

# Level of Quality of Option B+PMTCT Service Provision in Public Health Facilities in Mekelle Zone, Northern Ethiopia: Cross-sectional study

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## Research article

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# Abstract

Background: Substantial improvements have been observed in the coverage and access to maternal health services in Ethiopia. However, quality of care has been lagging behind. Therefore, the aim of this study was to assess quality of Option B + PMTCT service provision. Methods: Facility based cross-sectional study was conducted in 12 public health facilities from February to April 2016. It employed both quantitative and qualitative method. Donabedian input-process-output quality assessment model was used to evaluate the service. Data collection techniques carried out were facility inventory, non-participatory observation, record and chart review to assess input, process and output service quality. Concurrently, patients and service providers were subjected to exit and in-depth interview autonomously to explore barriers for good and bad service quality. Quantitative data were analyzed using SPSS version 21. Use of manual thematic approach was used for qualitative data analysis. Results: The level of overall quality of Option B+ PMTCT service provision has rendered as good in two out of 12(16.7%) studied health facilities. The input quality was better than its counterpart; which was judged as good in 33.3% of health facilities. Only, one fourth of studied health facilities were rated as good for the process and output service quality respectively. Conclusion: The overall level of quality was achieved optimal in insignificant number of facilities. The desired level of quality will be realized if and only if the three quality components would be kept on eye side by side during service mentoring. Likewise, persistent effort in view of Donabedian theoretical framework will improve the overall service quality. Key words: Quality, Option B+PMTCT, HIV Positive Women, Tigray, Northern Ethiopia

## Background

Globally, MTCT of HIV accounts 90% new pediatric HIV infection [1]. Sub-Saharan Africa experienced the greatest share. Regarding these challenges, World Health Organization (WHO) had been started implementing different strategies (Option A, Option B, Option B<sup>+</sup>) for optimizing PMTCT care and support for low and middle income countries since 2001[2]. Under Option A, women receive ante partum (starting at 14 weeks of gestation) and intra partum ARV prophylaxis to reduce the risk of drug resistance. Whereas, women receive triple ARVs starting as early as 14 weeks of gestation and this is continued during intra partum and through childbirth if not breastfeeding, or until 1 week after the cessation of all breastfeeding in case of Option B, [2, 3].

During PMTCT scale-up period under Option A, & B, significant achievements obtained by rolling back new pediatric HIV infection by 70% [3]. However, clinical and programmatic challenges of the above two interventions resulted near miss of 23% HIV positive women not to be enrolled in chronic HIV care and nearly 150,000 pediatric HIV infections were recorded. This was due to high turnaround time to receive HIV chronic care in health facilities because of the need of CD4 count for ART initiation and fragmented service provision in different entry points in addition to the routine maternal health care service. These resulted high attrition and lost to follow up of HIV positive pregnant and lactating women from chronic HIV care [3, 1]. For instance, 24.3% lost to follow up was reported from Cameroon [5], 20% in Malawi [6], and 28% from sub-Saharan African countries [3, 4] respectively. Similarly, it was a great challenge in

Ethiopia in which only 10% of HIV positive pregnant and lactating women complete PMTCT program until exposed infant HIV confirmatory testing at 18 months of age [7].

Having these realities, WHO introduced a new alternative approach (Option B<sup>+</sup>) which is fully integrated and simplified approach to PMTCT in 2012 [7,8]. This new strategy recommends offering of life-long antiretroviral therapy (ART) regardless of CD4 count and HIV positive women are administered triple ARVs starting as soon as diagnosed and continued for life in routine MNCH platforms which had both clinical and programmatic advantage in retaining mothers in HIV chronic HIV care especially in resource limited settings [6,8]. As evidence from Malawi [6, 9], due to the introduction of this new intervention, a five-fold increase was achieved in ART initiation and 88% client retention was reported in the first quarter of its implementation in 2011.

