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Perceived quality of care among households ever enrolled in a community-based health insurance scheme in two districts of northeast Ethiopia: a community-based, cross-sectional study

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ABSTRACT

Objectives To examine how clients perceived the quality of healthcare they received and identify associated factors both at the individual and facility levels.

Design A community-based, cross-sectional study.

Setting Two rural districts of northeast Ethiopia, Tehuledere and Kallu.

Participants 1081 rural households who had ever been enrolled in community-based health insurance and visited a health centre at least once in the previous 12 months. Furthermore, 194 healthcare providers participated in the study to provide cluster-level data.

Outcome measures The outcome variable of interest was the perceived quality of care, which was measured using a 17-item scale. Respondents were asked to rate the degree to which they agreed on 5-point response items relating to their experiences with healthcare in the outpatient departments of nearby health centres. A multilevel linear regression analysis was used to identify predictors of perceived quality of care.

Results The mean perceived quality of care was 70.28 (SD=8.39). Five dimensions of perceived quality of care were extracted from the factor analysis, with the patient-provider communication dimension having the highest mean score (M=77.84, SD=10.12), and information provision having the lowest (M=64.67, SD=13.87). Wealth status, current insurance status, perceived health status, presence of chronic illness and time to a recent health centre visit were individual-level variables that showed a significant association with the outcome variable. At the cluster level, the work experience of healthcare providers, patient volume and an interaction term between patient volume and staff job satisfaction also showed a significant association.

Conclusions Much work remains to improve the quality of care, especially on information provision and access to care quality dimensions. A range of individual-level and cluster-level characteristics influence the perceived quality of care. For a better quality of care, it is vital to optimise the patient-provider ratio and enhance staff job satisfaction.

INTRODUCTION

Healthcare providers and patients define the quality of care differently and attach

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study tried to assess the quality of care from the clients' point of view using a validated multidimensional scale.
⇒ This is the first cross-sectional study in Ethiopia, which considered health centre (cluster) level variables that have an association with perceived quality of care.
⇒ The observed association between current insurance status and perceived quality of care could be due to an endogeneity issue created by omitted variables.
⇒ The use of a relatively small cluster sample size in this study may limit the accuracy of the estimates in the multilevel modelling.
⇒ Because of the cross-sectional nature of the study, it is impossible to establish a cause-and-effect relationship.

varying levels of importance to its attributes. When assessing the quality of care, healthcare professionals tend to prioritise technical competence, while patients place a high value on patient-centeredness, amenities and reputation.[1] The emphasis on healthcare quality measurement has shifted away from the viewpoints of healthcare providers to people-centred approaches that rely on patient perceptions.[2–4] Patients' perception of healthcare quality has become an essential element of quality measurement due to its link with health service utilisation. It is based on a mix of patient experiences, processed information and rumours.[5]

Patient experience surveys elicit data on the transactional components of care, which are process-related, as well as the interpersonal interactions that occur over the course of care.[6] Individuals receiving care are asked about their experiences of health facility encounters to report if particular processes or

events occurred.[7] Patient experience measurements have received increased attention and are widely employed to inform quality improvement, and pay-for-performance.[8] Patient experience is consistently and positively associated with patient safety and clinical effectiveness, adherence to prevention and treatment recommendations and technical quality of care.[9 10]

Patient experience is a reflection of the patient journey, which consists of the myriad interactions patients have with healthcare providers and the healthcare system over time and in a variety of settings. It is shaped by the healthcare team, the organisation and the surrounding policy and regulatory environment. A negative patient experience is a proxy for a larger health system failure, underscoring the need to apply a systems approach to improving healthcare quality.[4]

Quality of healthcare is vital to the success of universal health coverage (UHC) initiatives, like community-based health insurance (CBHI). To achieve the desired outcomes, the development of CBHI schemes must be accompanied by improvements in healthcare quality.[2 4 11–13] To build sustainable CBHI schemes, members must believe that the benefits of healthcare provided via health insurance coverage outweigh the benefits of not being insured.[14] Patients' positive experiences with the quality of care provided under insurance schemes increase their trust in the health system and insurance schemes.[15 16] As a result, they are more likely to use healthcare services and participate in health insurance plans.[17] If insured clients are unable to access high-quality services, they lose trust in service providers and seek care elsewhere,[18] making them less likely to pay premiums.[19 20] Low perception of healthcare quality further deters people from interacting with the health system in the future.[4]

Although increased healthcare coverage is promising with the implementation of CBHI initiatives, quality of care remains a key impediment to achieving UHC.[13 21] For example, >8 million deaths amenable to a high quality of care occurred in low-income and middle-income countries, making the poor quality of care a bigger obstacle to mortality reduction than lack of access to care.[21] Poor quality of care is also a major issue that jeopardises the long-term viability of many CBHI schemes.[11 22] Findings of systematic reviews revealed that the quality of care was a key factor that influenced enrolment and renewal decisions of CBHI membership.[23 24] Some quality concerns include 'unavailability and perceived poor quality of prescribed medicines, misbehaviour of health professionals and the differential treatment of the insured in favour of the uninsured patients, unclean hospital environment, long queues, lack of diagnostic equipment and long waiting hours to obtain healthcare.[24]

To promote optimal utilisation, stable finance and better outcomes, the quality of healthcare must be monitored on a regular basis.[18] Previous studies in Ethiopia focused on surveys of client satisfaction and did not employ multidimensional measurement scales.[25 26] To our knowledge, the quality of care delivered under the CBHI

in Ethiopia has never been investigated using multidimensional metrics from the perspective of service users at the community level. There is also a paucity of literature on facility-level variables that influence the quality of care. Therefore, the purpose of this study was to examine the perceived quality of care (PQoC) from the perspective of clients and identify associated factors at the individual and facility level.

