Study on the Construction of Evaluation Dimensions of Accessibility of Basic Public Health Services in China

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ABSTRACT
Constructing professional and comprehensive evaluation dimensions of basic public health service accessibility is the key to promoting equalization and accessibility of basic public health services. This study constructs specific evaluation dimensions for the accessibility of basic public health services in China: The government supply dimension is a basic dimension, which focuses on accessibility at the supply level, and improves accessibility by ensuring financial, infrastructure, and human resource supply. The sense of accessibility dimension is a key dimension, which focuses on accessibility at the demand level, and improves accessibility by enhancing citizens’ awareness, service experience, and guiding citizens’ service expectations. The supply implementation dimension is a core dimension, which focuses on the accessibility of supply and demand by improving convenience, ensuring efficient implementation of service projects, and carrying out basic public health service activities with high quality.

Keywords: Basic public health services, Accessibility, Evaluation dimension

1. INTRODUCTION

The Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning Adhering to and Improving the Socialist System with Chinese Characteristics and Advancing the Modernization of the State Governance System and Governance Capability, adopted at the Fourth Plenary Session of the 19th CPC Central Committee, emphasizes “improving the public service system and promoting the equalization and accessibility of basic public services.” Basic public health service is a service to protect the basic health of citizens and prevent the occurrence of large-scale diseases, which is an important part of basic public services. Accessibility and equalization of basic public health services complement each other. As an important prerequisite for equalization, the accessibility of basic public health services is an important concern in the study of basic public health services, as it affects the health of individuals in a small way and the physical quality of several generations of Chinese people in a large way. Therefore, from the perspective of accessibility evaluation, it is beneficial for us to have a more comprehensive and profound understanding of the current situation of basic public health services in China. However, the current research on the accessibility evaluation of basic public health services in China is still from an objective and spatial-temporal perspective, neglecting the evaluation of non-spatial factors, and lacking in implementable evaluation indicators. Therefore, it is necessary to design a professional, comprehensive, and implementable evaluation dimension for the accessibility of basic public health services in China, which is also the key to improve the quality of basic public health services more efficiently.

2. A REVIEW OF RESEARCH ON ACCESSIBILITY OF BASIC PUBLIC HEALTH SERVICES

2.1. Definition of Accessibility of Basic Public Health Services

Basic public health services are services provided to all residents by disease prevention and control institutions, urban community health service centers, township health centers and other urban and rural basic medical and health institutions, which are public health interventions for the public good and mainly play a role in disease prevention and control. The basic public
health service program is an important part of China’s medical and health system, targeting the general public and focusing on special groups to provide them with basic medical and health services. In 2009, the national basic public health service program was launched, and local governments began to explore, summarize, and innovate themselves in the implementation of the program, gradually exploring effective models of basic public health services [1].

The term “accessibility” is derived from the Latin word “Accessus”, which contains four meanings, namely, access or way; right of approach, right of use; easily understood; the act of entering or approaching. The concept of accessibility has been gradually defined and refined in the field of health services since 1968, when Anderson (1986) first introduced the concept of accessibility explicitly. He argued that despite the differences in the economic ability of individuals, public health services are a basic right enjoyed by citizens, and health services exist to provide health services to citizens, not at the expense of individual interests. Later, Anderson (1970) vaguely expressed accessibility as “use of services” [2]. Subsequently, the concept of accessibility was defined by the academic community as “representing a functional relationship between the population and health care resources, and also reflecting the existence of barriers and other difficulties in accessing services” [3]. In 1981, Michigan State University’s Panchaski and William Thomas (1982) wrote a detailed discussion of the concept of health service accessibility as “the degree of fit between the client and the system” [4]. In 2000, the concept of health service accessibility was formally used in the World Health Report and defined as the ease of access to health services for the population.

With regard to the definition of the concept of accessibility, this study tends to draw on the perspective of “adaptation” (or “matching”). Based on China’s unique situation and the attributes of basic public health services, we define the accessibility of basic public health services as the degree of matching between the two subjects, basic public health service system and the public.

