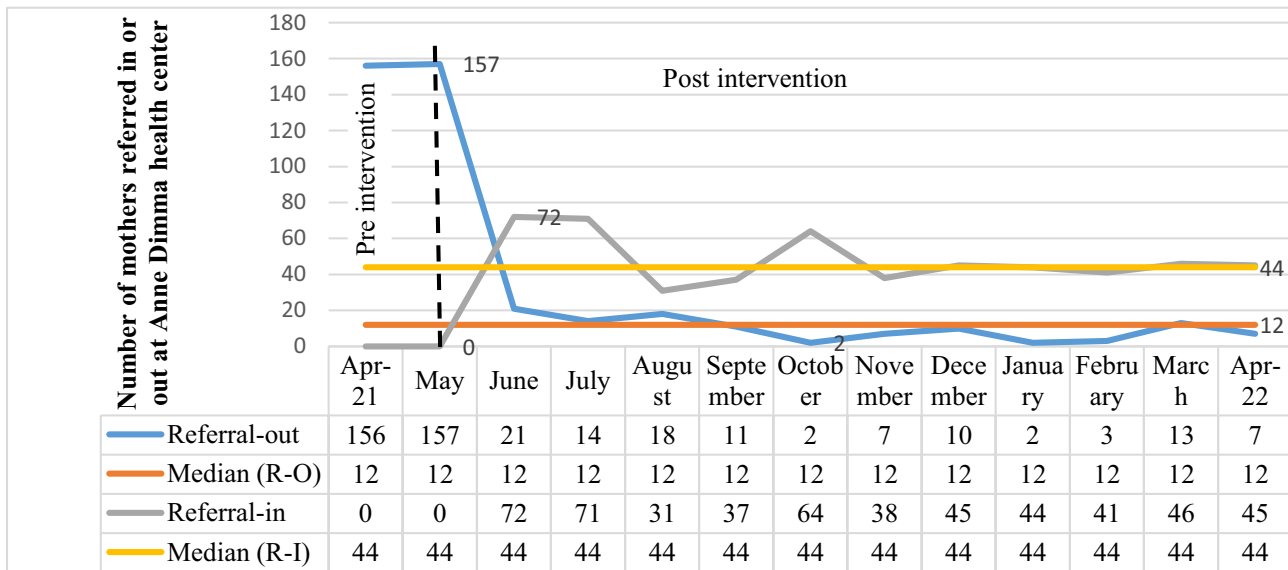
**Figure 2** Monthly total and cesarean section delivery at Anne Dimma health center from April 2021 to April 2022. **Abbreviation:** C/S, Cesarean Section.



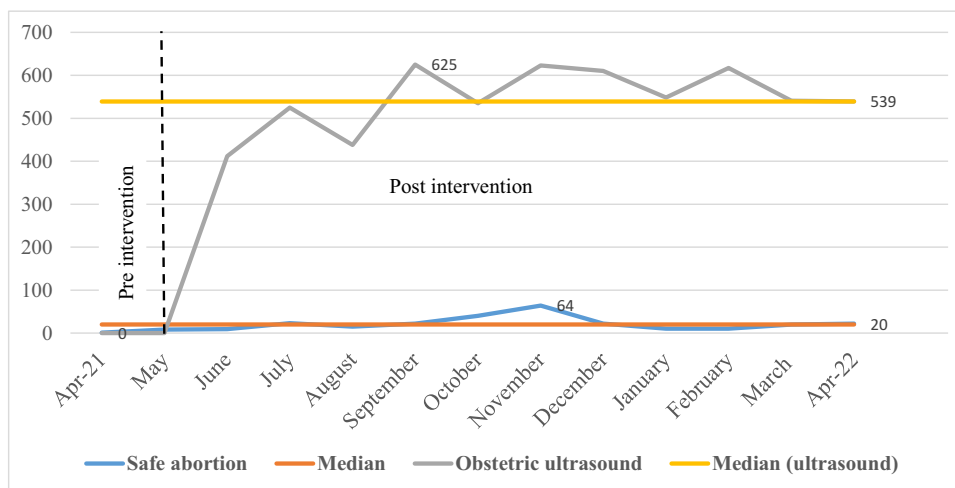
**Figure 3** Monthly total and cesarean section deliveries at SPHMMC from December 2020 to April 2022. **Abbreviations:** C/S, cesarean section; SPHMMC, St. Paul's Hospital Millennium Medical College.

On average, twenty safe abortions were done at Anne Dimma health center using medical, Manual Vacuum Aspiration, and extraction methods every month after the initiation of this project. The monthly obstetric ultrasound service provided to mothers on antenatal care at Anne Dimma health center became 539 from nil after the launching of this project in May 2021 (Figure 5).

The average number of pregnant women who received antenatal care at Anne Dimma health center at least once and four times by maternal age became 230 and 198 from a baseline of 56 and 65 respectively from April 2021 to April 2022 (Figure 6).



**Figure 4** Total number of monthly maternal referral-out from and referral-in to Anne Dimma health center from April 2021 to April 2022. **Abbreviations:** R-I, Referral in; R-O, Referral out.

