

# Comparative assessment of patient satisfaction with medical care before and after the implementation of the Public-Private Partnership (PPP) project, taking into account health literacy.

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## ABSTRACT

### Background

There is conflicting scientific evidence on the impact of the PPP model on patient satisfaction with medical care. The accumulated experience according to research data is currently insufficient to draw any unambiguous conclusions. The purpose of this study was to compare patient satisfaction with the medical care provided before and after the implementation of the PPP project, taking into account medical literacy.

### Materials and methods

A cross-sectional study was conducted with the participation of 217 people treated in the hospital of the Almaty Multidisciplinary Clinical Hospital three years before the implementation of the PPP project from 2017 to September 2020 and 241 patients three years after the implementation, from September 2020 to January 2024. Patients of both groups were assessed for satisfaction with the quality of medical care provided, using an adapted HEALTHQUAL – Kz questionnaire and an assessment of medical literacy using a version of the European HLS19 questionnaire adapted for the Russian-speaking population (HLS19 - Q22-RU). The level of statistical significance was determined as  $p < 0.05$ . The statistical analysis was performed in the SPSS-statistical 26.0 program.

### Results

In general, the implementation of the PPP project has had a positive impact on patient satisfaction with the medical services provided. Patients were more satisfied with the hospital infrastructure before PPP 2.91 ( $\pm 0.85$ ), after – 4.11 ( $\pm 0.82$ ), ( $p < 0.001$ ), the efficiency of the medical staff, which amounted to 3.03 ( $\pm 0.93$ ) before the introduction of PPP, after – 4.10 ( $\pm 0.74$ ), ( $p < 0.001$ ), and the results of the services rendered, up to -3.16 ( $\pm 1.01$ ), after – 4.22 ( $\pm 0.75$ ), ( $p < 0.001$ ).

### Conclusion

The implementation of the PPP project in the AMKB contributed to improving patient satisfaction with the medical services provided. It is also necessary to determine the level of medical literacy before assessing satisfaction with the quality of medical care, if sufficient and excellent, you can treat the results as more objective and critically evaluated.

### Keywords

public-private partnership; HEALTHQUAL questionnaire; satisfaction with medical care; assessment of medical literacy; medicine

## INTRODUCTION

There is conflicting scientific evidence regarding the impact of the Public-Private Partnership (PPP) model on patient satisfaction with medical care. Some researchers approach recommendations for the implementation of PPPs with caution, due to a lack of data confirming that the PPP model will indeed produce positive outcomes<sup>1</sup>. Other authors emphasize the need for a rigorous evaluation of PPPs based specifically on the quality of the services provided<sup>2</sup>.

The quality of medical care provided, as well as patient satisfaction, are important factors in healthcare management planning overall. Traditionally, the quality of medical care is assessed based on compliance with established standards. However, patients' opinions and levels of satisfaction expand the scope of this assessment and allow for a more critical evaluation and improvement of clinical effectiveness<sup>3</sup>.

In addition to patient satisfaction, it is necessary to assess health literacy, as a higher level of literacy enables individuals to evaluate the

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quality of care more objectively and critically<sup>4</sup>. Health literacy is defined as the ability of individuals to obtain, process, and understand health-related information and services in order to make appropriate decisions<sup>5,6</sup>.

Health literacy provides advantages in the following areas:

- (1) self-efficacy;
- (2) health promotion;
- (3) proactive use of healthcare services;
- (4) disease self-management; and
- (5) empowerment.

Currently, there is limited data on the effectiveness of PPP models in the healthcare sector. According to some sources, there is virtually no information about the quality of services provided within implemented PPP projects<sup>7,8,9</sup>. We found no studies in the Republic of Kazakhstan evaluating the effectiveness of PPPs or user satisfaction with the quality of medical services. This makes the present study particularly relevant.

Research objective:

To compare patient satisfaction with medical care before and after the implementation of the PPP project, taking into account health literacy.

