

Research on Improving the Quality of Rural Medical Services in Shandong Province Based on the SERVQUAL Model

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Abstract. Rural healthcare is an essential aspect to consider in rural revitalization. Using the SERVQUAL model to examine the present state and challenges of healthcare service quality in Shandong Province, it was observed that rural people's perception of actual value falls short of their expectations in five different areas: tangibility, reliability, responsiveness, assurance, and empathy. The primary challenges entail inadequate public health consciousness among particular villagers, deficient modernization of rural healthcare facilities, and illogical regional health strategizing. Hence, to enhance the standard of living in rural regions and foster the building of a rural public health network, it is imperative to take initiatives to enhance villagers' hygiene awareness, promote the modernization of rural medical aid, and enhance practitioners' expertise via various means.

Keywords: Rural healthcare; Service optimization; Rural revitalization.

1. Introduction

Shandong Province is a significant agricultural region with a substantial rural populace. As the economy has grown, the gap between urban and rural areas has widened, and this gap is reflected in the quality of rural medical services. With the aim of promoting the modernization of agriculture and rural areas in Shandong Province, it is necessary to improve the quality of rural medical services.

2. Research objects and methods

SERVQUAL theory is a new service quality evaluation system put forward in the service industry in the late 1980s by the American marketing scientist Parasuraman and others based on the theory of Total Quality Management (TQM), the theoretical core of which is the "Service Quality Gap Model". Starting from the consumer's perspective, the gap between the consumer's expectation and perceived value of the service provided is measured to gauge the quality of the service, and the model has been widely recognized in the application of healthcare services.

2.1 Research objects

A randomized survey was conducted in some rural areas of Jinan, Qingdao, Tai'an and Liaocheng in Shandong Province. A total of 665 samples were recovered, 94 invalid questionnaires were excluded, 571 valid questionnaires were recovered, and the effective recovery rate of the questionnaires was 85.86%.

2.2 SERVQUAL model description

The SERVQUAL model, also known as the Expectation-Perception model, recognizes that service quality is determined by the degree of difference between the level of service perceived by the consumers and the level of service expected by the consumers. SERVQUAL categorizes service quality into five dimensions: tangibility, reliability, responsiveness, assurance, and empathy, each dimension is subdivided into a number of questions, and through a questionnaire, consumers are asked to rate their expectations, perceptions, and minimum acceptability for each question, using identified relevant factors to illustrate the service quality scores from the questionnaire, customer scores, and comprehensive calculations. The SERVQUAL formula is $SQ = \sum_{j=1}^5 w_j \sum_{i=1}^{20} (P_i - E_i)$ ($i=1,2,3,\dots,20, j=1,2,3,4,5$), w_j is the weight of the j th attribute. P_i is the score of the i th factor in terms

of customer perception; E_i is the score of the i th factor in terms of customer expectation ($i=1,2,3,\dots,n$, $n = 22$). Finally, the SERVQUAL scores of all consumers in the survey are summed up and divided by the number of consumers m to obtain the average SERVQUAL score for the service, i.e. $SERVQUAL = (\sum_{i=1}^m SQ_i) / m$.

2.3 SERVQUAL scale design and instructions

In order to identify the reasons for the poor quality of rural healthcare services, the literature on "public health events", "quality of healthcare services" and "quality of rural healthcare services" was systematically reviewed. On the basis of this scale, the questionnaire on the quality of rural medical services based on the SERVQUAL model was revised to form a questionnaire that included two parts: ①basic information about the villagers: location, gender, age, annual income, and whether or not to participate in the New Rural Cooperative Medical System, etc.; and ②an evaluation scale of the villagers' expectations of the quality of the quality of the rural medical services and perceptions of the villagers, which consisted of five dimensions and a total of 23 questions; tangibles (Q1 to Q5), reliability (Q6 to Q10), responsiveness (Q11 to Q14), assurance (Q15 to Q18), and empathy (Q19 to Q23). The scale of the survey is "7-point", which is a 7-point scale from 1 to 7, where 1 represents very dissatisfied and 7 represents very satisfied. The scores from low to high represent: very dissatisfied, less dissatisfied, dissatisfied, average, satisfied, more satisfied, and very satisfied. The topics were assigned codes according to the dimensions and the order of the topics: A, B, C, D, and E, which represent tangibles, reliability, responsiveness, assurance, and empathy, respectively. Where A1 was used to represent the first question in tangibility, A2 to represent the second question in tangibility; B1 to represent the first question in reliability, and coded with this regularity.

