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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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 from February to April 2016 in Northern Ethiopia. The quality of service delivery was assessed in 12 health facilities based on Donabedian input-process-output quality components. It employed mixed method approach involving both quantitative and qualitative data. Facilities were categorized rendering good input service quality if scored 100 % as per national guideline; whilst, 90 % and more for process and output quality components respectively. The emerged themes of factors for good and bad service quality from content analysis were then thematically fitted to donabedian themes.

Results: Overall 2 of 12 (16.7%) facilities fulfilled all the three quality components according to predetermined judgment criteria. The input quality was better than their counterpart; in which it was judged as good in 33.3% of facilities. Besides, one fourth of them were realized process and output quality. We identified multiple barriers and facilitators for good and bad service quality in respective quality components influencing quality of care.

Conclusion: Only 16.7% of facilities declared the overall quality in all three dimensions according to service delivery guideline. The desired level of quality will be realized if and only if the three quality components would be kept on eye side by side in line with identified facilitators and barriers for good and bad service quality.

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^{+}) 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^+) 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+ 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^+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+ 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. The level of quality of Option B+ PMTCT was articulated considering three predetermined quality components (Input-Process-Output) in which each performance verification standards stated in the national guide line has been achieved during service provision in

respective quality components[17,19] . This oversee an evidence for the overall service quality targeted in the country's health sector transformation agenda [10]. However, no study tried to assess level of quality of Option B^+PMTCT services provision with respect to the three predetermined quality components. Therefore, the study aimed to assess level of quality of Option B^+PMTCT service provision in public health facilities in Mekelle Zone, Northern Ethiopia using Donabeidan quality assessment model.

[Figure 1]

Methods

Aim

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

Study design

The study has been 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 [21] census, the projected total population of Mekelle is 320,000. 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^+PMTCT under their MNCH continuum of care. The study period was from February to April 2016.

Sampling and Sample size

The study took place among 12 purposively selected public health facilities providing Option B^+PMTCT under MNCH continuum of care. Similarly, 168 mother infant pairs were included for the study that had been completed Option B^+ follow up visits in the previous one year prior to data collection period. Besides, 12 HIV exposed infant follow up charts were subjected for chart review. The clients who participated for observation and interviews were a convenience sample while the service had been provided at selected facilities. The intention was to observe 10 sessions of Option B^+ service consultations from each facility during each round of data collection. However, this was not possible since too few women came for Option B^+PMTCT services while data collectors were present at the facility. Therefore, none participatory observation was conducted on 60 clients five from each facility. After service consultation, a total of 30

volunteered clients were subjected for exit interview. We also conducted 12 in-depth interviews with healthcare providers until the required information saturation was achieved.

Inclusion criteria to recruit study participants were considering those clients who were under continuous follow up in the previous year before data collection. In addition, their voluntarism during consenting process also considered. 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 service quality. Three data collectors were recruited for facility inventory, non-participatory observation and record review. Their professional qualification is Master Degree in public health. They had been also working for more than three years under MNCH continuum of care.

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 in 12 health facilities 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^{+}PMTCT service provision under MNCH continuum of care. See list of input quality verification variables (Additional file 1).

A total of 43 performance verification standards articulated for assessing process quality dimension [16, 17]. Observation of Option B+ service consultation sessions under MNCH continuum of care was performed to assess client counselor interaction, adequacy, compliance and quality of the counseling sessions. See list of process quality verification variables (Additional file 1).

Output quality was assessed using 13 items adopted from national guide line [17, 18]. Record review was conducted among 168 mother infant pair from maternity record. While, 12 HIV exposed infant follow up charts were reviewed to summarize service outputs of adult and pediatric HIV chronic. See list of process quality verification variables (Additional file 1).

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 is 100 % [10], and 90% or more for process, output, and overall quality performance standards [10, 22]. See the score of each variable for respective quality components (Additional file 1).

The interviews were conducted by lead principal investigator, assisted by research adviser. The interview took 30–40 minutes. 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. The aim was to explore their perception about 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^+ PMTCT service provision [15].

Process dimension: this dimension used to reflect how service providers adhere to service standards during service consultation of Option B^+PMTCT service in MNCH unit [16].

Output dimension: used to evaluate the ultimate service result of Option B^+PMTCT service and patient satisfaction level [15].

Overall quality: this particular dimension was determined by combining predetermined three quality components; input, process, and output [13].

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 [16].