In Ethiopia, it was rolled out in 2013 and currently implemented in 2495 health facilities in routine MNCH platform similarly in northern Ethiopia where the study was conducted and all health facilities were implementing it in similar context to the national level as a strategy for MTCT elimination in 2020 [7,10]. However, still only 60.6% of HIV positive pregnant and lactating women were enrolled in HIV chronic care during Option B<sup>+</sup> in 2015[10]. Mothers were still faced a challenge to retain in the service. For instance, 16% over all LTF was reported in North East Ethiopia in which, (11.9%) at 6 months, (15.7%) at 12 months and (22.6%) at 24 months respectively [11]. Similarly, 14.8% was reported from Eastern Ethiopia [12] and 9.8% from northern Ethiopia [13]. As evidenced from different facility based studies [14-16], poor service quality was the main challenge. For instance, an evidence from [10], relay on input-process quality items in which some health facilities were made operational with necessary supply chain related problems, lack of service integration and poor service compliance with national technical standards . On the other hand, inadequacy of trained human resources and compliance of health care providers with national standards were documented as predictor factors that render service quality in Hadya Zone of Southern Ethiopia [14]. With regard to process quality component, poor counseling, room privacy, waiting time, and inadequate confidentiality were reported from Dessie referral hospital of northern Ethiopia [15]. Similarly of poor service adherence to national standards from Gebretsadiq Shawa Memorial Hospital, Kafa Zone, South West Ethiopia [16].

Improving quality of Option B<sup>+</sup>PMTCT was a priority agenda in the health sector transformation plan of Ethiopia to achieve three 90's (90-90-90) in 2020[10]. Since, reviewed predictor variables reported for lagging service quality in the previous studies were input-process-output related factors, we preferred to use Donabedian model of input-process-output quality assessment framework [17]. Performance indicators of Option B<sup>+</sup> in the national guideline were based on this model [17,18 ] including input quality items (human resource, infrastructure, drugs, medical supplies, and medical equipments, maternity registers and forms), process quality item (service provider's adherence to service standards) and output quality item (service outputs and client satisfactions) respectively. However, no study tried to assess level of quality of Option B<sup>+</sup>PMTCT services provision with respect to the three predetermined quality components. Therefore, the study aimed to assess level of quality of Option B<sup>+</sup>PMTCT service provision

in public health facilities in Mekelle Zone, Northern Ethiopia using Donabedian quality assessment model.

## Methods

### Aim

The aim of the study was to assess the level of quality of OptionB<sup>+</sup>PMTCT and to explore reasons for good and bad service quality.

### Study design

The study has employed cross-sectional study in the public health facilities. It has involved mixed method approach using both quantitative and qualitative data collection methods. The study used Donabedian model of health care quality assessment framework [19]. The model was depicted in the figure below (Figure 1).

### Study setting and period

The study was conducted in Mekelle zone, Tigray of Northern Ethiopia, 802KMs from Addis Ababa, the capital city of Ethiopia. It is among the top three high HIV prevalent and prioritized areas in Tigray region [20]. According to 2007 national census, the projected total population of Mekelle is 320,000 [21]. Zonal health tier system composed of 12 public health facilities. Of which, three of them are hospitals and nine health center. All health facilities had been providing OptionB<sup>+</sup>PMTCT under their MNCH continuum of care. The study period was from February to April 2016

### Sampling and sample size

Purposive sampling method was used to recruit the study participants. All the public health facilities providing OptionB<sup>+</sup>PMTCT were included in the study.

With the purpose of assessing recent practices, record review was carried out for 168 mother infant pairs who had completed Option B<sup>+</sup> follow up visits in the previous one year. Similarly, 12 HIV exposed infant follow up charts were reviewed. Direct non-participatory observations were conducted among 60 clients who were eligible and attending the service during data collection period. The aim was to assess client provider interaction and health care provider's adherence to service standards during service consultation.

For qualitative data, half of the clients under observation were purposely included for client exist interview. Similarly, 12 service providers who were under observation were enrolled for in-depth interview. Patients who visited the health facilities for the first time and health care providers who worked for less than two years were excluded as they didn't have prior experience with the health facility to provide valid information.

## Data collection and measurements

Data collection was conducted in line with input-process-output quality assessment dimensions to evaluate the level of quality of option B+PMTCT. Three data collectors were recruited for facility inventory, non-participatory observation and record review.