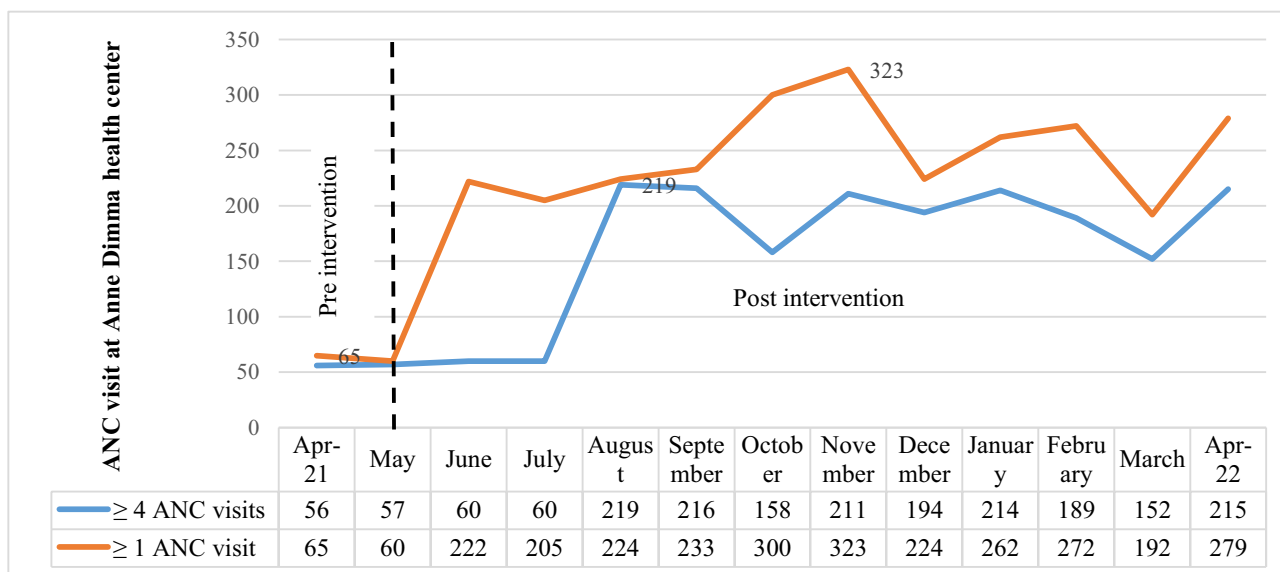


**Figure 5** Total number of monthly obstetric ultrasounds done for clients who had antenatal follow-up and safe abortion service delivered at Anne Dimma health center from April 2021 to April 2022.

## Discussion

Improving access and quality of comprehensive obstetric care based on data-driven evidence at a health center level requires a step-wise approach, coordinated effort, and collaboration to re-innovate the existing structure and sustain service delivery in the long run. There were challenges in each phase of the project: During the initial phase of the project, the major challenges faced were the emergence of the COVID-19 pandemic which hindered resource mobilization, late induction of trained staff to service delivery, and diversion of health facilities’ attention which is similar to challenges paused by COVID-19 pandemic on essential health service in Ethiopia.<sup>14</sup> The other challenges were work overload due to the scale-up of services at the health center which was managed by hiring additional staff and financial compensation.

Underperforming autoclave and hematology machines, non-functional chemistry machines, inadequate suturing materials and anesthesia drugs, and low levels of regional and zonal health bureau engagement to support the health



**Figure 6** Total number of pregnant women that received antenatal care at least once and four visits on a monthly basis from April 2021 to April 2022 at Anne Dimma health center. **Abbreviation:** ANC-Antenatal Care.

center were the other major setbacks that affected the sustainability of the project. It was managed by corrective maintenance of equipment by the biomedical engineering team from SPHMMC, outsourcing sterilization, laundry, and laboratory services freely at SPHMMC to avoid service interruption in the health center.

Following the establishment and initiation of comprehensive obstetric care at Anne Dimma health center, maternal service provision has shown a dramatic increment in the health center while the labor and delivery burden at SPHMMC has shown a reduction. In the later phase of the project, the labor and delivery service at SPHMMC has increased despite the continuation of service delivery at Anne Dimma, which could be due to the assignment of additional catchment health centers to the SPHMMC because of the re-innovation of one of the major referral hospital in Addis Ababa referral network starting from February 2022.

The strength of this project is the presence of strong leadership roles from the senior management team of SPHMMC and Anne Dimma health center, the presence of motivated staff working at Anne Dimma health center to adapt themselves easily to the new environment and the workload, strong and uninterrupted communication between SPHMMC and Anne Dimma health center, and continuous supportive supervision and evaluation system enable the project to be impactful. In addition, meticulous application of the science of improvement, data interpretation and analysis, and decision-making based on the facts are the strengths of this project.

Being tested in a single health center only might make its generalizability questionable and need further testing on a larger scale. However, as far as we follow the improvement science which dictates data-driven change that targets building a system could make this kind of project reproducible locally or universally.

## Conclusion and Recommendation

This project taught us that strengthening catchment health centers can significantly reduce unnecessary and delayed referrals, promote institutional maternal delivery, increase antenatal care attendance, ensure equitability of obstetric service, and cost containment. Starting cesarean delivery in our highly referring catchment health center with a collaborative approach also helps the mothers to get the service in their vicinity without affecting the quality of service.

Tertiary hospital overcrowding can be minimized by supporting and empowering catchment health centers and hospitals. Therefore, similar projects should be planned and implemented by other hospitals to improve access and quality of service delivery. Strong engagement of the Oromia health bureau to ensure the sustainability of service is very crucial, particularly in the annual budget allocation to the Anne Dimma health center. Lastly, a comprehensive neonatal

care service should be preplanned and integrated with comprehensive obstetric care to improve the outcome of the newborns as both services are inseparable.

## Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

## Ethical Approval and Consent to Participate

The current manuscript got ethical approval from St. Paul's Hospital Millennium Medical College institutional review board (IRB).

Further, informed consent for publication was obtained from the two institutions as the data is institution-specific rather than individual information that the data will be published in an international journal. Consent to participate for individual participants was waived by St. Paul's Hospital Millennium Medical College IRB. The collected data is kept confidential by the primary investigator and co-investigators. All methods were carried out in accordance with the relevant guidelines and regulations.

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## Disclosure

All authors read and approved the final manuscript. The authors declare that they have no competing interests.

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