Data quality assurance

To enhance data quality, data collectors who had experienced and trained on Option B^+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. We piloted the tools in two sites (health facilities), which were not among the included research sites, and the necessary adjustments were made based on these pilots. For instance two missed performance indicators of process quality components were modified. During the data collection period, there was a strict supervision and completed questionnaires were checked on a daily basis by principal investigator to assure the reliability of the data. Similarly, use of mixed method approach and direct observation assured the validity and objectivity of the data.

Data management and analysis

Quantitative data were coded, cleaned, and entered into EPI info version 7 and then exported and analyzed using SPSS version 21 software for windows. The percentage of verification criteria achieved was calculated. Descriptive statistics were used to describe the prevalence of input, process, and output related service quality verification standard for each facility.

The principal investigator who had an experience on qualitative data analysis transcribed and translated the qualitative data with reference to the Tigrigna audio recordings for clarification. The coding framework followed the topic guide and texts were coded based on three categories (facilitators and barriers for good and bad service quality in respective three quality components) in which later three broad themes were emerged (facilitators and barriers for input service quality, facilitators and barriers for process service quality, facilitators and barriers for output service quality). Finally, thematic content analysis was conducted basing reviewed literature on similar studies [23-25] following data familiarization (reading and re-reading of the transcripts).

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^{+}PMTCT under MNCH continuum of care.

The study showed that the overall level of service quality of Option B^{+}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).

[Figure 2]

Table 1: Summarized themes that emerged from the data analysis and their relationship to the predetermined categories that are reflective of Donabedian's model.

Categories	Themes	Sub-themes
Input service quality	**Theme 1:** Reasons for good input quality	Good partnership
	Theme 2: Reasons for bad input quality	Resource constraint
Process service quality	**Theme 1:** Reasons for good process quality	Service integration
		ART initiation regardless of CD4 count
		Simplicity of ARV drug regimen
	Theme 2: Reasons for bad process quality	Poor service compliance
		prolonged waiting time
		Work load
Output service quality	**Theme 1:** Reasons for good output quality	Patient retention
	Theme 2: Reasons for bad output quality	high DBS result turnaround time

Regarding input service quality, the study revealed that majority of the health facilities were equipped with clinical care supplies and drugs for Option B^+PMTCT service provision. Long life ARV regimen (TDF+3TC +EFV), and other basic obstetric care supplies for Option B^+ were not reported as stock out for the past one year (additional file one). However; critical input related items for Option B+ 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 2).

Table 2: Health facilities not fulfilling 100% of input service quality performance verification indicators in Mekelle zone, Tigray, Northern Ethiopia [N=12].

Input quality items	No of facilities	Percent
Human resource and infrastructure		
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^+	6	50
Medical supplies		
Cotrimoxazole prophylaxis	8	66.7
DBS sample collection kit	7	58.3
Job aid IEC materials		
PMTCT broachers	7	58.3
PMTCT leaflets	5	41.7
Technical guide line	7	58.3
PMTCT cure card	8	66.7
Patient forms and registers		
Referral slips	8	66.7
Referral linkage slips	8	66.7
Appointment cards	8	66.7

Theme 1: Reasons for good input quality

Majority of service providers recognized that building team work among program directors and district level experts enabled them to identify availability related factors on time. This is an identified contributing facilitator for facilities to be judged providing good input service quality (Figure 1). This is illustrated clearly by the following service provider:

"..... we have been conducted weekly meetings with program managers and district level experts with availability related factors and prepare an action plan to resolve input related constraints on time" (PMTCT service provider ≠12).

Theme 2: Reasons for bad input quality

Consistent with quantitative findings (Table 1), health workers expressed their opinion on shortage of trained human workforce and supply chain issues for Option B+ as a barrier for input related factor. Sometimes, trained staffs were also preferred to serve health care services other than MNCH unit as described below:

"..... Imagine only two health care providers trained on Option B^+ and serving more than an average of 80 clients per day. Having this reality, how can we provide quality? Therefore, without allocating appropriate number of trained health care providers , only integrating the service to MNCH unit may not be successful" (PMTCT service provider ≠4).

"..... Some drug list used for opportunistic infection such as co-trimoxazole prophylactic therapy was reported as stock out for more than six months in the past year lack of transportation was a reason given for us when requested" (PMTCT service provider≠8).

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 included 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 service consultation (Table 3).