3. Measurement results and analysis

3.1 validity analysis

Using SPSS26.0 to analyze the validity of the scale, it was found that the Cronbach's α coefficients of the rural healthcare service quality expectation and perception evaluation scale were 0.989 and 0.992 respectively, and the Cronbach's α coefficients of the five dimensions were all greater than 0.9, and the scale had a high degree of internal consistency; the factor analysis was used to evaluate the validity of the scale, and the statistical value of the KMO was 0.982, Bartlett's spherical value is 78479.105, the validity of this scale is fair, as shown in Table 1.

Table 1 Scale validity analysis

KMO value	0.982
Bartlett's spherical value	78479.105
degrees of freedom	2346.000

3.2 Reliability Analysis

The conclusions drawn from the statistical analysis of the newly revised scale using SPSS 26.0 analysis software are shown in Table 2 below:

Table 2 Table of five-dimensional reliability coefficients

dimensions	degree of expectation	perceptivity	minimum acceptable level
Tangibility A	0.960	0.945	0.978
Reliability B	0.973	0.962	0.984
Responsiveness C	0.968	0.955	0.979
Assurance D	0.974	0.959	0.983
Empathy E	0.976	0.964	0.985
overall reliability	0.989	0.992	0.994

From the above table, it can be seen that the α coefficients derived from the reliability tests of respondents' expectations and actual perceptions as well as the minimum acceptable level are all greater than 0.9, which is high and the reliability of the scale is strong.

3.3 Basic information of the villagers interviewed

Of the 571 valid questionnaires collected, 240 respondents were male, accounting for 42%, and 331 were female, accounting for 58%. 33 respondents were under 18 years old, accounting for 5.78%; 280 respondents were between 18 and 25 years old, accounting for 49.04%; 33 respondents were between 26 and 30 years old, accounting for 5.78%; 48 respondents were between 31 and 40 years old, accounting for 8.41%; 126 respondents were between 41 and 50 years old, accounting for 22.07%; 45 respondents were between 51 and 60 years old, accounting for 7.88%; 6 respondents were over 60 years old, accounting for 1.05%. 126 persons aged 41 to 50, or 22.07 %; 45 persons aged 51 to 60, or 7.88 %; and 6 persons aged 60 or over, or 1.05 %. In the survey group, 508 people, or 88.97 %, participated in the new rural cooperative medical care; 63 people, or 11.03 %, were not enrolled in the new cooperative medical care. There were 448 people, or 78.46 %, who had purchased commercial medical insurance, and 123 people, or 21.54 %, who had not.

3.4 Questionnaire analysis based on SERVQUAL model

In order to visually reflect the satisfaction of villagers in each dimension, the "average difference" of the indicators of each dimension is used for measurement. The "average difference" refers to the difference between the "average perceived value" and the "average expected value". A negative value indicates that the perceived value is less than the expected value and that the quality of service needs to be improved; a positive value indicates that the perceived value is greater than the expected value and that the quality of service is better. The results show that the average difference in the quality of rural health care services in all dimensions is negative, indicating that the patients' perceived value of the quality of the service is less than the expected value, as shown in Table 3. Based on the feedback from the magnitude of the difference in the table, it is concluded that, in the tangibility dimension, the villagers have the highest difference in their satisfaction with the modernization of the service facilities in the village health offices and private clinics, which reaches -1.01. In the reliability dimension, the highest difference in the extent to which village health units and private clinics accurately record and standardize the content of medical consultations was -0.91. In the responsiveness dimension, the highest difference in the extent to which village health units and private clinics consistently put the needs of the patient first was -0.86. In the assurance dimension, the highest difference in the extent to which villagers trust the healthcare workers in village health units and private clinics was -0.77. In the empathy dimension, the difference between the village health office and the private clinic's ability to provide personalized services to patients was the highest at -0.86. The above five dimensions are the five dimensions that have the largest gap between villagers' expectations and the reality of the results, and they are also the focus of this study to solve the problem.