Improving the quality of care under the CBHI is among Ethiopia's top priorities in its health sector strategic plan.[27] The findings of this study will inform relevant stakeholders on the current state of clients' perceptions of the quality of care and will be an essential input for quality improvement initiatives. It will also provide useful information for decision-makers to address challenges in the country's endeavours to establish higher-level insurance pools.

METHODS

Study setting and population

A community-based cross-sectional study was conducted in rural parts of two neighbouring districts in northeast Ethiopia, Tehuledere and Kallu. Tehuledere is divided into 20 rural and 7 urban *Kebeles* (subdistricts) with a population of 145 625, of which 87.5% reside in rural areas. There are five health centres and one primary hospital in the district. It was one of the 13 districts in Ethiopia where CBHI was piloted in 2011. The scheme was introduced in Kallu district after 2 years, in July 2013. Kallu is divided into 36 rural and 4 urban *Kebeles* and has 9 health centres. It is the most populous district in the zone, with a population of 234 624, of which 89.11% live in rural areas.[28]

The study population of interest was rural households who had been ever enrolled in the CBHI scheme before January 2020. To minimise recall bias, households who had not used healthcare in the 12 months before data collection were excluded from the study.

Sample size and sampling procedure

The sample size was calculated using MedCalc software by assuming a mean difference of two independent groups. A previous study on PQoC reported mean scores of 5.2 and 5.4 with SD of 0.8 and 0.7 among insured and uninsured respondents, respectively.[29] Using this output and assuming an 80% power, 95% confidence level and equally sized groups, a sample size of 446 was calculated. Considering a design effect of 1.5 attributable to multistage sampling and a potential non-response rate of 10%, the effective sample size was estimated to be 736 households. An alternative sample size of 1257 was calculated for a companion article as part of a research project examining the sustainability of a CBHI in Ethiopia.[30] Among those, 1081 eligible households participated in this study. Furthermore, 194 healthcare providers from 12 health centres participated in the study to provide cluster-level data.

The study participants were recruited using a three-level multistage sampling approach. First, 12 clusters of *Kebeles* organised under a health centre catchment area were selected. Then, 14 rural *Kebeles* were drawn randomly using a lottery method proportional to the number of *Kebeles* under each cluster. Accordingly, five *Kebeles* from Tehulederie and nine from Kallu were included. A list of households who have ever been enrolled in the CBHI was obtained from the membership registration logbook of each *Kebele*. The required sample was generated at random from each *Kebele*, proportional to the number of households who have ever been enrolled in the scheme, using random number generator software.

Data collection and measurement

The data were collected from 4 February to 21 March 2021. Individual-level data were collected through face-to-face interviews with household heads at their homes or workplace using a structured questionnaire via an electronic data collection platform. The data collectors submit the completed forms to a data aggregating server daily, which allowed us to review the submissions and streamline the supervision process.

The PQoC, which is the outcome variable of interest, was measured using a 17-item scale designed after a thorough review of validated tools.[29 31–34] Respondents were asked to rate the extent to which they agreed on a set of items relating to their experiences with the healthcare they received in the outpatient departments of nearby health centres. Each item was designed on a 5-point response format with 1—strongly disagree, 2—disagree, 3—neutral, 4—agree and 5—strongly agree. The summary scores for the PQoC and its dimensions were calculated for individual respondents by adding the scores of each item. This gives a scale ranging from 17 (1×17) to 85 (5×17) for the overall PQoC score. For quality dimensions consisting of three and four items, the scale ranges from 3 to 15 and 4 to 20, respectively. When reporting the results, the scores were arithmetically transformed to a scale of 20–100.[35] This allows the comparison of mean scores of PQoC, its dimensions and each measurement item on a common scale.

Wealth index was generated using the principal component analysis method. The scores for 15 types of assets were translated into latent factors, and a wealth index was created based on the first factor that explained most of the variation. The study households were grouped into wealth tertile—lower, medium and higher based on the index. Perceived health status was measured based on a household head's subjective assessment of the health status of the household, and was rated as 'poor, fair, good, very good or excellent'. However, for analysis purposes, it was recategorised into 'fair, good and very good', by merging the two extreme response categories to the next option due to fewer replies.

Before the data collection, the questionnaire was pretested on a sample of 84 randomly selected participants in one *Kebele*. As part of the pretest, a cognitive interview was conducted on selected items using the verbal probe technique among eight respondents to determine if the items and response categories were understood, and interpreted by the potential respondents as intended. Accordingly, the phrasing of some items and response options were modified, and some items were omitted.

Cluster-level data were collected from 12 health centres that provide healthcare for the population in the sampled *Kebeles*. Patient volume data were obtained by reviewing the monthly service delivery reports of health centres, while data related to work experience, affective commitment and job satisfaction were collected through a self-administered questionnaire among healthcare providers who worked >1 year in the current facility.

Patient volume was measured using the daily average number of patients managed by a healthcare provider in the outpatient department. It was calculated by dividing the number of patients who visited the health centre in the last 6 months before the study by the number of working days, and then by the number of consultation rooms in each health centre.[36] Affective commitment and job satisfaction were composite variables that were assessed using a 5-point Likert scale. Affective commitment was measured with a seven-item questionnaire based on a modified version of the Meyer *et al* scale, which had previously been used in a hospital setup.[37] Staff job satisfaction was measured using a 10-item scale, which was adapted from a previous study among healthcare workers in Ethiopia.[38] Average affective commitment and job satisfaction scores were computed for each health centre.