## MATERIALS AND METHODS:

**Study design:** Cross-sectional.

**Participant selection criteria:**

A total of 300 medical records of inpatient cases from AMKB (Almaty Multidisciplinary Clinical Hospital) before the implementation of the PPP project and 300 records after its implementation were selected. The records were randomly chosen using the Comprehensive Medical Information System (CMIS) and covered cases treated in the hospital over a three-year period prior to the PPP project implementation (from 2017 to September 2020) and a three-year period after its implementation (from September 2020 to January 2024).

Subsequently, passport and contact information of the patients were extracted. All participants were contacted by phone. After obtaining consent to participate in the survey, patients were sent the informed consent form and an electronic survey (Google Form) via messaging apps. The form included the adapted **HEALTHQUAL-Kz** questionnaire in both the state (Kazakh) and Russian languages, as well as a version of the **European HLS19 questionnaire (HLS19-Q22-RU)** adapted for the

Russian-speaking population<sup>10</sup>.

There is evidence-based scientific opinion suggesting that satisfaction with medical care should be interpreted through the lens of health literacy, as individuals who are more familiar with medical terminology and have a basic understanding of health and healthy lifestyles are better able to critically assess the quality of healthcare services provided<sup>11-13</sup>.

Not all potential study participants were available or agreed to take part in the research. As a result, the number of respondents before the implementation of the PPP project was 217, and after the implementation—241. During conversations with respondents, we emphasized the importance of not skipping questions and answering all of them whenever possible, which helped to virtually eliminate missing responses.

There is a recommendation for interpreting health literacy results using the HLS19 (HLS19-Q22-RU) tool only if more than 80% of the questions are answered<sup>14</sup>.

### Assessment process:

At the first stage, the level of health literacy was assessed. The interpretation of general literacy levels was performed using the following criteria (K. Sørensen):

- *Inadequate* (0–25.0 points)
- *Problematic* (25.1–33.0 points)
- *Sufficient* (33.1–42.0 points)
- *Excellent* (42.1–50.0 points)

Next, overall satisfaction with the medical services received was assessed. After that, satisfaction levels were evaluated specifically for patients with *sufficient* and *excellent* health literacy scores.

Satisfaction with medical care was assessed using the **HEALTHQUAL-Kz** model across five domains. Each domain was rated on a five-point Likert scale, calculated as the average of five questions:

- 1 – Strongly disagree (very poor)
- 2 – Disagree (poor)
- 3 – Neutral (satisfactory)
- 4 – Agree (good)
- 5 – Strongly agree (excellent)

Correlation analysis was also conducted between

satisfaction levels and health literacy, education, age, and financial limitations in accessing healthcare services.

**Statistical analysis** was performed using SPSS Statistics 26.0. Normality of distribution was assessed using the following methods:

1. Kolmogorov-Smirnov test with Lilliefors correction (for  $n > 50$ )
2. Kurtosis
3. Skewness
4. Visual method – histogram analysis

Quantitative data following a normal distribution were analyzed using the **paired Student's t-test** for equal variances and **Welch's t-test** for unequal variances.

Quantitative data that did not follow a normal distribution were analyzed using the **Mann-Whitney U test**. For nominal data, **Pearson's chi-square test** or **Fisher's exact test** was used. Correlations were assessed using **Spearman's rank correlation coefficient**. The strength of the association was interpreted according to **Chaddock's scale**, where:

- $|r_{xy}| < 0.3$  – weak correlation
- $0.3 \leq |r_{xy}| < 0.7$  – moderate correlation
- $|r_{xy}| \geq 0.7$  – strong correlation

The level of statistical significance was set at  $p < 0.05$ .

## RESULTS

In the group before PPP implementation (hereinafter referred to as **Group 1**), 44.3% were men ( $n=96$ ) and 55.7% were women ( $n=121$ ). In the group after PPP implementation (**Group 2**), 47% were men ( $n=113$ ) and 53% were women ( $n=128$ ). No statistically significant gender differences were found.