Table 3 Results of patients' evaluation of the quality of rural medical services

dimensions	average difference
tangibility	-1.00
1. Satisfaction of villagers with the quality of emergency services provided by staff at village health offices and private clinics	-0.87
2. Satisfaction of villagers with the modernization of service facilities in village health offices and private clinics	-1.01
3. Satisfaction of villagers with emergency service facilities provided by village health offices and private clinics	-0.98
4. Satisfaction of villagers with the neatness and cleanliness of the dress of medical and nursing staff in village health offices and private clinics	-0.98

5. Match between the facilities of village health offices and private clinics and the services they provide	-0.84
reliability	-0.90
1. Villagers' recognition of medical skills in village health offices and private clinics	-0.89
2. Degree to which village health offices and private clinics accurately record and standardize the content of medical consultations	-0.91
Responsiveness	-0.90
1. Satisfaction with timely patient assistance in village health offices and private clinics	-0.85
2. Whether village health offices and private clinics always put patients' needs first	-0.86
Assurance	-0.80
1. Villagers' trust in health care workers at village health offices and private clinics	-0.77
2. Friendliness of health care workers in village health offices and private clinics	-0.70
Empathy	-0.80
1. Whether village health offices and private clinics can provide personalized services to patients	-0.86
2. Whether health care workers in village health offices and private clinics prioritize the interests of patients	-0.83

3.4.1. Tangibility analysis

In the process of rural medical services, villagers will come into contact with the medical care and staff of village health offices and private clinics, will come into contact with medical service facilities, and will experience the environment of medical care in the village, which are all manifestations of the tangible attributes of the services. According to Table 3, the quality of medical services provided by village health offices and private clinics does not meet the expectations of villagers. Most village health rooms and private clinics do not have a 24-hour duty system and cannot provide medical services during off-duty hours. The small number of doctors in village health offices, the small space for consultation, the small number and backwardness of basic medical equipment, and the limited emergency medical equipment make the consultation and treatment environment poor and inefficient.

3.4.2. Reliability analysis

Whether the medical services in the village can be completed accurately and reliably depends mainly on whether the village health office and private clinics can complete the things promised to the patients in time, and the villagers' recognition of the doctor's level of medical skills. According to Table 3, villagers do not yet recognize the medical skills of village doctors. Most of the rural doctors are not highly educated and have been practicing medicine for generations, so they can treat common colds and fevers, but for most complicated cases, the doctors in the village health offices are inexperienced and lack the instruments to confirm the diagnosis, so it is difficult for them to make accurate judgements. Most of the rural medical staff do not have a scientific background and lack systematic and professional training, and the standardization of the recording and management of medical consultations is poorly implemented.

2.4.3. Responsiveness analysis

Responsiveness refers to the ability of rural healthcare services to provide patients with relatively accurate consultation times, timely services, and timely responses to the needs of daily life. The data show that the equipment and medical staff of village health offices and private clinics do not meet the expectations of villagers in terms of providing timely assistance to patients. The number of medical staff in village health offices and private clinics is not large enough to meet the needs of services such as drug delivery and home visits. During periods of seasonal illnesses, when the number

of consultations at the health offices surges, there is often a shortage of beds and so on, and it is really difficult for the doctors and nurses to serve the patients. Due to the number of doctors in the village health offices, those with only one doctor are relatively weak in their ability to meet the needs of patients. If the doctor is away on a study trip or busy with farming, he or she is unable to provide consultation services in time to meet the needs of patients.

3.4.4. Assurance analysis

Assurance is mainly due to the fact that the medical staff of village health offices and private clinics are trustworthy, their words and behavior are more reliable, and patients feel more assured and solid when seeking medical treatment at village health offices and private clinics. The average difference between the villagers' trustworthiness of the medical staff of village health offices and private clinics is -0.77, and the medical standard of the medical staff of village health offices and private clinics has not yet reached the villagers' satisfaction level. For the villagers, they hope that they can be treated for minor illnesses at the health offices, and they have higher expectations of the medical staff. In view of this, the medical staff of village health offices and private clinics still need to improve their business skills. There is still a gap between the friendliness of medical staff in village health offices and private clinics and the expectations of villagers; the number of medical staff is insufficient, and when there is a busy farming season or a large number of patients, the attitude of the medical staff is significantly lower than usual.