Data analysis

The data were analysed using Stata V.17.0. Exploratory factor analysis was performed to assess the validity of the quality measurement scale. Bartlett's test of sphericity and Kaiser-Mayer-Olkin's (KMO) measure of sampling adequacy were performed to assess the appropriateness of the data for factor analysis. The principal component factor method of extraction and Promax rotation with Kaiser normalisation was used. The Eigenvalue greater than one decision rule was used to determine the appropriate number of factors to be extracted. Items with both loadings and communalities below 0.40 were removed from the analysis.[39] Correlation coefficients were used to test construct validity. Item-total score correlation, dimension-total score correlation and dimension inter-correlation were computed. The total score was the mean score of the ratings for all items of the scale, and the dimension score was the factor score. A questionnaire has good construct validity when the item-total score correlations are >0.40, dimension intercorrelations are <0.80 and dimension-total score correlations are higher than dimension intercorrelations.[32] Cronbach's alpha coefficients were generated for each dimension to assess the internal consistency. The reliability of the scale was considered acceptable if Cronbach's alpha coefficient was 0.60 or higher.[39]

To compare mean scores of PQoC and its dimensions among subgroups, an independent t-test and a one-way analysis of variance (ANOVA) with Tukey's post hoc test were used. Because the outcome variable was considered a continuous variable, a multilevel linear regression model was fitted to identify its predictors. The PQoC was assumed to be influenced by the characteristics of households (individual-level variables) as well as the characteristics of health centres (cluster-level variables). Cluster-level data were linked to individual-level data based on the usual source of healthcare for each study participant. Considering the hierarchical structure of the data, where patients are nested within health centres, a two-level linear regression model was applied. In this study, there were 12 health centres (level-two units), hence the restricted maximum likelihood estimation approach was employed because it is appropriate for smaller cluster sizes.[40] Four models were estimated to choose the one that best fits the data. The first model or the null model (a model without predictors) is given by:

$$Y_{ij} = \gamma_{00} + u_{0j} + \varepsilon_{ij} \qquad (1)$$

The null model estimates three parameters: the average intercept (γ_{00}), the between-health centre error, or deviation, from the average intercept (u_{0j}), and the individual-level residual, or variation in individual scores within health centres (ε_{ij}). The second model estimated PQoC (Y_{ij}) for individual household i at health centre j. We treat PQoC as a function of a matrix of individual-level variables (X_{ij}), which include age, gender, education and marital status of the household head; wealth status; household size; current health insurance status; the presence of chronic illness in the household; perceived health status and time to a recent visit to a health centre, and expressed as:

$$Y_{ij} = \begin{aligned} &\gamma_{00} + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + u_{1j}X_{1ij} + u_{2j}X_{2ij} \\ &+ \ldots + \gamma_{n0}X_{nij} + u_{nj}X_{nij} + u_{0j} + {}_{ij} \end{aligned} \qquad (2)$$

where u_{1j}, $u_{2j} \ldots u_{nj}$ indicate the random error terms connected to each X_{ij}.

The third model estimated the PQoC as a function of cluster-level variables (Z_j) that include average work experience, affective commitment and job satisfaction of healthcare providers and patient volume. The model accounts for the variation among health centres and explains it in terms of these characteristics. It is given by:

$$Y_{ij} = \gamma_{00} + \gamma_{01}Z_{1j} + \gamma_{02}Z_{2j} + \ldots + \gamma_{0n}Z_{nj} + \gamma_{11}PV_j \times JS_j + u_{0j} + {}_{ij} \qquad (3)$$

where $PV_j \times JS_j$ indicates an interaction term between patient volume and job satisfaction in which job satisfaction was assumed to moderate the effect between patient volume and PQoC. The interaction effect was tested by plotting the marginal effects of interaction terms. The two variables were centred towards the grand mean to facilitate the interpretation of the coefficients. By combining models II and III, the fourth model estimated the PQoC as a function of both individual-level and cluster-level variables, and can be written as:

$$Y_{ij} = \begin{aligned} &\gamma_{00} + \gamma_{10}X_{1ij} + \gamma_{20}X_{2ij} + u_{1j}X_{1ij} + u_{2j}X_{2ij} \\ &+ \ldots + \gamma_{n0}X_{nij} + u_{nj}X_{nij} + \gamma_{01}Z_{1j} + \gamma_{02}Z_{2j} \\ &+ \ldots + \gamma_{0n}Z_{nj} + \gamma_{11}PV_j \times JS_j + u_{0j} + {}_{ij} \end{aligned} \qquad (4)$$

where γ_{10} and γ_{01} are the vector of coefficients of n explanatory variables whose values are at X_{1ij}, $X_{2ij}, \ldots, X_{nij}$ for the ith individual within the jth cluster, and Z_{1j}, $Z_{2j}, \ldots, Z_{nj}$ for the jth cluster, respectively. The intercept γ_{00} and slopes γ_{01}, γ_{10} and γ_{11} are fixed effects, while u_{0j}, u_j and ε_{ij} are random effects.

This multilevel regression decomposes the total variances into two independent components: σ_e^2, which is the variance of individual-level errors ε_{ij}, and σ_{u0}^2, which is the variance of cluster-level errors u_{0j}. From this model, we can define the intraclass correlation (ICC) by the equation[41]:

$$ICC = \sigma_{u0}^2 / \left(\sigma_{u0}^2 + \sigma_e^2 \right)$$

The ICC and proportional change in variance (PCV) were used to report the measures of variation (random effects). The need for multilevel analysis, which considers cluster-level factors, was tested using the ICC. The ICC shows the variation in PQoC accounted for cluster-level characteristics. Statistically significant variability between health centres justifies the need to consider cluster-level factors.[42] The PCV expresses the change in the cluster-level variance between the empty model and models with more terms and is calculated by PCV=(V_A−V_B)/V_A, where V_A is the variance of the null model and V_B is the variance of the model with more terms. It measures the total variation explained by individual-level and cluster-level factors.