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

Process quality items	No of facilities	Percent
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

Theme 1: Reasons for good process quality

Task shifting to scale up Option B^+ by integrating the delivery of Option B^+ ART initiation as one service package in MNCH unit, initiation of ARV regardless of CD4 count, and simplicity of ARV regimen was greatly appreciated by majority of service providers and clients during an interview:

***"……** discrimination is not my concern for the past two years after the adoption of Option B^+. I am confident enough to attend my follow up visit together with HIV negative mothers in MNCH clinic. This is because; we all received our follow up care in one room and with the same health professionals" (PMTCT client ≠ 18).*

"……Before the introduction of Option B^+ 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 for ART initiation but after its adoption, patient high patient retention was documented " (PMTCT service provider ≠ 2).

***"……** 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≠ 21).*

***"……**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 ≠5).*

Theme 2: Reasons for bad process quality

Majority of service providers had good experience regarding Option B^+. However, one health care provider reported her experience of considering CD4 count as criteria for initiating ART which resulted poor service compliance with service standards. Some other providers criticized its integration as creating workload and prolonged waiting time as described as follows:

***"……** 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 service provider*

≠10).

***"……** before the introduction of Option B+ 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 service provide≠3).*

***"……** 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 ≠19).*

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 which needed great attention while the service has been provided (Table 4).

Table 4: Health facilities not fulfilling 90% of output service quality performance verification indicators in Mekelle zone, Tigray, Northern Ethiopia [N=12].

Output quality items	No of facilities	Percent
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

Theme 1: Reasons for good output quality

As described by majority of service providers, client's belief in the efficacy of ARVs, absence of stigma and discrimination were facilitators for high patient retention as articulated below:

"..... 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 provide≠5).

Theme 2: Reasons for bad output quality

Big issue forwarded by almost all participants was high turnaround time for DNAPCR virological test result communication which was arrived within 4-6 months time period at the health facility from the central testing unit 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 ≠28).

"..... I am always communicating using mobile 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≠ 7).

Discussion

The primary aim of this study was to evaluate the level of quality of option B^+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^+PMTCT service provision in Ethiopia [17, 19].

Accordingly, the study result showed that the overall level of service quality of Option B^+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 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 by 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 lead 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+ 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^{+}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 for Option B^{+}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+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. Since the three quality components are interrelated and the effect of one component had an impact on the other [19]. We found multiple factors that influenced positively and negatively service quality. Team works, service integration, ART initiation regardless of CD4 count are identified facilitators for improving service quality. On the other hand, shortage of trained staffs, service task shift to other unit of care after training, high DBS result turnaround time were common identified barriers that hinder service improvement.

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 generalizablity but in process evaluation generazablity is not an issue. In addition, rigor statistical test was not done since it was program based process evaluation and use of sophisticated statistical analysis is not a must unlike outcome evaluation [39].