For input service quality, 47 input performance standards were adopted from the national guide lines [17, 18] to assess input service quality. Facility inventory was conducted to ensure the availability of medical equipment , supplies, infection prevention materials, job aids , IEC materials, basic obstetric care supplies, maternity registers and forms for Option B<sup>+</sup>PMTCT service provision under MNCH continuum of care.

A total of 43 performance standards for process dimension were developed from the national guidelines [17] and from similar study conducted in Kafa zone of South West Ethiopia [16]. To assess adherence of health care providers to the service standards, non-participatory observation was conducted during service consultation using structured observation check list.

Output quality was assessed using 13 items adopted from national guide line [17, 18]. Record review was conducted on 168 mother infant pair from maternity record and 12 HIV exposed infant follow up charts to summarize service outputs on adult and pediatric HIV chronic care in MNCH service unit using structured record and chart review check list.

Overall service quality was assessed by combining input; process and output service quality components.

Facilities were categorized rendering good input service quality, if the average weighted score of input quality performance standards was 100 % [10], and 90% or more for process, output, and overall quality performance standards [10, 22]. See the list of variables used in measuring each service quality components (Additional file 1).

Qualitative data were collected by principal investigator (Kiros Fenta) who had an experience on qualitative data collection. Client exit interview was conducted after service consultation was finished. Concurrently, service providers who were under observation were subjected for an in-depth interview using semi structured interview guide to explore their perception about the reasons for good and bad service quality.

## Operational definitions

**Input dimension:** this dimension was used to assess the availability of human resources, materials, drugs, equipment, and supplies needed for Option B<sup>+</sup> PMTCT service provision.

**Process dimension:** this dimension used to reflect how service providers adhere to service standards during service consultation of Option B<sup>+</sup>PMTCT service in MNCH unit.

**Output dimension:** used to evaluate the ultimate service result of Option B<sup>+</sup>PMTCT service and patient satisfaction level.

**Overall quality:** this particular dimension was determined by combining predetermined three quality components; input, process, and output.

**DBS result turnaround time:** in this study this was used to assess the total time taken for DNAPCR virological test result from blood drawback to infant care at the health facility.

## Data quality assurance

To enhance data quality, data collectors who had an experience and trained on Option B<sup>+</sup>PMTCT were recruited for data collection. In addition, they were trained for two days on the nature of the tool, objective of the study and ways of approaching during interview, observation, record and chart review. The tools were piloted and necessary modifications were made. During the data collection period, there was a strict supervision and completed questionnaires were checked on a daily basis by principal investigators.

## Data management and analysis

Quantitative data were coded, cleaned, and entered into EPI info version 7 and then transferred and analyzed using SPSS version 21 software for windows. Descriptive statistics were used to describe the prevalence of input, process, and output related service quality assessment results. Qualitative data were analyzed using content thematic approach that involved reading scripts several times, identifying themes and sub-themes, and grouping data according to these themes for interpretation [23, 24]. The main study themes were reasons for good and bad quality. All authors (Kiros Fenta Ajemu and Alem Desta) were involved in the discussions of study themes, sub-themes and interpretation of findings. This process facilitated result triangulation [25].

## Results

The study was assessed based on Donabedian input-process-output service quality assessment model. The study health facilities were health centers (Mekelle , Semien , Kasech , Quiha , Adishmdihun , Aynalem, Serewat , Adiha, and Lachi ) and hospitals ( Mekelle , Quiha, and Ayder ) which has been providing Option B<sup>+</sup>PMTCT under MNCH continuum of care.

The study showed that the overall level of service quality of Option B<sup>+</sup>PMTCT was rendered as good in one out of six(16.7%) of studied health facilities. Specifically, input service quality was judged as good in 33.3% of health facilities but only 25% of them realized good process and output service quality respectively (Figure 2).

