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FACTOR-CLUSTER ANALYSIS IN THE PRIVATE HEALTHCARE SYSTEM OF THE REPUBLIC OF ARMENIA

The study of the factors affecting the pricing of medical services in the private healthcare sector in the Republic of Armenia reveals several internal and external determining factors that significantly impact the pricing dynamics. This article mainly aims to evaluate the satisfaction level of patients from private medical institutions in Armenia through factor-cluster analysis. Eleven different factors were identified and classified according to two main variables: medical and maintenance. This article aims to measure patient satisfaction in different types and levels of healthcare facilities and determine which factors influence this level of satisfaction. In this article, we will discuss

how these factors affect patient satisfaction levels. This paper also aims to develop a detailed conceptual model for understanding and quantifying the factors influencing the quality of care based on patient satisfaction.

In the largest cluster, to which 70% of the respondents belong, individuals expressed dissatisfaction with the medical services offered by private medical facilities in Armenia, providing valuable insight into the nuances of patient satisfaction with the private healthcare sector in Armenia, shedding light on the areas in which they work that may be in need of improvement or further attention.

Keywords: *private healthcare system, cluster analysis, factor analysis, Republic of Armenia, field research*

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INTRODUCTION. Armenia is performing continuous reforms to revitalize its healthcare system which makes it crucial to evaluate, track, and manage the system's complexity. To strengthen the healthcare system as a whole, it is essential to comprehend the many relationships, interactions, feedback, and processes that exist between its various components.

In this context, one of the most important instruments for assessing the efficiency of the healthcare system is the measurement of patient satisfaction. Patient satisfaction is the main indicator that influences the quality and price of services provided in healthcare facilities. It assesses the healthcare system's responsiveness by providing information on what can influence satisfaction and how well it satisfies patients' needs in terms of cost and quality. By comprehending the variables that influence patient satisfaction levels, we can summarize the factors influencing the functionality of the healthcare system.

Consequently, getting a comprehensive understanding of the healthcare system's dynamics in conjunction with an in-depth analysis of patient satisfaction becomes necessary.

Such a dual approach not only helps evaluate the system's effectiveness but also lays the foundation for the targeted improvement of service delivery, quality, and accessibility. The continuous assessment and measurement of these vital components significantly contribute to the continuous improvement and optimization of Armenia's evolving healthcare system.

LITERATURE REVIEW. Patient satisfaction is a cognitive response influenced by various factors such as treatment outcome, gender, age group, institutions, medical insurance, processes in administrative and financial departments, the speed of admission and registration, etc. (Farzianpour, 2009). Patient satisfaction and the quality of medical services, although difficult to measure, can be realized using an interdisciplinary approach that combines patient information and expert opinion (Naidu, 2009). Kamra et al. have shown that the following elements affect patient satisfaction: 1. cost and convenience; 2. addressing clinical requirements; 3. nursing and staff care; 4. general practitioner behavior; 5.

registration and administrative procedures; 6. infrastructure and facilities; 7. professional physician's behavior; 8. both in the outpatient and the reception department (Kamra et al., 2015). Adhikary evaluates patient satisfaction at different levels and in different types of medical facilities and identifies variables that affect this degree of satisfaction. Patient satisfaction is significantly correlated with elements such as convenient working hours, cleanliness in the institution, and privacy settings (Adhikary et al., 2018). Liu's study, examining potential general factors of patient satisfaction, shows that quality, price, and convenience of medical services can explain patients' demands (Liu & Fan, 2019). Bleich has discovered that private healthcare is typically more expensive than public, and people who employ the services of private healthcare providers anticipate receiving better care (Bleich et al., 2009).

European nations have garnered a lot of attention to promoting patient-centered care to meet patient expectations and improve care quality (OECD, 2020). Several hospitals have formed patient groups to improve patient participation and their attractiveness to patients. These organizations offer a forum for active engagement, with patients working alongside medical professionals. By sharing their opinions about the quality of services, making suggestions for enhancements, and actively taking part in the planning and development of services, patients who take part in these conversations help to foster a culture of patient-centered care. The World Health Organization (WHO) states that "quality of care is the degree to which health services for individuals and populations increase the likelihood of achieving desired health outcomes" (World Health Organization, 2022). So, the overall quality of health care is related to the efficiency of the whole health care system. It refers to the timely, equitable, and efficient delivery of services, regardless of factors such as gender, ethnicity, geographic location, and socio-economic status (Peltola& Tiirinki, 2020).