The measures of association (fixed-effects) estimate the association between the PQoC score and various explanatory variables. The existence of a statistically significant association was determined at p values of <0.05. The degree of the association was assessed using regression coefficients, and their statistical significance was determined at a 95% CI. Models were compared using the Deviance Information Criteria (DIC) and Akaike Information Criteria (AIC). The best-fit model was determined to have the lowest DIC and AIC values. The preliminary analysis confirmed no violation of the assumptions of normality, linearity, homoscedasticity and multicollinearity. The presence of multicollinearity was determined using the variance inflation factor with a cut-off point of 5.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS
Background characteristics of the study participants

The household survey included 1081 respondents who had visited a health centre at least once in the previous 12 months prior to the study. The average age of the study participants was 49.25 years (SD=12.07), with slightly more than half (51.34%) between the age ranges of 45

Table 1 Independent t-test and one-way ANOVA comparing mean scores of the PQoC (20–100 scale) across respondent characteristics in two districts of northeast Ethiopia, 2021

Variable	Categories	N=1081	%	PQoC score M	SD	t-test/F-test
Age (years)	25–44	389	35.99	69.97	7.78	1.08
	45–64	555	51.34	70.26	8.52	
	65+	137	12.67	71.20	9.49	
Gender	Men	938	86.77	70.15	8.21	−1.31
	Women	143	13.23	71.13	9.51	
Marital status	Divorced/Widowed	78	7.22	71.61	10.95	1.46
	Married	1003	92.78	70.17	8.16	
Attend formal education	No	855	79.09	70.29	8.48	0.07
	Yes	226	20.91	70.24	8.05	
Household size	<Five	403	37.28	70.85	8.63	1.73
	≥Five	678	62.72	69.94	8.25	
Wealth tertile	Lowest	361	33.40	71.77	9.15	8.83**
	Medium	360	33.30	69.36[b]	8.16	
	Highest	360	33.30	69.70[b]	7.62	
Current insurance status	Ex-member	139	12.86	67.66	9.65	−3.96**
	Active member	942	87.14	70.66	8.13	
Perceived health status	Fair	207	19.15	72.28	8.84	8.04**
	Good	511	47.27	70.08[b]	7.83	
	Very good	363	33.58	69.41[b]	8.73	
Chronic illness	No	803	74.28	69.54	8.29	−4.96**
	Yes	278	25.72	72.40	8.33	
Last health centre visit	<3 months	499	46.16	70.75[b]	8.99	4.78*
	3–6 months	239	22.11	70.94[b]	7.60	
	6–12 months	343	31.73	69.13	7.92	
Total		1081	100	70.28	70.28	

Based on Tukey's post hoc test, mean values sharing letter 'b' are not significantly different in the group at the 5% level.
*P<0.01, **p<0.001.
ANOVA, analysis of variance; PQoC, perceived quality of care.

and 64 years, and 12.67% being 65 years and older. Of the total study participants, 938 (86.77%) were men, and 1003 (92.78%) were currently married. One-fifth of the study participants (20.91%) attended formal education, and 62.72% had a household size of five or above.

Nearly 90% of the households (87.14%) were active members of the CBHI scheme at the time of the study. A quarter of households (25.72%) had one or more individuals with a known chronic illness informed by a healthcare provider. One-third of respondents (33.58%) rated their household health status as very good, while 207 (19.15%) and 511 (47.27%) rated it as fair and good, respectively. Nearly half of the households (46.16%) had visited a health centre within 3 months prior to the study, while 31.73% and 22.11% had their most recent visit to a health centre before 6–12 and 3–6 months, respectively (table 1).

The median work experience of healthcare providers involved in this study ranges from 3 to 10 years. The mean scores of affective commitment and job satisfaction were 29.00 and 30.95 (SD=2.08 and 3.17), respectively.

The average patient volume was 32.17 per day per care provider, with a range of 19–43 (SD=7.83).

Factor analysis

Sampling was adequate as measured by the KMO (0.83), and Bartlett's test of sphericity was significant (p<0.001). Two items were removed from further analysis due to loadings below 0.40, and one item was removed due to low communality. The factor analysis extracted five dimensions that explained 59.25% of the total variation (online supplemental file 1). The item-total score correlations ranged from 0.268 to 0.622, four items had correlations <0.40. The dimension intercorrelations ranged from 0.031 to 0.434, all of which were less than the 0.80 criterion, indicating that each dimension was distinct enough to be considered an independent measure. Dimension-total score correlation ranged from 0.417 to 0.772, all significant at a p value of 0.001, and are higher than dimension intercorrelations. The scale was tested for reliability and had an overall Cronbach's alpha coefficient of 0.804. The Cronbach's alpha coefficients for the

five dimensions exceeded 0.60, except for the access to care subscale, which had an alpha coefficient of 0.531.

Perceptions of the quality of care

The minimum and maximum PQoC scores were 37.65 and 97.65, respectively. The mean score was 70.28 (95% CI 69.77 to 70.78) with an SD of 8.39. The aggregated mean score at the health centre level ranges from 64.94 to 74.06. Patient-provider communication had the highest mean score (M=77.84, SD=10.12) of the five quality dimensions, while information provision had the lowest score (M=64.67, SD=13.87). The mean score for each measurement item is summarised in the online supplemental file 2.