Regarding input service quality, the study revealed that majority of the health facilities were equipped with clinical care supplies and drugs for Option B<sup>+</sup>PMTCT service provision. Long life ARV regimen (TDF+3TC +EFV), and other basic obstetric care supplies for Option B<sup>+</sup> were not reported as stock out for the past one year. However; critical input related items for Option B<sup>+</sup> service provision were missed in considerable no of studied health facilities. Only, half of the health facilities kept on hand the necessary trained service providers, drugs for opportunistic infections, and DBS test kits necessary for the desired input service quality (Table 1).

### **Factors attributed to good input service quality**

**Regular multi-disciplinary team meeting (MDT):** during an in-depth interview, majority of health service providers recognized that weekly meeting with member of MDT enabled them to identify availability related factors on time;

*"..... we conduct weekly meeting with member of the MDT team and we have been raised a number of issues related to input related service demand, identify gaps, and we tried to prepare an action plan to resolve input related constraints on time " (PMTCT client).*

### **Factors attributed to bad input service quality**

**Trained staff shortage:** Consistent with quantitative findings, most health workers expressed their opinion on limited trained human workforce as a barrier for input related factor due to staff turnover. On the other hand, trained staffs were preferred to serve health care services other than MNCH;

*".....Imagine only two health care providers trained on Option B<sup>+</sup> has been providing service in MNCH unit of this facility but we are serving more than an average of 80 clients per day. Having this reality, how can we provide quality service counseling? Therefore, without allocating appropriate number of trained health care providers, only integrating the service to MNCH unit may not be successful" (PMTCT service provider)*

**Supply chain issues for Option B<sup>+</sup>:** supply chain issues reported as a challenge to rollout Option B<sup>+</sup> successfully. Majority of study participants explained that lack of drugs for opportunistic infection was reported as a barrier for availability related factor, this was due to poor management of integrated pharmaceutical logistic system at facility level which resulted weak inventory of stock balance at the right time;

*".....Some drug list used for opportunistic infection such as co-trimoxazole prophylactic therapy was reported as stock out of more than six months in the past year and stock out of drugs in PFSA and lack of transportation was a reason given for us when requested" (PMTCT service provider).*

**Table 1:** Health facilities not fulfilling 100% of input service quality performance verification indicators in Mekelle zone, Tigray, Northern Ethiopia [N=12].

<b>Input quality items</b>	<b>No of facilities</b>	<b>Percent</b>
<b>Human resource and infrastructure</b>		
Well ventilated waiting room	8	66.7
Well ventilated counseling room	8	66.7
Cleanness of counseling rooms	6	50
Trained service providers on OB <sup>+</sup>	6	50
<b>Medical supplies</b>		
Cotrimoxazole prophylaxis	8	66.7
DBS sample collection kit	7	58.3
<b>Job aid IEC materials</b>		
PMTCT brochures	7	58.3
PMTCT leaflets	5	41.7
Technical guide line	7	58.3
PMTCT cure card	8	66.7
<b>Patient forms and registers</b>		
Referral slips	8	66.7
Referral linkage slips	8	66.7
Appointment cards	8	66.7

With regards to process quality, some prominent key interventions had been missed during service consultation. Option B+ ARV drug adherence counseling and partner notification were offered in 58.3% of the health facilities. Some of the common limitations to the quality of maternity services include that women were greeted on arrival in 58.3% of the health facilities. Prolonged waiting time was also an issue observed during service consultation. It had been noted that health service providers in majority of health facilities were observed not adhered to service standards while providing the service (Table 2).

### **Factors attributed to good process service quality**

**Option B<sup>+</sup> service integration to MNCH unit:** Task shifting to scale up Option B<sup>+</sup> by integrating the delivery of Option B<sup>+</sup> ART initiation as one service package in MNCH was greatly appreciated by majority of clients attending the service;

*“..... discrimination is not my concern for the past two years after the adoption of Option B<sup>+</sup>. I am confident enough to attend my follow up visit together with HIV negative mothers in underlined MNCH continuum of care. This is because; we all received our follow up care in one room and with the same health professional and this is a good opportunity for us. Therefore, I preferred this service package rather than previous vertically standalone PMTCT service in ART unit” (PMTCT client).*