2.2. Theoretical foundation of accessibility of basic public health services

The concept of accessibility was first defined by Ronald Anderson in 1968 in his book A behavioural model of families use of health services, which laid the conceptual foundation for the subsequent accessibility theory [5]. There are two classical interpretations of what accessibility means. One is that accessibility theory focuses on the “utilization” dimension, which Ronald Anderson explains as the actual use of public health services and the factors that contribute to or hinder that use in the process. Secondly, accessibility theory focuses on the “matching” aspect, Roy Penchansky and J William Thomas outline accessibility theory as the matching between the health service system and the actual health needs of the public. Campbell SM suggests that accessibility is the analysis of the public’s ability to get the services that meet their own financial needs easily and quickly. In addition, with regard to the evaluation of public service accessibility, Anderson of the “utilization” perspective divides accessibility evaluation into real and potential accessibility; scholars from the “matching” perspective divide accessibility evaluation into the “availability” and “accessibility” based on the matching between service recipients and the service system. The scholars from the “matching” perspective classify the accessibility evaluation into usability, acceptability, accessibility, affordability and applicability based on the matching between the service recipients and the service system.

Based on the accessibility theory from the “matching” perspective, this study divides the dimensions of accessibility evaluation of basic public health services in China into three dimensions: government supply dimension, the sense of accessibility dimension and supply implementation dimension from the perspective of supply, demand and supply-demand relationship, and designs secondary and tertiary indicators under each dimension.

2.3. A review of research on accessibility of basic public health services

2.3.1. Chinese research review

2.3.1.1. A study on the concept of accessibility of basic public health services in China

Liu (2009) argues that the study of health service accessibility needs to put aside personal factors and study both economic and material aspects. In the material aspect, it mainly refers to the hardware and facilities of health service institutions, the specific content of health service resources, and the time cost of enjoying health service resources. In the economic aspect, it mainly refers to the supply cost of health service resources, the general economic income level of the society, and the proportion of government funding [6].

Professor Gong (2000) proposed that health service accessibility can be studied in terms of three major factors: economy, geography, and services [7], while some studies have also suggested that health service accessibility is basically accessibility in terms of both economy and distance. In terms of economics, whether patients have the financial means to access health service resources. In terms of distance, it mainly refers
to the physical distance between the health service provider and the patient.

2.3.1.2. Factors influencing the accessibility of basic public health services in China

The level of accessibility of basic public health services is influenced by various factors. According to Qian (2008), the level of access to health services is influenced by citizens’ willingness to receive services, which is influenced by their own perceptions, family environment, degree of illness, and social environment [8]. According to Lin and Du (2008), the patient’s ability to tolerate the disease also reflects the level of accessibility of health service resources to a certain extent, and also reflects the patient’s utilization of health services from the side [9]. Zhou (2000) believes that the accessibility of primary health services is influenced by institutional factors [10], and he analysed the institutional factors from three aspects. Firstly, the operation mechanism of primary health care institutions is not perfect, the responsibilities are not clear, and the nature of public welfare is weak. Secondly, in remote areas, primary health care resources are very important, but due to the vast size of China and the changing geographical environment, it is difficult to set up health care institutions to meet the demand for health care services because of the scattered nature of the population. Finally, the health awareness of grassroots people is weak, and they usually only go to medical and health institutions to obtain health service resources when they are sick, but they do not have a good understanding of the role of medical prevention, so it is difficult to give full play to the service role of health service institutions.

2.3.1.3. Related studies on the dimensions of public service accessibility evaluation

In recent years, the field of public service has paid increasing attention to the concept of public service accessibility. The concept of “accessibility” has also been gradually presented in Chinese public service policy texts. “The 13th Five-Year Plan” explicitly proposes to strive for the equalization of basic public services and to improve the accessibility of public services [11]. Health service accessibility studies have been available since 2000 and are therefore more mature. Miao (2008) divided the dimensions of health service accessibility into two, including supply accessibility and demand accessibility. Supply accessibility refers to the objective level of accessibility, in which the public evaluates the distance and content of public health services in order to effectively access them. Demand accessibility refers to the subjective level of accessibility, i.e., the ability of public health service users to obtain public health services themselves, including their actual or potential purchasing power and personal health awareness status [12].