3.4.5. Empathy analysis

Empathy refers to caring for and providing personalized services to patients, being able to take care of the difficulties of special patients and carry out special treatment, understanding the needs of patients in depth, considering more from the perspective of patients, and reasonably arranging time and tasks to take care of the time requirements of the majority of patients. However, the medical staff of village health offices and private clinics are not able to provide personalized services for patients such as drug purchasing, buying masks on behalf of patients, etc. The reason for this is that the number of medical staff in village health clinics is small, and the daily consultation has taken up most of their time, so they cannot guarantee that they can provide personalized services for villagers every day. The prices of medicines in some village health offices are not open and transparent, and some villagers think that the health offices charge higher fees, without a specific price list being made public. Some rural elderly people with low incomes often suffer from minor illnesses, which can be treated in the health offices, but the costs incurred by the health offices are not very satisfactory to the elderly.

4. Problems with the quality of rural health services

Today, the rural medical public health system has been improved everywhere and is generally more complete. It is able to meet the basic medical needs of the local people, and is basically able to cope with sudden public health events. However, through the survey found that rural medical also exists in some villagers of public health awareness is weak, health service professionals are unevenly distributed, to deal with sudden rural medical public health events system is not sound and other problems.

4.1 Low public health awareness among some villagers

For responding to medical public health incidents, villagers' awareness of public health is a necessary prerequisite for being able to prevent them in advance or to treat them correctly. Although the village committees have conducted knowledge campaigns on public health events, villagers do not have a high level of understanding of the content of the campaigns, and only have a partial understanding of them. 88.97 percent of the respondents have joined the new rural cooperative medical care, but there are still 11.03 percent of the respondents who have not joined the new rural cooperative medical care. 70.28 percent of the respondents are willing to continue to increase the

expenditure on medical care, while 29.72 percent of the respondents are unwilling to continue to increase the expenditure on medical care; 78.46 per cent of the respondents have purchased individual medical insurance, while 21.54 percent have no individual medical insurance. There is still a need to strengthen the publicity of the new medical and health care guarantee, so that farmers can increase their understanding of the new medical and health care system and raise their awareness of their own health and safety.

4.2 Inadequate modernization of the infrastructure of health units and insufficient human resources for high-quality medical services

The degree of modernization of the facilities in village health offices is not high. As villagers get older, most of the diseases that appear in their bodies are major diseases that cannot be known through daily medical check-ups using the existing equipment in the health offices, making it very easy to miss the best time for treatment of major diseases. From the survey on the degree of modernization of the service facilities of village health offices and private clinics, more than half of the villagers interviewed thought that the degree of modernization of village health rooms was not high, and 27.32% of the respondents were satisfied with the modernization of the facilities in the range of 65-79 points. With the rapid development of China's economy, the differences in regional economic development are widening, which leads to a large number of rural population outflow to large and medium-sized cities to work, and talents are also gathered in better-developed cities. Poorly equipped rural medical infrastructure makes it difficult to attract high-quality medical service personnel to the countryside. In addition, the low income of village health offices makes it difficult for high-quality medical personnel to work in rural areas for long periods of time, even if they go into the countryside.

4.3 Inadequate regional health planning and difficulties in securing medical services

With the transformation of rural areas in recent years, transport has improved in most areas, but in mountainous and more remote areas, where transport is still inconvenient because of the terrain and topography, problems such as the slow transport of medicines and delays in their arrival have arisen. In case of emergency, there are problems of inconvenient transport and delay in contacting the higher-level medical department. The results of the questionnaire show that about 47 percent of the respondents are still satisfied with the level of satisfaction of the village health office in emergency assistance below 80 points, and about 48 percent of the respondents are satisfied with the level of satisfaction with the preparation of emergency medicines below 80 points, which can be concluded that the village health office is not able to provide the required emergency services in a timely manner. The stock of basic medicines is sufficient, but emergency medicines are scarce, and emergency medicines cannot be supplied in a timely manner in the face of health emergencies. China's regional health planning is mostly synchronized with administrative divisions, and there is a lack of overall coordination of the sector at the national level; medical and health resources are plentiful in large and medium-sized cities, but insufficient or even severely lacking in the vast rural areas.