**Immediate ART initiation regardless of CD4 count:** overall, elimination of CD4 assessment as a requirement for ART treatment initiation for Option B<sup>+</sup> in MNCH unit was highly accepted and acknowledged among different participant groups;

*".....Before the introduction of Option B<sup>+</sup> PMTCT high lost (3%) and dropout rate (4%) was documented in our facility. The main reason forwarded by majority of the clients was repeated appointments for CD4 count to assess illegibility criteria for initiating ART but after its adoption, patient retention to HIV chronic care was increasing" (PMTCT service provider).*

**Simplicity of ARV drug regimen (B<sup>+</sup>):** Easy administration of one tablet per day of TDF+3TC+EFV for the woman during pregnancy, labour and delivery made easier when compared with the previous Option A or B that make patients easily adhere to the drug as described by majority of service providers and women;

*"..... the drug provided for me during PMTCT visit was comfortable and easy to use. I selected a fixed time at 7:00 PM and I have been taking the drug usually with a specified time and I don't want to miss even a fraction of seconds" (PMTCT client).*

*".....During the time of Option A and B, multiple ARV drugs were prescribed and patients were complained about the situation but now patient were easily adhere to the regimen and no more need of continuous adherence support"(PMTCT service provider).*

### **Factors attributed to bad process service quality**

**Poor adherence to service standards:** Majority of service providers had good experience regarding Option B<sup>+</sup>. However, one health care provider from one studied health facility reported her experience of considering CD4 count as criteria for initiating ART.

*"..... I am not aware of prescribing ARV drugs regardless of CD4 count and I appointed two PMTCT clients for CD4 investigation before prescribing the drug"(PMTCT provider).*

**Workload:** during an in-depth interview , some service providers had complained integration of Option B<sup>+</sup> to MNCH service unit as it created patient load since no more health professional was appointed considering its integration to MNCH continuum of care ;

*"..... before the introduction of Option B<sup>+</sup> mother living with HIV were under follow up in ART clinic but now they had been enrolled in MNCH clinic during their maternal and child health care visit which resulted additional work load in our health facility" (PMTCT provider).*

**Prolonged waiting time:** with similar finding to quantitative finding, majority of women reported their concern about long waiting time to get the service and a challenge that making them reluctant to come back;

*"..... my great concern during my PMTCT follow up visit was issue of timing to get the service on time since there was delayed service as a result I have been thinking to miss the opportunity"(PMTCT client).*

**Table 2:** Health facilities not fulfilling 90% of process service quality performance verification indicators in Mekelle zone, Tigray, Northern Ethiopia [N=12].

<b>Process quality items</b>	<b>No of facilities</b>	<b>Percent</b>
Facility suitable opening hour	8	66.7
Client greeting and welcoming	7	58.3
Introducing himself to clients	7	58.3
Waiting time to the counselor	6	50
Adequacy of counseling session	6	50
Counselor confidence during counseling	7	58.3
Conduct history taking	8	66.7
Conduct physical examination	8	66.7
Screening for opportunistic infection	8	66.7
Discus issues of reproductive health	8	66.7
Support for disclosure	7	58.3
Reviewing need of partner notification	7	58.3
Reviewing ARV drug adherence	7	58.3
Reviewing about safe sex practice	8	66.7
Reviewing of HIV infection	8	66.7
Screening for substance abuse	6	50
Discus issues of psychosocial support	7	58.3
Counseling for nutritional support	8	66.7
Screening for STI	8	66.7
Screening for cervical cancer	8	66.7
Calling clients by name	6	50
Encouraging women to ask questions	6	50
Reviewing mothers understanding	6	50
Conduct child growth assessment	7	58.3
Review issues of child immunization	8	66.7
Reviewing issues of infant feeding	8	66.7
Initiating cotrimoxazole therapy	9	75
Review TB risk assessment	8	66.7
Conduct virological test at 6 weeks of age	6	50
Conduct anti-body test at 18 months of age	6	50

As an Option B+ service output, majority; 91.7% of mother infant pair were alive and in their first line recommended treatment regimen in the past one year. However; high DBS result turnaround time and low patient satisfaction level were vital issues needed great attention while the service has been provided (Table 3).