The above-mentioned studies have shown that patients value effective and continuous interaction and communication with healthcare professionals, and these elements play an important role in patient satisfaction, length of hospital stay, and recovery. HCP communication skills are important in making patients feel valued and well cared for, as patients tend to respond to the level of respect shown to them (Karaka & Durna, 2019). Patients feel satisfied when they understand that they receive individual care (Amiryan et al., 2021), and they are respected and treated in a humane and caring environment. It has been shown that providing information and counseling to patients is also crucial for patient satisfaction (Karaka et al., 2019). Goh and Lopez found that professionals should provide patients with the opportunity to support their participation in planning and decision-making related to their care (Goh, Lopez, 2016). The authors mention that giving patients a chance to participate in care planning and decision-making is necessary, and professionals should encourage this participation (Goh & Lopez, 2016). This participation helps to reduce side effects, improve patient

safety, and improve the effectiveness of hospitalization to shorten the duration (Giap & Park, 2021): Patient satisfaction is positively associated with access to services (Amiryan et al., 2021), waiting time for admission, interruption of data flow (Deslauriers, et al, 2021). Waiting time for admission, intermittent data flow and inadequate anesthesia are among the causes of dissatisfaction (Hämäläinen, et al., 2021). Elements related to nursing care, especially harsh working conditions and job dissatisfaction, have been identified as elements that harm patient outcomes. These effects include increased complications and side effects, with increased workload for nurses associated with decreased patient satisfaction. According to Didier and others, positive interprofessional cooperation is associated with improved patient care, safety, and well-being (Didier et al., 2020). Furthermore, a higher degree of patient satisfaction is correlated with the availability of well-educated nurses. The results show that patients are more satisfied with their care overall when nurses are happy with their jobs.

RESEARCH METHODOLOGY. In our article's analysis phase, we applied factorial and cluster methods using IBM SPSS Statistics 23 software. We have used a factor analysis tool to group a large number of variables into more manageable groups, which are known as factor components. By using this method, we could simplify the overall structure and combine variables that are strongly correlated with each other and variables weakly correlated with other groups. Factor analysis has transformed the complex relationships between several variables into a more understandable structure. In the next step, we have identified and grouped variables that showed similar correlation patterns. As a result, we were able to identify latent factor components and simplify the data. This reduction has helped us reveal the underlying structures that support the observed correlations.

On the other hand, we have also used cluster analysis to classify objects based on predetermined characteristics. In this context, the analysis allowed the creation of internally homogeneous groups while drawing clear differences between them.

The internal homogeneity condition emphasizes within-group similarity, while the external heterogeneity condition emphasizes distinct differences between groups. Cluster analysis has played a key role in our research in identifying specific target groups among medical patients. To understand the different characteristics of patient groups, we have formed homogeneous internal clusters and clearly distinguished between them.

In addition, our study aimed to identify the complex interaction of the factors components in these identified patient groups. Understanding the mechanisms by which the factors' components influence each group is a fundamental basis for developing recommendations to increase patients' overall satisfaction. Our analysis aimed to obtain valuable information describing the unique impact

structure of these clusters, which can serve as a guide for developing targeted strategies to increase the satisfaction level of individual patient groups.

ANALYSIS. The first step in the study of factors affecting patient satisfaction in non-state medical institutions of the Republic of Armenia (RA) was using the SPS analytical program for factor analysis. The goal was to simplify the analysis by combining the 12 factors affecting satisfaction into two-factor components, facilitating a simpler and more constructive analytical process.

The initial step in conducting factor analysis involved KMO (Kaiser-Meyer-Olgin) and Bartlett's test to assess whether the collected data fit the factor analysis, as shown in Table 1. This phase ensures the reliability and up-to-dateness of the data.

Table 1

KMO and Bartlett test results

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.947
Bartlett's Test of Sphericity	Approx. Chi-Square	13033.889
	df	66
	Sig.	0.000

It can be seen from the table that the newly developed aggregate coefficient effectively captures 94.7% of the original variables obtained from the respondents' satisfaction ratings. This implies a minimal loss of information of only 0.053%, which indicates the "compression" applied to the original set of variables A significant value of 0.00 (Sig) indicates the presence of relative dependence between the base variables, confirming the relevance of the data for factor analysis.

After factor analysis, the available variables were divided into two groups based on the values of the original variables and the correlation coefficients of the factor components, as shown in Table 2. This helps interpret the patterns and trends in the database.