An independent t-test and a one-way ANOVA were performed to compare the mean scores of PQoC and its dimensions between subgroups. As shown in table 1, there was a significant difference in the PQoC mean score for wealth tertile at p<0.05 (F=8.83, p=0.001). Tukey's post hoc test indicated that the mean score of PQoC for the lowest wealth tertile (M=71.77, SD=9.15) was significantly different from both the medium (M=69.36, SD=8.16) and highest (M=69.70, SD=7.62) wealth tertile. However, no significant difference was seen between medium and high wealth tertile. The ANOVA test also showed that the PQoC mean score showed significant differences based on the respondents' perceived health status and time to a recent visit to a health centre, with (F=8.04, p<0.001) and (F=4.78, p<0.01), respectively. There was a significant difference in the mean score of PQoC between active insurance members (M=3.53, SD=0.41) and ex-members (M=3.38, SD=0.48); t=3.96, p<0.001. The mean PQoC score of households with chronic illness (M=3.62, SD=0.42) was also significantly higher compared with those who did not have a chronic illness (M=3.48, SD=0.42); t=4.95, p<0.001. The results of an independent t-test and a one-way ANOVA that compare the differences in mean scores of the five dimensions between subgroups are displayed in table 2.

The mean PQoC score was significantly different among health centres (F=11.85, p<0.001). The mean scores for the five dimensions were also significantly different among health centres at p<0.001 level: technical care (F=8.66), patient-provider communication (F=6.65), information provision (F=47.42), access to care (F=36.87) and trust in care providers (F=6.98). The mean scores of the PQoC and its dimensions across the 12 health centres are depicted using a radar chart (figure 1). The chart shows a comparison of mean scores on a scale of 10–90. For example, respondents from 11 health centres had a higher perception score on patient-provider communication than other dimensions with less variation, while the information provision dimension was mostly ranked lowest with more variability.

Predictors of perceived quality of care: multilevel analysis

The fixed effects (measures of association) and the random effects (measures of variation) for the multilevel

linear regression model are depicted in table 3. In the null model, 8.5% of the total variance in PQoC was attributed to cluster-level variables. The variability between clusters was statistically significant (τ=5.90, p<0.001). Furthermore, the null model showed a significant improvement in fit relative to a standard linear model, demonstrating the importance of developing a multilevel model. The cluster-level variation in model II remained significant (τ=6.33, p<0.001), with 9.31% of the total variability attributed to differences across clusters. The PCV was negative in this model, indicating that individual-level characteristics did not play a role in explaining the variation between clusters. In model III, cluster-level variables accounted for just 1.33% of the variation in PQoC across clusters. The PCV showed that cluster-level variables explained 85.42% of the variation between health centres, indicating the importance of including cluster-level characteristics to build a more robust explanatory model. We interpreted the results of the regression analysis using model IV, which has the lowest DIC and AIC.

After adjusting for other individual-level and cluster-level factors, the mean PQoC score for households with higher wealth tertile increased by 1.79 points compared with those with lower wealth tertile (b=1.79; 95% CI 0.37 to 3.21). Households who were active members of CBHI at the time of the study had a 2.70-point higher PQoC score than ex-members (b=2.70; 95% CI 1.25 to 4.14). The PQoC score of households who rated their health status as very good was 1.80 points lower compared with those who rated it as fair (b=−1.80; 95% CI −3.31 to −0.29). Compared with households without a chronic illness, those with one or more family members with a chronic illness had a 1.42-point higher perception score (b=1.42; 95% CI 0.22 to 2.63). Time to a recent visit to a health centre was also significantly associated with PQoC score. The mean score for households who had their most recent visit to a health centre before 3–6 months was 1.89 points higher compared with those whose recent visit was within 3 months prior to the study (b=1.89; 95% CI 0.61 to 3.17).

Regarding cluster-level variables, the average work experience of healthcare providers and patient volume had statistically significant associations with PQoC. A 1.07-point improvement in the average PQoC score of health centres was noted for every year's increase in the median work experience of healthcare providers (b=1.07; 95% CI 0.74 to 1.40). An interaction term between patient volume and job satisfaction was positively associated with PQoC, implying that improving staff job satisfaction would buffer or lessen the effect between patient volume and PQoC. At an average staff job satisfaction, a 0.42-point drop in the average PQoC score of health centres was observed for a unit increase in patient volume (b=−0.42; 95% CI −0.50 to −0.33). A one-unit increase in patient volume would only result in a 26% fall in average PQoC if the average job satisfaction is set 1 SD above the mean. This prediction was substantiated by the fact that the margins graph for patient volume showed the flattest slope for higher

Table 2 Independent t-test and one-way ANOVA comparing mean scores of PQoC dimensions (20–100 scale) across respondent characteristics in two districts of northeast Ethiopia, 2021