### **Factors attributed to good output service quality**

**High patient retention:** client's belief in the efficacy of ARVs to prevent transmission improvement of their health status, confidentiality, absence of stigma and discrimination, and positive women-health worker relationships were facilitators for high patient retention of women to HIV chronic care after the introduction of Option B+ PMTCT.

*"..... before the introduction of option B+ high patient lost and drop out were documented but now Option B+ was highly accepted by patents" (PMTCT service provider).*

### **Factors attributed to bad output service quality**

**High turnaround time of DNAPCR virological test result:** big issue forwarded by almost all participants was high turnaround time for DNAPCR virological test result communication. Majority, of clients attending the service suggested that DNAPCR result was arrived at the health facility from the central testing unit within 4-6 months time period as explained below;

*"..... I am always worried regarding delay of my new borne baby's HIV virological test result. As you have seen, am receiving exposed infant test result today after six month. Unfortunately, I am very much happy today since his result non-reactive. But the past six months were painful for me" (PMTCT client).*

**Non-functionality of DBS analyzer machine:** as described by most of the service providers, the reason forwarded by experts from the central testing unit for result delay was DBS analyzer machine was frequently non-functioning ;

*"..... I am always communicating using phone with laboratory experts in the central testing unit an issue of DBS result delay but they told me that the machine was under maintenance" (PMTCT Service provider).*

**Table 3:** Health facilities not fulfilling 90% of output service quality performance verification indicators in Mekelle zone, Tigray, Northern Ethiopia [N=12].

<b>Output quality items</b>	<b>No of facilities</b>	<b>Percent</b>
Client satisfaction per standard	7	58.3
Clients with good treatment adherence	8	66.7
Clients involved partner testing	5	41.7
Early infant diagnosis for virological test	6	50
Confirmatory antibody test	7	58.3
DBS result turnaround time per standard	4	33.3
Enrolling HIV positive pediatrics to HIV chronic care	8	66.7
Perform CD4 count as base line during their initial visit	7	58.3
Perform CD4 count at least one as follow up visit	6	50

## Discussion

The primary aim of this study was to evaluate the level of quality of option B<sup>+</sup>PMTCT and to explore factors for good and bad service quality in Mekelle Zone of Northern Ethiopia. Evaluation was conducted based on three quality components suggested in the Donabedian model and under the umbrella of the national guidelines for Option B<sup>+</sup>PMTCT service provision in Ethiopia [17, 19].

Accordingly, the study result showed that the overall level of service quality of Option B<sup>+</sup>PMTCT was rendered as good in one out of six (16.7%) of studied health facilities. Specifically, 33.3% were judged as providing good in terms of input quality but only 25% for the process and output service quality respectively. However, it is important to note that the three quality components are interlinked to each other and the effect of one component had its own impact on the other [19].

This finding was far from pre-determined national target in 2020 [10] and evidences from Southern Ethiopia [14, 30]. The reason for such discrepancies might be due to stretched nature of the second health sector transformation plan and methodological difference in which only client interview was conducted to assess client satisfaction in the later two studies.

Regarding input quality, it was found better provided than its counterparts. The study showed that only 33.3% of the studied health facilities had the necessary inputs to provide quality delivery service. It was relatively lower when compared to some other African countries [31-33]. This discrepancy might be due to variation in national guideline and performance targets that lead variation in service quality. However, the study revealed the finding was almost consistent with a report from Northern and South West Ethiopia [13, 16]. Use of the same quality assessment model (Donabedian) might lead this consistency. From the qualitative finding, poor inventory of resources was a big issue that led availability related constraints in which similar results have been also observed in Southern parts of Ethiopia [30]. This availability related barrier had an impact on the remaining quality components due to the nature of their interrelation [19].