Table 2

Rotated Component Matrix[1]

Factors	*Factorial components*	
	1	*2*
The doctor's professionalism, courtesy, and attention	0.74	0.65
Presence of a doctor's explanation	0.76	0.63
Quality of hardware diagnostics	0.78	0.60
Quality of laboratory analyses	0.79	0.60
Clarity of doctor's registration hours	0.64	0.75
Diagnose the accuracy of survey registration times	0.65	0.74
The volume of correspondence	0.56	0.81
Time to wait for laboratory test results	0.65	0.74
Building shelves, cabinets	0.67	0.71
Quality of services provided	0.76	0.62
Completeness of physician appointments	0.80	0.59
Quality of treatment	0.79	0.60

[1] Extraction Method: Principal Component Analysis. Rotation converged in 6 iterations

Variables showing the greatest correlation between factors and components were grouped into separate groups. The first, called “medical”, mainly includes variables related to satisfaction with the doctor and his work; the second, called “maintenance”, includes variables related to aspects of service.

Respondents were further divided into clusters based on the similarity of their satisfaction ratings using Ward's method as a clustering method. Ward's method prioritizes combining elements that contribute least to increasing heterogeneity in the newly formed clusters. The number of clusters is determined based on the mentioned indicator's coefficients. The analytical package used in the study divided the respondents into three clusters as shown in Figure 1. This clustering approach allows for a better understanding of similarities in respondents' satisfaction indicators and facilitates a more thorough analysis of the data.

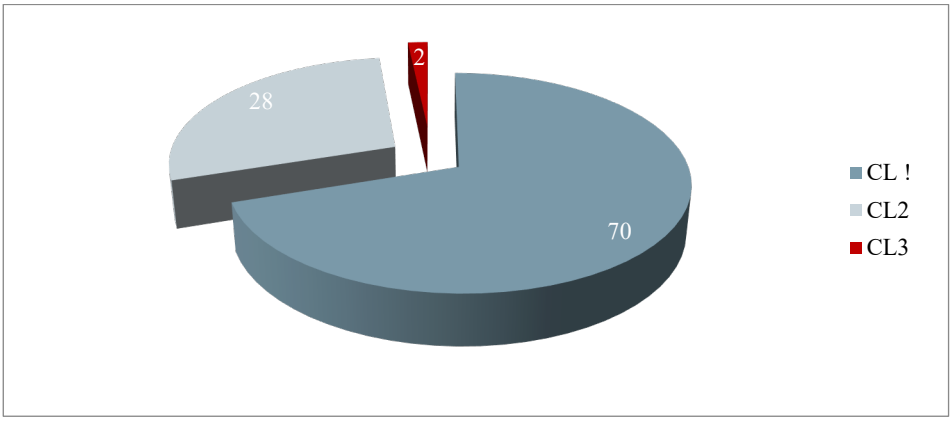

Figure 1. ***Distribution of respondents in clusters***

Based on the benchmark results (see Table 3), we created histograms showing the influence values of the factor components in each cluster (see Figure 3). These visual representations visualize and compare the levels of influence of the factor components on the identified clusters. In Table 3, we can see how these components affect each cluster's overall satisfaction rates, contributing to a more intuitive understanding of the distinct dynamics presented in the study.

Table 3

Results of analysis of comparison of means

Report			
Ward Method		*F1 (Medical)*	*F2 (Maintenance)*
1	Mean	.4248905	.3743393
	N	70%	70%
2	Mean	-1.2468271	-.6425991
	N	28%	28%
3	Mean	3.4214746	-4.7356733
	N	2%	2%
Total	Mean	.0000000	.0000000
	N	100%	100%

It is important to note that the process of factor analysis resulted in the transformation of the respondents' original 1-10 point scale from '-5 to +5' while developing the factor components. It is important to note that a more negative value of a factor component indicates greater importance, while a more positive value indicates less importance. This transformation ensures that the numerical representation accurately reflects each factor's relative influence and importance within the analysis. The scale adjustment helps to provide a clearer interpretation of the influence of factors on the overall dynamics of satisfaction.