Variables	N	Technical care		Communication		Information provision		Access to care		Trust in providers	
		M	SD	M	SD	M	SD	M	SD	M	SD
Age (years)											
25–44	389	68.33	15.61	77.60	9.89	62.75[b]	13.73	69.99	11.64	73.59[b]	10.11
45–64	555	68.14	15.19	77.71	10.01	64.60[b]	14.03	69.41	12.04	73.61[b]	10.96
65+	137	69.15	14.44	79.03	11.19	70.36***	12.09	68.25	10.97	70.46**	13.21
Gender											
Men	938	68.36	15.15	77.67	10.17	64.40	13.80	69.34	11.67	73.18	10.80
Women	143	68.48	16.00	78.93	9.81	66.40	14.27	70.31	12.42	73.38	12.37
Marital status											
Divorced/Widowed	78	70.77	14.74	78.80	12.10	70.77***	13.58	67.18	13.03	72.31	14.01
Married	1003	68.15	15.27	77.76	9.96	64.19	13.79	69.65	11.65	73.27	10.75
Formal education											
No	855	68.37	15.41	77.78	10.29	64.43	13.98	69.63	11.64	73.39	11.13
Yes	226	68.20	14.62	78.05	9.54	65.55	13.46	68.89	12.24	72.51	10.56
Household size											
<Five	403	69.10	15.21	78.51	10.07	65.14	14.31	70.37	11.25	73.18	11.94
≥Five	678	67.89	15.25	77.43	10.14	64.39	13.61	68.94	12.04	73.22	10.44
Wealth tertile											
Lowest	361	69.64	14.42	79.56***	9.94	70.21*** a	12.84	68.70	11.49	72.13[a]	13.07
Medium	360	67.11	15.28	76.80[b]	10.57	63.08[a]	14.40	69.00	11.82	73.02*	10.45
Highest	360	68.26	15.93	77.13[b]	9.65	60.69[a]	12.54	70.63	11.94	74.46[a]	9.04
Insurance status											
Ex-member	139	64.75**	15.73	74.29**	12.91	63.13	14.46	67.05**	13.56	70.79**	13.07
Active member	942	68.87	15.10	78.36	9.54	64.89	13.78	69.83	11.44	73.56	10.64
Self-rated health											
Fair	207	71.76[b]	13.73	80.35***	9.55	70.02***	12.87	68.62	11.51	72.59*	11.83
Good	511	68.85[b]	14.73	76.73[b]	10.06	63.86[b]	13.95	69.18	11.14	74.16[a]	9.83
Very good	363	65.67***	16.31	77.96[b]	10.29	62.74[b]	13.59	70.37	12.71	72.21[a]	11.99
Chronic illness											
No	803	67.39***	15.58	77.30**	10.35	63.09***	13.74	69.13	11.90	73.07	10.94
Yes	278	71.08	13.90	79.38	9.29	69.21	13.26	70.47	11.33	73.60	11.25
Last health centre visit											
<3 months	499	68.08	15.10	78.46	10.25	68.07***	13.95	68.88[b]	11.49	71.77***	12.20
3–6 months	239	69.71	14.79	77.68	9.97	62.97[b]	12.90	71.67***	11.28	75.06[b]	9.31
6–12 months	343	67.76	15.74	77.03	10.02	60.90[b]	13.26	68.80[b]	12.34	73.99[b]	10.01
Total	1081	68.34	15.24	77.84	10.12	64.67	13.87	69.47	11.77	73.20	11.02

Based on Tukey's post hoc test, mean values sharing letter 'a' are significantly different; while mean values sharing letter 'b' are not significantly different in the group at the 5% level.
*P<0.05, **p<0.01, ***p<0.001.
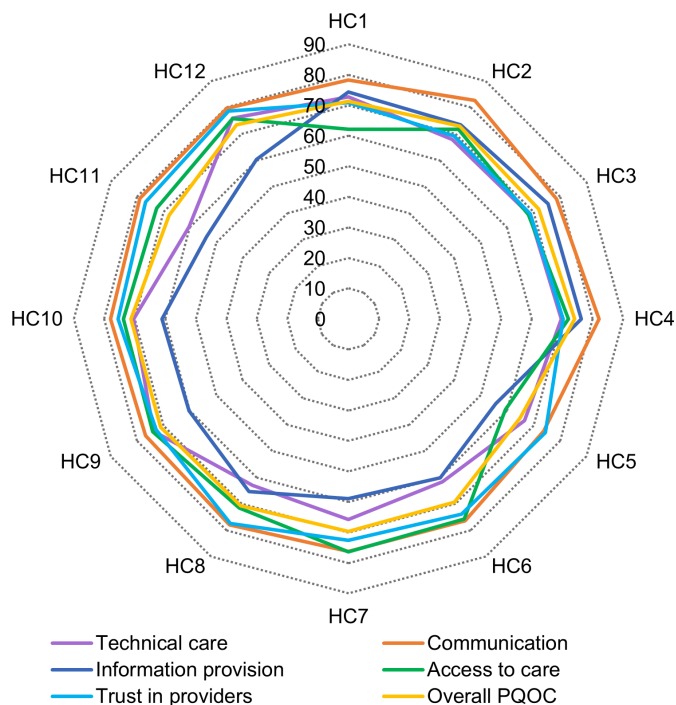ANOVA, analysis of variance; PQoC, perceived quality of care.

DISCUSSIONS

Individuals with health insurance will continue to be members if they believe they are receiving the highest possible quality of healthcare.[19 20] In this study, the mean PQoC score was 70.28 on a scale of 20–100 with an SD of 8.39. The patient-provider communication received the highest score (M=77.84, SD=10.12) among the five quality dimensions. In 2015, the Ethiopian government incorporated the development of caring, respectful and compassionate healthcare providers as one of the main transformation agendas in its 5-year health sector strategic plan, and movements were created around it.[27] Our finding may be attributed partly to the government's ongoing training initiatives aimed at producing healthcare providers who are competent in this aspect. The perception score for the information provision dimension, on

job satisfaction. However, the buffering role is observed in health centres with an average patient volume of 30.75 or higher.