The study also revealed that only one fourth of the study health facilities fulfilled service adherence to process related service delivery of Option B<sup>+</sup> according to the national guideline. This finding was

comparable with evidence from Northern and South West Ethiopia [13, 16]. But lower when compared with evidence from Malawi [28]. Variation of the finding in the later study might be due to their good experience in implementing the service since it was an area in which Option B<sup>+</sup>PMTCT first piloted internationally [29]. Identified barriers for process related factors during an interview were poor service adherence to service standards, work load, and prolonged waiting time which were similarly reported from [30, 34, 35]. This process related factors had serious implications in compromising the overall quality of care currently aspired in 2020[10, 19].

Similar to process quality, the study showed good service quality was archived in one fourth of the studied health facilities in terms of service utilization and satisfaction of mothers of Option B<sup>+</sup>PMTCT. Patient satisfaction is one of the desired items in the measure of output service quality [19]. The overall client satisfaction about the service was reported low (58.3%) which had an impact on service output quality. Qualitative finding suggested that high turnaround time for DBS result communication and prolonged waiting time to get the service genuinely forecasted that significantly affect service output. This finding seems very plausible and significantly associated with other evidences [22, 36-38].

## Conclusions

*The overall level of quality of Option B<sup>+</sup>PMTCT was optimal in insignificant number of facilities. Only, 16.7% of health facilities recognized achieving the overall service quality based on three quality components. To realize the current aspired level of service quality in the country's health sector transformation plan, the three quality components will be kept on eye side by side during service mentoring. This is because the three quality components are interrelated and the effect of one component had an impact on the other [19]. Having this reality, persistent effort in view of Donabedian's theoretical framework will also improve the overall service quality.*

## Study limitations

The model used in this study had its own drawbacks that considered only linear assumption that do not infer casual relationships. In measuring process quality, over estimations of findings could happen due to either Hawthorn or social desirability biases during service observations. Use of small sample size may affect finding generalizability but in process evaluation generazability is not an issue. In addition, rigor statistical test was not done since it was program based process evaluation

## List Of Abbreviations

MTCT: Mother to Child Transmission; DBS: Dried blood spot test; HIV: Human -Immune -Virus; MNCH: Maternal, Neonatal, and Child Health; ART: Antiretroviral Therapy; ARV: Antiretroviral Medication; PMTCT: Prevention of Mother-to-Child Transmission; WHO: World Health Organization; IEC: Information, Education, and communication

# Declarations

## Ethical approval and consent to participate

The study protocol was reviewed and approved by Mekelle University School of Public Health ethical review board with a reference and approval no (MUEB/2016). Permission was also received from Tigray Regional Health Bureau and respective health facilities. Similarly, data collection was conducted if and only if an informed consent was given from the participants.

## Consent for publication

Not applicable

## Availability of data and materials

The datasets used and/or analyzed for the study were available from the corresponding author on reasonable request.

## Competing interests

The authors declare that they have no competing interests.

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## Authors' contributions

KF and AD designed the study; KF was developed the protocol, data analysis, interpretation, and preparing the first draft of the manuscript. All authors were involved in commenting, revising, and approving the final version of the manuscript.