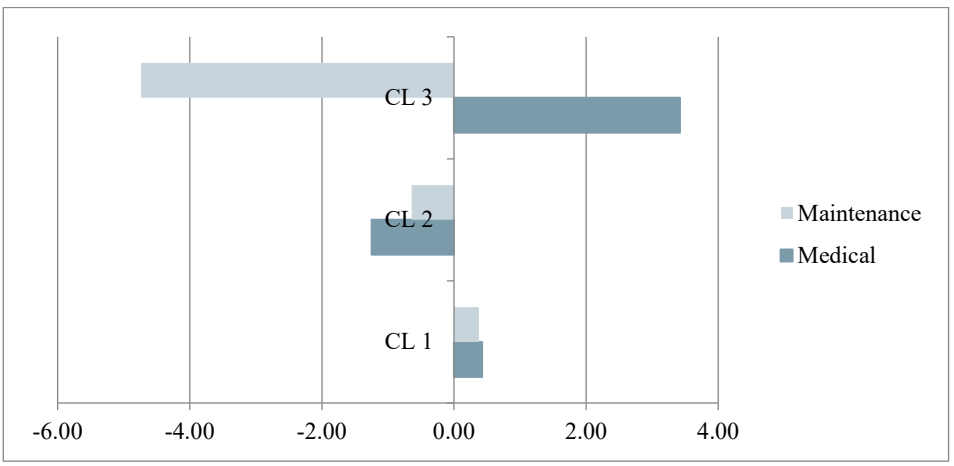

Figure 2. ***Structure of factor component values in clusters***

Let us dig deeper into the results we have got. In the main cluster, which is 70% of the respondents, it is clear that this segment expresses a significant level of dissatisfaction, but it shows the least concern. Notably, the dissatisfaction is more pronounced in the field of treatment rather than service quality.

The second category, which includes 28% of the respondents, refers to both health services and service offers. It is noteworthy that satisfaction with doctors' work goes beyond personal hygiene.

These subtle differences between the three categories shed light on the different patterns of satisfaction within the study, highlighting the need for targeted interventions to address the specific concerns of each group.

Summing up, it should be noted that the factor analysis carried out within the framework of this research has effectively summarized the 12 factors affecting patient satisfaction in non-state medical institutions of Armenia into two main components: "medical" and "maintenance". The "medical" component includes aspects related to the quality of care physicians provide, such as professionalism, courtesy, and quality of treatment. On the other hand, the "maintenance" component covers elements like waiting time and general service quality associated with maintenance.

KMO and Bartlett's tests have confirmed the validity of the used data for factor analysis, showing that 94.7% of the original variables were effectively

represented by two-factor components. This high level of presentation guarantees an accurate understanding of the essence of patient satisfaction without losing important information.

Further cluster analysis using Ward's method revealed three different groups of respondents with different levels of satisfaction. The largest group, representing 70% of respondents, showed a tendency to be dissatisfied with the quality of treatment. However, these respondents expressed their concerns to a lesser extent, pointing to potential areas for improvement in the health services offered.

The second cluster, which includes 28% of respondents, showed that patients are more satisfied with health services than with individual aspects of health services. As a result, only 2 percent of the respondents in the smallest group expressed higher satisfaction with the quality of the provided services, but they were dissatisfied with the work of doctors.

These results highlight the importance of distinguishing between medical and service aspects when assessing patient satisfaction. They indicate that while some patients are generally satisfied with service-related elements, others pay more attention to the quality of care. Such fine-grained understanding can help Armenian non-governmental healthcare facilities adapt their strategies to effectively increase patient satisfaction, paying special attention to different patient groups' specific needs and preferences.

In conclusion, the factor analysis and further clustering enabled us to obtain valuable information about different forms of patient satisfaction in non-state medical institutions of Armenia. Addressing the issues in each cluster will be critical to improving overall patient health and ensuring a higher quality of care. This comprehensive approach to analyzing satisfaction data not only achieves the study's objectives but also has practical implications for improving private-sector health services.

CONCLUSIONS. In summary, this in-depth analysis of patient satisfaction in non-governmental healthcare facilities in Armenia has illuminated the key factors shaping patients' perceptions of healthcare services.

In the factor analysis, the original 12 satisfaction factors were divided into two main components: "medical" and "maintenance." Using Ward's method, respondents were divided into three different satisfaction characteristics.

The results showed that the main group (70%) was mainly dissatisfied with the quality of treatment. They were highly satisfied with aspects of medical care delivery but significantly dissatisfied with physician performance.

The results show the different effects of each factor component in the clusters and prove that the initial scale, which was set between -5 and +5, allowed for a more accurate interpretation of the factor value. The research results show that patient satisfaction varies. Thus, targeted patient-centered strategies must be implemented to meet the different needs found in different cluster groups.

The study shows that non-governmental healthcare facilities in Armenia should constantly evaluate and adjust their services as the patient's demands and expectations are growing

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