Figure 1 Summary of the mean scores of the perceived quality of care (PQoC) and its dimensions across 12 health centres (HC) in two districts of northeast Ethiopia, 2021.

the other hand, was the lowest (M=64.67, SD=13.87). This could be attributed to an increase in patient volume following the implementation of CBHI.[26] Items loaded under this dimension appear less practical in the presence of a larger patient load. If healthcare providers are required to treat a large number of patients, consultation times will be reduced. They are unlikely to provide the necessary information to their clients if they are under time constraints. Regarding item-level observations, waiting time and medicine availability received the lowest perception scores (62.96 and 63.50, respectively), which could also be related to increased patient load. This is in line with earlier studies in Ethiopia, which revealed that clients with health insurance frequently complain about a lack of medicine and long wait times at CBHI-affiliated health facilities.[43 44]

Results of the regression analysis revealed that households with higher wealth tertile had a higher PQoC score than those with lower wealth tertile. This is in contrast to other studies whereby the richest group had a lower perception score.[16 45] This discrepancy could be partly attributed to the use of different metrics to assess the quality of care. People with higher economic status may be more aware of health issues and able to bargain with healthcare providers to obtain the best possible care. Furthermore, if prescribed medicines are not available in CBHI-affiliated health facilities, for instance, they can afford to buy from private pharmacies. On the contrary, it may be irritating for people with lower economic status to buy medicines with limited money or to forgo treatment due to lack of money. In this regard, they may develop a negative perception of the quality of care.

Households who were active members of CBHI at the time of the study had a higher rating of PQoC compared with ex-members. Contrary to our finding, a study in Ghana showed that previously insured clients had a higher perception of quality of care compared with actively insured clients (statistical significance is not reported). The authors argue this was due to the more time-consuming nature of the service delivery processes for insured clients.[46] At least three possible explanations exist for the relationship between CBHI status and PQoC. First, because they do not have to pay for healthcare, active members have better access to and enjoyment of its benefits, resulting in a favourable perception of its quality. Second, the relationship could be due to an endogeneity issue created by omitted variables. It is plausible that higher quality score reported by active members is due to such variables, as the desire to continue their membership. Third, ex-members of CBHI may have had negative experiences with health services, which led to the decision to discontinue their membership. As a result, they would be critical in rating the quality of care provided. In support of the latter argument, it was evidenced that poor quality of care was a major reason for insurance members to leave the scheme.[24 47] Elsewhere, a statistically significant association was also reported between dropout and low quality of care.[48 49]

This study verified that the PQoC score of households who rated their health status as very good was significantly lower compared with those who rated it as fair. The households' chronic illness experiences also influence the PQoC rating. The PQoC score of households with a chronic illness was higher compared with those without a chronic illness. This may be true for people who perceive their health as fair or who live with chronic conditions to appreciate the gains or benefits of the healthcare they received. In this respect, they may be more likely to rate the quality of care higher than their counterparts.

The results also indicated that households who had their most recent visit to a health centre before 3–6 months had higher PQoC scores compared with those whose recent visit was within 3 months prior to the study. Patients may experience varying levels of emotional highs and lows, depending on the length of the most recent facility visit. Although patients' perceptions of quality may develop over time,[5] patients who recently visited a health facility may be more critical of the quality of care due to strong emotions attached to negative events or health services that fall short of their expectations.

Our findings revealed that the average work experience of healthcare providers was positively associated with PQoC. Work experience is linked to task specialisation, which can lead to a faster work pace, more output in less time and higher quality. Providers with more experience take less time to make diagnoses and treatment decisions, while still providing recommended practical aspects of care, such as good communication, physical examination and provision of relevant health information.[50] As a result, they can reduce waiting times, and their management

Table 3 Multilevel linear regression analysis of factors associated with PQoC among households ever enrolled in a CBHI scheme in two districts of northeast Ethiopia, 2021

Variables	Category	Model I	Model II b (95% CI)	Model III b (95% CI)	Model IV b (95% CI)
Fixed effects					
Age			−0.02 (−0.06 to 0.03)		−0.03 (−0.07 to 0.02)
Gender	Women		0.64 (−1.06 to 2.34)		0.80 (−0.88 to 2.49)
Marital status	Married		−0.14 (−2.42 to 2.15)		0.18 (−2.09 to 2.45)
Modern education	Yes		−0.07 (−1.34 to 1.19)		−0.25 (−1.49 to 1.00)
Wealth tertile	Medium		−0.57 (−1.89 to 0.74)		−0.16 (−1.40 to 1.09)
	High		0.73 (−0.87 to 2.34)		1.79 (0.37 to 3.21)*
Household size	Large (≥5)		−0.28 (−1.28 to 0.72)		−0.31 (−1.31 to 0.68)
Insurance status	Active member		2.65 (1.20 to 4.11)***		2.70 (1.25 to 4.14)***
Perceived health status	Good		−0.75 (−2.16 to 0.66)		−0.73 (−2.14 to 0.67)
	Very good		−1.78 (−3.29 to 0.26)*		−1.80 (−3.31 to 0.29)*
Chronic illness	Yes		1.55 (0.34 to 2.76)*		1.42 (0.22 to 2.63)*
Last health centre visit	3–6 months		1.64 (0.35 to 2.94)*		1.89 (0.61 to 3.17)**
	6–12 months		0.77 (−0.45 to 1.99)		1.02 (−0.18 to 2.21)
Work experience				0.75 (0.33 to 1.17)**	1.07 (0.74 to 1.40)***
Affective commitment				0.48 (0.04 to 1.00)	0.27 (−0.10 to 0.65)
Patient volume				−0.33 (−0.45 to 0.21)***	−0.42 (−0.50 to 0.33)***
Job satisfaction				0.01 (−0.24 to 0.27)	0.07 (−0.10 to 0.24)
Patient volume×job satisfaction				0.06 (0.02 to 0.11)**	0.05 (0.02 to 0.08)**
Random effect					
τ (SE)		5.90 (2.78)***	6.33 (3.10)***	0.86 (0.94)	≈0.00
ICC (%)		8.50	9.31	1.33	≈0.00
PCV (%)		Reference	−7.29	85.42	≈100
Model fitness					
DIC		7578.01	7528.89	7572.79	7516.90
AIC		7584.01	7560.89	7588.79	7558.90