The median age and interquartile range (IQR) were as follows:

- **Group 1:** Median = 53.0, IQR = 16.5
- **Group 2:** Median = 54.0, IQR = 19

No statistically significant differences in age were observed.

**Incomplete secondary education** was reported by:

- Group 1 – 11 people (5.1%)
- Group 2 – 16 people (6.7%)

The difference was not statistically significant ( $p = 0.48$ ).

### Secondary education:

- Group 1 – 31 people (14.2%)
  - Group 2 – 46 people (19.3%)
- The difference was not statistically significant ( $p = 0.17$ ).

### Vocational secondary education:

- Group 1 – 102 people (47.4%)
  - Group 2 – 80 people (33.4%)
- There were significantly more respondents with vocational secondary education in Group 1 ( $p < 0.001$ ).

### Incomplete higher education:

- Group 1 – 16 people (7.2%)
  - Group 2 – 17 people (7.0%)
- The difference was not statistically significant ( $p = 0.90$ ).

### Higher education:

- Group 1 – 54 people (24.6%)
  - Group 2 – 70 people (28.6%)
- The difference was not statistically significant ( $p = 0.32$ ).

### Postgraduate education (Master's/PhD/Residency):

- Group 1 – 3 people (1.5%)
  - Group 2 – 12 people (5.0%)
- There were significantly more individuals with postgraduate education in Group 2 ( $p = 0.03$ ) (**Figure 1**).

### No problems paying for treatment at any time:

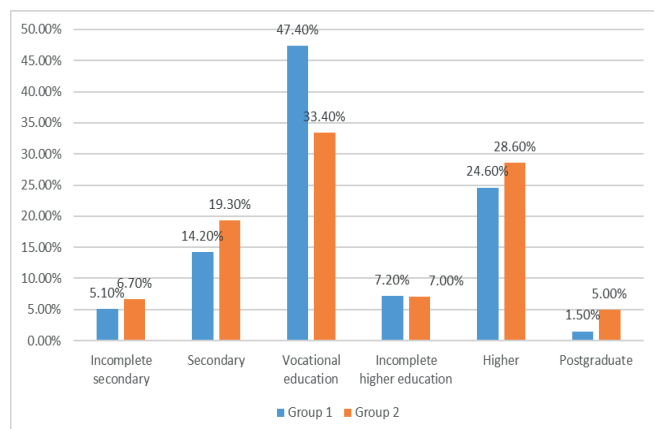
Group 1 – 41 respondents (19%),  
Group 2 – 36 respondents (15%),  
No statistically significant differences ( $p = 0.26$ );

### Prefer to be treated in public institutions but can use paid services if needed:

Group 1 – 80 respondents (33%),  
Group 2 – 71 respondents (29%),  
No statistically significant differences ( $p = 0.09$ );

### Can only be treated in public hospitals, have no problems buying medicines:

Group 1 – 72 respondents (33%),  
Group 2 – 94 respondents (39%),



**Figure 1-** Education of respondents

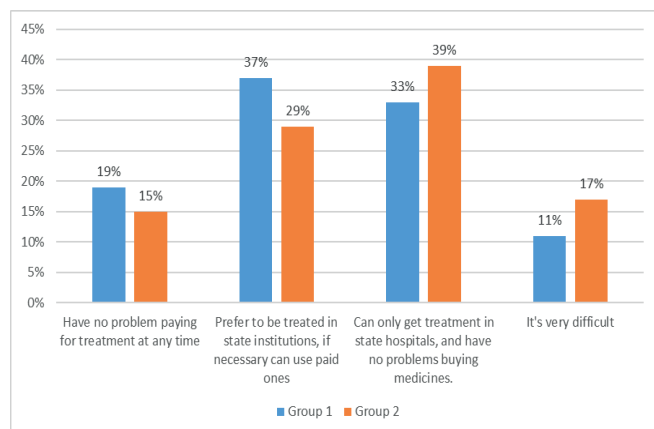
No statistically significant differences ( $p = 0.20$ );

#### Answered “very difficult”:

Group 1 – 24 respondents (11%),  
Group 2 – 40 respondents (17%),

No statistically significant differences ( $p = 0.09$ ).