In terms of accessibility evaluation dimensions, most scholars have focused on the accessibility evaluation dimensions of public service facilities from a spatial and temporal perspective. According to Liu (2016), to improve the spatial accessibility of public service facilities focuses on the reasonable planning and allocation of community public services, which should, on the one hand, guarantee the adequacy of the number and scale of service facilities with the guiding principle of satisfying the basic life of residents; on the other hand, it should realize the convenience of public ownership of facilities [13].

In addition, the scope of research on the spatial accessibility of public services in China mainly refers to the construction of public service infrastructures such as science, education, culture, and health, and less attention has been paid to the study of “non-spatial” elements. Therefore, in addition to the analysis of spatial factors, the in-depth investigation of public service accessibility evaluation should also focus on non-spatial factors. For example, Peng (2012) argues that research on public service accessibility should be enriched to include both spatial and non-spatial elements in accessibility evaluation [14], specifically, Chen (2007) argues that spatial factors represent the costs of transportation and time due to the physical distance between the public and public service provision. Then, the non-spatial factor represents whether the specific related institutional construction can play a sustainable guarantee role and whether the individual ability and quality of users meet the usage standards [15].

2.3.2. Foreign research review

2.3.2.1. Development of the accessibility of basic public health services

During the era of the industrial revolution in the West from the late 18th to the early 19th century, rural populations rapidly gathered in towns and cities, resulting in the gradual spread of infectious and occupational diseases. Based on this, sociologists, medical doctors called on the government to solve serious social problems, and the concept of public health gradually became clear [16]. In the 1850s, the problem of public health was effectively solved. In the history of medicine, this period is called “the first sanitary revolution”. In 1952, Winslow first defined the concept of public health services and it was adopted by the World Health Organization [17]. In the 1860s, people began to think about how to develop public health. This was the “second health revolution”, when the public health strategy of prevention and health protection emerged [18]. By 1978, the World Health Organization (WHO) made primary health care the core policy for
achieving “health for all”. In the World Development Report 1993, the “basic public health service package” was introduced to the public, which includes health service packages and medical service packages [19]. The essence of basic public health services is the basic health services provided by different countries to their citizens according to their economic level.

European and American countries have widely advocated and actively promoted the equalization of public services since a long time ago [20]. The goal of the development of basic public health services abroad is equity. Equity is mainly reflected in the fact that every citizen can enjoy the basic public health services provided by the state in a fair manner. In the developed countries in the West, the degree of equalization of basic health services is high, but in the current situation, no country in the world is able to make basic public health services cover all citizens in the national region. In the face of this reality, with limited health service resources, it has become a common direction for countries to develop an effective service plan to ensure that all citizens can enjoy basic public health services in an equitable and orderly manner [21]. As a result, research on how to better make basic public health services accessible to citizens has gradually come into focus.

2.3.2.2. Factors influencing the accessibility of basic public health services

Foreign research on accessibility of health services tends to focus on empirical measurement studies. Based on the concept of accessibility of “customer-system fit”, Panchaski and William Thomas constructed a “five-dimensional measure” of accessibility, including affordability, availability, accessibility and acceptability. David Peter (2008) and others built on this concept by classifying the measurement dimensions into accessibility, financial accessibility, and acceptability [22], and Hobkens (1969) and others argued that the extent to which patients need physicians affects the level of accessibility of health services. They found empirically that the higher the demand for physicians, the higher the sensitivity of their corresponding conditions, and the worse their perception of health service accessibility [23]. The US Agency for Healthcare Research and Evaluation (1972) constructed empirical indicators of “accessibility” based on patient needs [24]. However, some foreign scholars believe that this indicator is flawed because it ignores the complexity of the health care system itself and the organizational aspects of management. Therefore, some scholars have revised the measurement model by adding two dimensions, “financial” and “supply”. Wakeman (1979) constructs three dimensions of accessibility, availability and service quality to measure the level of accessibility of health care services [25]. In general, foreign studies on the factors influencing the accessibility of health services have focused on organizational, patient, and economic environments.

3. DESIGN OF DIMENSIONS FOR EVALUATING THE ACCESSIBILITY OF BASIC PUBLIC HEALTH SERVICES

This study is based on the theory that defines accessibility as “matching”. Thus, the dimensions of accessibility, acceptability, and adaptability can be considered to evaluate the accessibility of basic public health services. To facilitate the design of a practical dimension system, this study replaces “accessibility dimension” with “government supply dimension”, “acceptability dimension” with “the sense of accessibility dimension”, and “adaptability dimension” with “supply implementation dimension”, thus forming three interrelated elements of government supply, the sense of accessibility and supply implementation, and discussing them separately, as shown in Figure 1 below.