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

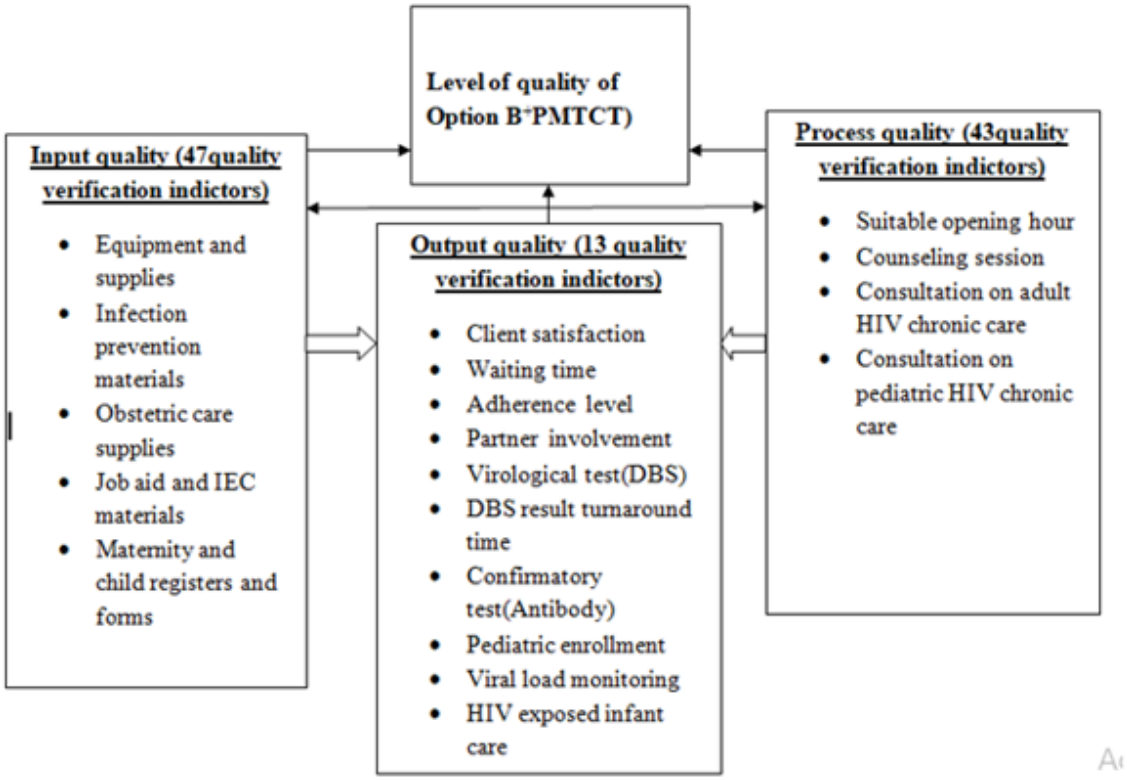
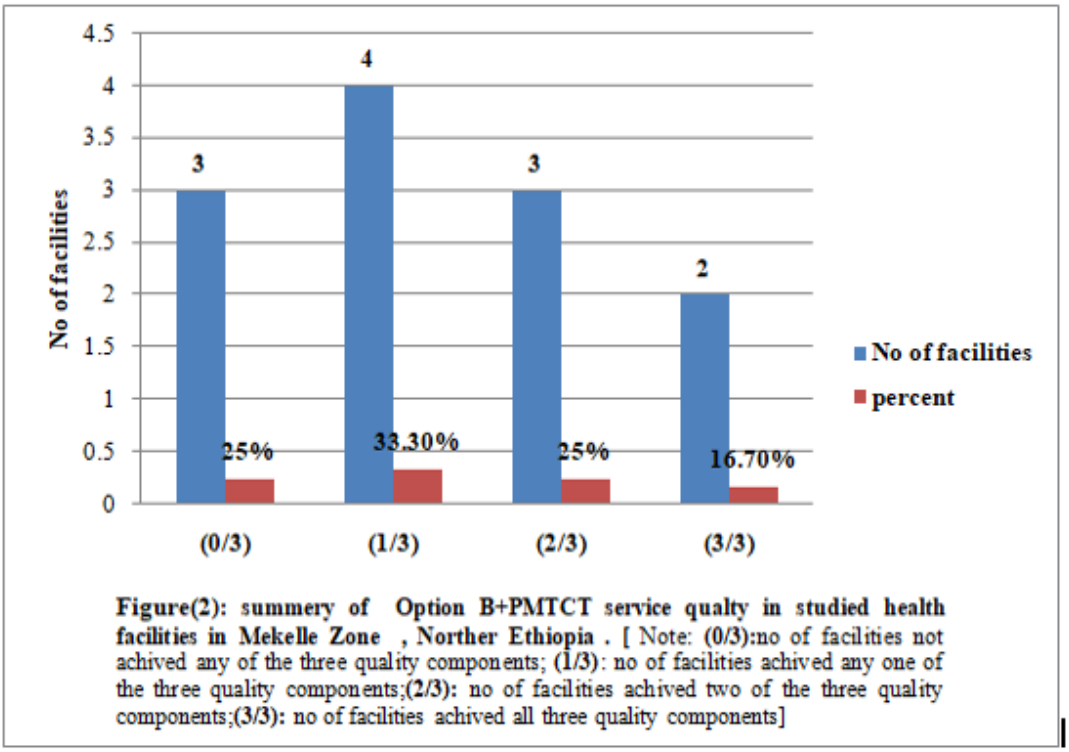


Figure (1): Conceptual framework for assessing quality of OptionB+ PMTCT adopted from [17-19]

Figure 1

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



Figure(2): summery of Option B+PMTCT service qualty in studied health facilities in Mekelle Zone , Norther Ethiopia . [Note: **(0/3)**:no of facilities not achived any of the three quality components; **(1/3)**: no of facilities achived any one of the three quality components;**(2/3)**: no of facilities achived two of the three quality components;**(3/3)**: no of facilities achived all three quality components]

Figure 2

Summary of OptionB+PMTCT service quality in studied health facilities in Mekelle Zone, Northern Ethiopia.

Supplementary Files

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

- OptionBXLdetailqualityscore.xls