(Figure 2)



**Figure 2** – Financial constraints in obtaining medical services

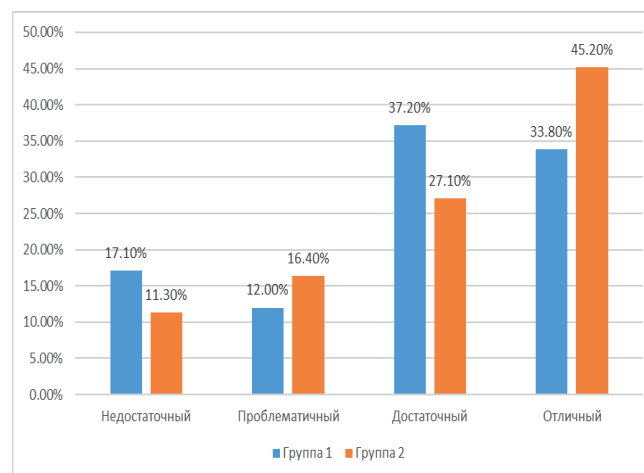
The absence of statistically significant differences in financial constraints on accessing medical care and possibly education is due to the fact that AMKB serves approximately the same population group.

In Group 1, 37 people (17.1%) had a low level of health literacy, and in Group 2, 27 people (11.3%); the difference was not statistically significant ( $p = 0.07$ ).

“Problematic” level: Group 1 – 26 people (12%), Group 2 – 39 people (16.4%); the difference was not statistically significant ( $p = 0.20$ ).

“Sufficient” level: Group 1 – 80 respondents (37.2%), Group 2 – 66 people (27.1%); Group 1 had significantly more respondents with a “sufficient” level of health literacy ( $p = 0.03$ ).

“Excellent” level: Group 1 – 74 people (33.8%), Group 2 – 109 people (45.2%); Group 2 had significantly more respondents with an “excellent” level of health literacy ( $p = 0.02$ ).



**Figure 3** – Level of health literacy according to the HLS19 questionnaire — Q22-RU.

Excluding health literacy, in almost all domains except safety, there were statistically significantly better results in satisfaction with the quality of medical care provided. If the average satisfaction rating before the implementation of the PPP project can be considered satisfactory, then after implementation it was good. No statistical differences were found in the safety rating (Table 1).

The “Empathy” scale was 3.06 ( $\pm 0.92$ ) before the PPP implementation and 4.21 ( $\pm 0.75$ ) after; the difference was statistically significant ( $p < 0.001$ ).

The “Hospital Infrastructure” scale was 3.00 ( $\pm 0.87$ ) before and 4.24 ( $\pm 0.72$ ) after; the difference was statistically significant ( $p < 0.001$ ).

The “Work Efficiency” scale was 3.13 ( $\pm 1$ ) before and 4.24 ( $\pm 0.68$ ) after; the difference was statistically significant ( $p < 0.001$ ).

The “Service Outcomes” scale was 3.06 ( $\pm 0.91$ ) before and 4.22 ( $\pm 0.67$ ) after; the difference was statistically significant ( $p < 0.001$ ) (Table 1).

**Table 1 – Mean scores of HEALTHQUAL – Kz domains excluding health literacy**

Scales	1-group			2-group			p-value
	N	M	Sd (±)	N	M	Sd (±)	
1. Empathy	217	3,06	0,91	241	4,21	0,75	<0,001*
2. Hospital infrastructure	217	3,00	0,87	241	4,24	0,72	<0,001*
3. Safety	217	3,89	0,91	241	4,19	0,73	-
4. Medical staff performance	217	3,13	1,00	241	4,24	0,68	<0,001**
Result of services rendered	217	3,06	0,91	241	4,22	0,67	<0,001*

N – sample size, M – mean, Sd – standard deviation, \* – Mann-Whitney U test, \*\* – Student's t-test

When accounting for health literacy, there were no statistically significant differences in two domains – “Empathy” and “Safety.” Before the implementation of the PPP project, the average rating was closer to satisfactory, whereas after implementation it was good.