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## Figures

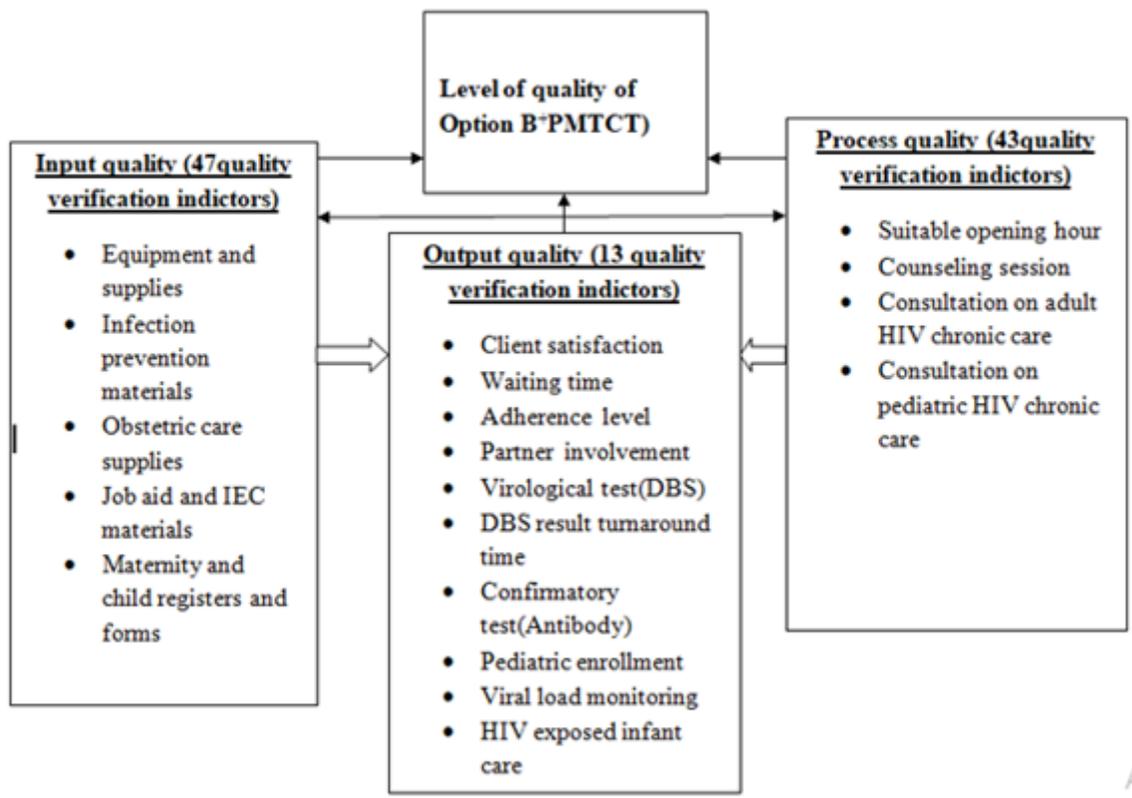
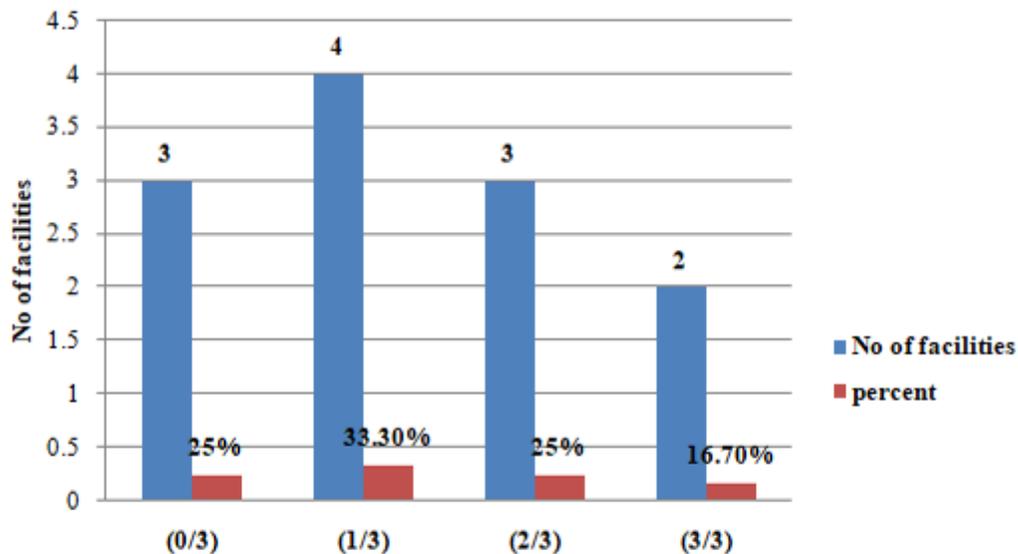


Figure 1

Conceptual framework for assessing quality of OptionB+PMTCT adopted from [17-19]



[ Note: (0/3):no of facilities not achieved any of the three quality components;(1/3): no of facilities achieved any one of the three quality components;(2/3): no of facilities achieved two of the three quality components;(3/3): no of facilities achieved all three quality components]

Figure 2

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [OptionBXLdetailqualityscore.xls](#)