5. Path to quality improvement of rural medical services

With the accelerated pace of social and economic reform and development, the people's demand for health services continues to increase, and the demand for medical services and other aspects of the demand has gradually risen and presented the characteristics of diversification and personalization. In order to promote the quality of rural medical services, we must effectively stand in the villagers' point of view to consider the problem, and then promote the quality of rural medical services to accelerate the upgrading of medical services, so that medical services become the endogenous driving force of rural revitalization.

5.1 Strengthening policy and system publicity to increase the motivation of farmers to participate in the insurance scheme

In order to increase the motivation of farmers to participate in the insurance system, the first step is to make villagers understand the importance of medical services. Targeted publicity on typical medical cases is being carried out, so that the public can actually feel the benefits of the current rural medical policy and system through personal experience, and the awareness of the public's participation in the insurance system can be raised by subtle means.

5.2 Improving rural community health services and promoting the application of modern rural facilities

Existing rural medical and health resources should be brought into full use, and the supply of basic emergency medicines and emergency facilities should be guaranteed. Through modern scientific and technological means, the use of electronic cases and prescriptions has made it possible to achieve online interconnection and interoperability in medical diagnosis and improve the efficiency of medical services in rural community health offices. The promotion and application of artificial intelligence diagnostic and treatment systems has made online remote diagnosis and treatment possible, assisting rural doctors in correctly diagnosing and treating patients and avoiding misdiagnosis as much as possible.

5.3 Innovative channels to strengthen service building and improve practitioner standards

It is recommended that preferential policies be introduced for graduates of medical schools who devote themselves to rural medical and health care, and that the wages of rural medical and health care workers be guaranteed, so as to increase their willingness to work in the field. Systematic training has been provided to in-service medical and nursing personnel through online and offline means, with a view to improving their practical medical and nursing skills. The establishment of joint training of physicians by universities and health administrative departments, and the exchange of medical personnel between urban hospitals and rural health offices, will alleviate the shortage of medical personnel in rural areas. The construction of medical care should be based on both Chinese and Western medicine, encouraging colleges and universities to train Chinese medicine personnel, introducing policies to improve the vitality of the development of the traditional Chinese medicine industry, allowing Chinese medicine to penetrate rural services, and constructing a coordinated development of Chinese and Western medicine in the rural public health system.

The development of rural medical services cannot be achieved in one go, and alleviating the problem of access to medical care for the masses and improving the quality of rural medical services is a gradual process. In this era of rapid development, the rational use of resources and the adoption of feasible measures are the only way to promote the healthy development of medical services.

6. Conclusion

In conclusion, the intrinsic importance of rural healthcare within the framework of rural revitalization is paramount. Employing the SERVQUAL model as a diagnostic tool to scrutinize the contemporary state and attendant challenges of healthcare service quality in Shandong Province reveals a conspicuous dissonance between the pragmatic valuation of healthcare by rural denizens and their corresponding anticipations. This disjuncture notably extends across five fundamental dimensions: tangibility, reliability, responsiveness, assurance, and empathy.

The implications of these findings serve to accentuate exigent challenges warranting redressal to fortify the edifice of rural healthcare. Such challenges encompass the perceptible lack of public health cognizance within specific rural enclaves, a dearth in the modernization of rural healthcare infrastructure, and an apparent lacuna in harmonized regional health strategems. Against this backdrop, the imperative of fashioning an augmented rural quality of life and erecting a resilient rural public health framework beckons proactive interventions. These interventions encompass

heightening hygienic mindfulness among rural inhabitants, propelling the modernization of hinterland medical facilities, and amplifying the erudition of healthcare practitioners through a nuanced and variegated approach.

In essence, effectuating a congruence between the perceptual and anticipatory realms of healthcare delivery within rural milieus is pivotal for a holistic rural developmental paradigm. By judiciously tackling the aforementioned impediments, a more efficacious healthcare milieu can be engendered, thereby inexorably advancing the broader imperatives of rural resurgence and ameliorated public health indices.

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