The “Hospital Infrastructure” scale was 2.91 ( $\pm 0.85$ ) before the PPP implementation and 4.11 ( $\pm 0.82$ ) after; the difference was statistically significant ( $p < 0.001$ ).

The “Work Efficiency” scale was 3.03 ( $\pm 0.93$ ) before and 4.10 ( $\pm 0.74$ ) after; the difference was statistically significant ( $p < 0.001$ ).

The “Service Outcomes” scale was 3.16 ( $\pm 1.01$ ) before and 4.22 ( $\pm 0.75$ ) after; the difference was statistically significant ( $p < 0.001$ ) (Table 2).

**Table 2 – Mean scores of HEALTHQUAL – Kz domains accounting for health literacy**

Scales	1 group			2 group			p-value
	N	M	Sd (±)	N	M	Sd (±)	
1. Empathy	154	4,18	0,75	175	4,21	0,75	-
2. Hospital infrastructure	154	2,91	0,85	175	4,11	0,82	<0,001*
3. Safety	154	4,01	0,87	175	4,19	0,73	-
4. Medical staff performance	154	3,03	0,93	175	4,10	0,74	<0,001**
Result of services rendered	154	3,16	1,01	175	4,22	0,75	<0,001*

N – quantity, M – mean, Sd – standard deviation, \* – Mann Whitney U test, \*\* Welch t-test

Only one statistically significant correlation was observed—between health literacy level and satisfaction with medical care ( $r_{xy} = -0.683$ , an inverse relationship according to the Chaddock scale;  $p < 0.001$ ) (Table 3).

**Table 3 – Correlation between factors and satisfaction with medical care**

Factors	satisfaction with medical care			
	Spearman Rank Correlation Test (SRC)	Chaddock scale for assessing the strength of a connection	Direction of communication	p-value
Health literacy level	- 0,683	Noticeable	Reverse	<0,001
Education level	- 0,273	Weak	Reverse	-
Age	0,117	No connection		
Financial capabilities	0,089	No connection		



## RESULTS AND DISCUSSION

Overall, the implementation of the PPP project had a positive impact on patient satisfaction with the medical services provided, although some foreign sources report ambiguous or even negative effects<sup>1,2</sup>. In our study, as well as in some other international studies, statistically significant improvements were observed in most domains, with ratings improving from “satisfactory” before implementation to “good” after implementation<sup>4</sup>.

There were no statistically significant differences in the “Safety” domain; before the PPP project, the rating was already close to “good.” However, when accounting for health literacy, no statistically significant differences were found in the “Empathy” domain, consistent with results from international research.

Patients were more satisfied with hospital infrastructure, with scores increasing from 2.91 ( $\pm 0.85$ ) before the PPP to 4.11 ( $\pm 0.82$ ) after ( $p < 0.001$ ); with the efficiency of medical staff, from 3.03 ( $\pm 0.93$ ) before to 4.10 ( $\pm 0.74$ ) after ( $p < 0.001$ ); and with service outcomes, from 3.16 ( $\pm 1.01$ ) before to 4.22 ( $\pm 0.75$ ) after ( $p < 0.001$ ).

No correlations were found between age, education

level, financial capacity, and satisfaction with the services provided, whereas a notable inverse correlation was observed with health literacy: the higher the patient’s health literacy, the lower their satisfaction with the level of medical care, which may reflect a more critical evaluation.

A reduction in observed statistical differences was also noted when accounting for health literacy.

## CONCLUSION

The implementation of the PPP project at AMKB contributed to improved patient satisfaction with the medical services provided. Additionally, before assessing satisfaction with the quality of medical care, it is important to determine the level of health literacy; with sufficient and excellent literacy levels, the results can be regarded as more objective and critically evaluated.

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