*P<0.05, **p<0.01, ***p<0.001.
AIC, Akaike Information Criterion; b, regression coefficient; CBHI, community-based health insurance; DIC, Deviance Information Criterion; ICC, intraclass correlation; PCV, proportional change in variance; PQoC, perceived quality of care; τ, cluster-level variance.

outcomes may be more effective than inexperienced providers. This could be more pronounced in Ethiopia where there has been a sharp rise in outpatient visits to CBHI-affiliated health centres.[26]

Conditional to the average staff job satisfaction, patient volume is negatively correlated with PQoC. A study in Ethiopia identified a non-linear significant association (an inverted U-shape) between patient volume and quality. Quality decreased with increasing patient volume in health facilities that treated 90.6 or more patients per day, while quality increased with increasing patient volume in health facilities that treated fewer than 90.6 patients per day in the outpatient departments.[51] Our finding is consistent with a study at public hospitals in China where overcrowding was negatively associated with clients' perception of quality of care.[31] The apparent correlation between patient volume and PQoC could

be explained by factors such as increased demand for healthcare providers and longer wait times. An increased patient volume would put a great deal of pressure on healthcare providers to treat a large number of patients in a short time. This may result in shorter consultation time and the omission of important practical aspects of care. On top of that, an increase in patient volume would mean longer waiting times at various service delivery points. Both these factors could have contributed to a negative patient experience and influenced their perception of overall quality of care. Some studies reported a positive relationship between patient volume and quality of basic maternal care, and postoperative infections.[52 53] The alternative direction of this relationship, in which quality drives patient volume, is based on the assumption that the provision of high-quality care will attract more patients. This may be true in areas where patients have

access to competitive health facilities, and healthcare providers are incentivised for providing higher quality care. This is not the case in low-income countries, like Ethiopia, where healthcare facilities are hard to reach for most rural populations. Members of CBHI are further limited to using health services only in public health facilities affiliated with the scheme.

This study found no significant association between staff job satisfaction and PQoC. This contrasts with the findings of Kvist *et al*, which reported a positive relationship between job satisfaction among the nursing staff and patients' perceptions of quality of care.[54] Despite this, it moderates the relationship between patient volume and PQoC in a non-linear fashion. Improved job satisfaction buffers the negative relationship between patient volume and PQoC in health centres with an average patient volume of 30.75 or higher. When the average patient volume is <30.75, however, improving job satisfaction enhances the effect between patient volume and PQoC. The buffering role of service providers' job satisfaction at higher patient volume may indicate that job satisfaction is the result of intrinsic rewards for higher work performance. Providers may also be fully available during working hours at the health facility due to the increased number of clients. On the other hand, the moderating role in enhancing the relationship at lower patient volume may suggest that a low workload is one source of job satisfaction. Because clients are in small numbers, providers may not be fully engaged during working hours. They may have the freedom to do other businesses outside the health facility, leaving patients unattended and dissatisfied.

The findings of this study will be an essential input for quality improvement initiatives as well as addressing challenges in the country's efforts to establish higher-level insurance pools. This is the first study of its kind to consider cluster-level variables associated with PQoC in Ethiopia. It gives an important lesson to healthcare managers and other relevant stakeholders to consider cluster-level characteristics in healthcare quality improvement efforts. It also pointed out quality dimensions that require special consideration in managerial decisions. Despite the significant findings of the current study, some caution should be taken in interpreting the findings. One noteworthy limitation of this study is the use of relatively small cluster sample size. In this study, only 12 health centres (level 2 units) were included to assess the role of cluster-level variables on the outcome variable. Concerns have been raised about the accuracy of estimates in multilevel modelling when there is small number of clusters. However, we employed the restricted maximum likelihood estimation method, which could substantially improve the accuracy of estimates.[40] Second, due to the cross-sectional nature of the data, the analysis was conducted to identify associations rather than prove causation. Third, the association between current insurance status and PQoC could be due to the possibility of endogeneity. Fourth, patient volume data based on secondary data may not reflect the true figure due to the possibility of under-reporting or over-reporting.

CONCLUSIONS

Despite encouraging findings on patient-provider communication, much work remains to be done to improve information provision and access to care quality dimensions. According to the findings, people's perceptions of quality of care varied depending on a variety of individual-level and cluster-level factors. The household's wealth status, current insurance membership, perceived health status, presence of chronic illness in the household and time to a recent visit to a health centre were individual-level predictors of PQoC. At the cluster level, patient volume and work experience of healthcare providers were associated with PQoC. A lower patient volume allows the healthcare provider to devote more time and attention to each patient, address the individual patient's needs and have more time to improve communication with and provide behaviour change counselling, which has an impact on the quality of care.[55] Therefore, to ensure that patients have access to a better quality of care, it is critical to determine an appropriate patient volume per care provider. Staff job satisfaction was an important factor that buffers the effect between patient volume and PQoC. Hence, it is vital to devise mechanisms to improve staff job satisfaction, especially in health facilities with higher patient volumes. More importantly, health centres should go to great lengths to ensure that every patient has access to the necessary medications. This will boost clients' trust in healthcare providers, which will be critical for health insurance schemes to retain and attract members.

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