From the supply perspective, the government supply dimension analyses whether the supply of human, financial, and material resources for basic public health services meets public expectations for basic public health services. From the demand perspective, the sense of accessibility dimension analyses whether the products and activities of basic public health services meet public needs. From the supply-demand perspective, the supply implementation dimension analyses whether basic public health services meet public needs in terms of convenience, utilization of basic public health services and implementation of basic public health services activities. In this study, detailed analyses are conducted between these three dimensions.

![Figure 1 Analytical perspective diagram of the evaluation dimensions of the accessibility of basic public health services in China](Image)
3.1. Analyzing the government supply dimension of accessibility evaluation from a supply perspective

Before Analyzing the dimension of government supply, we should first clarify the concept and objectives of government supply. Government supply is mainly used to express whether the type and quantity of facilities provided by the public service system, medical and nursing personnel and the funds that can be given by the state or policies can meet the actual public demand for basic public health services. Government supply is the most intuitive way to highlight the extent to which the government performs public service functions and protects the public’s right to public services. If the most basic quantity and type of provision cannot meet demand, then, as Katarina Tomaszewski suggests in Education 4A theory, citizens’ access to basic public health services will be unattainable [26]. This is only an aspiration, not a right.

According to the analysis of the concept of government supply, it can be obtained that the government supply dimension is mainly to evaluate whether the types and quantities of human, financial, and material resources supplied in the construction of the basic public health service system meet the actual expectations of the public for basic public health services. The specific dimensions include the financial supply, the infrastructure supply and the human resource supply. The specific operationalized index criteria are shown in Table 1.

Table 1. Government supply dimension evaluation index system

<table>
<thead>
<tr>
<th>First level dimension</th>
<th>Secondary indicators</th>
<th>Tertiary indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Supply</td>
<td>Financial Supply</td>
<td>Government financial allocation (Yuan)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Basic public health service business expenses per capita (Yuan)</td>
</tr>
<tr>
<td></td>
<td>Infrastructure supply</td>
<td>The proportion of financial allocation for basic public health services to financial expenditure (%)</td>
</tr>
<tr>
<td></td>
<td>Human Resource Supply</td>
<td>Number of beds in medical institutions per 1,000 resident population (pcs)</td>
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<td></td>
<td></td>
<td>Building area of urban and rural primary care institutions per 10,000 people (square meters)</td>
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<td></td>
<td></td>
<td>Number of health technicians per 10,000 people (persons)</td>
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<tr>
<td></td>
<td></td>
<td>Number of rural health technicians per 10,000 people (persons)</td>
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<tr>
<td></td>
<td></td>
<td>Number of urban practicing (assistant) physicians per 10,000 people (persons)</td>
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<tr>
<td></td>
<td></td>
<td>Number of urban health technicians per 10,000 people (persons)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of rural practicing (assistant) physicians per 10,000 people (persons)</td>
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</tbody>
</table>

In summary, one of the dimensions of basic public health service accessibility evaluation is the government supply dimension, based on the relevant accessibility evaluation framework. The government supply dimension is influenced by the supply of basic public health services, and the supply elements that specifically affect the accessibility of basic public health services contain the financial, infrastructure and human supply of basic public health services.

3.2. Analyzing the sense of accessibility dimension of accessibility evaluation from a demand perspective

The connotation of the sense of accessibility dimension is mainly defined by the academic community as whether the service content, service level, and service attitude of basic public health services provided by urban and rural basic medical and health institutions meet the public’s health service expectations. Therefore, the evaluation of the sense of accessibility dimension must pay attention to the analysis of whether basic public health services can be accepted at the level of public demand, as well as reflect whether the public can receive basic public health services and programs in a happy mood [27]. The specific dimensions include citizen perception, service experience and service expectation, and the specific operationalized index criteria are shown in Table 2.

Table 2. Evaluation index system of the sense of accessibility dimension

<table>
<thead>
<tr>
<th>First level dimension</th>
<th>Secondary indicators</th>
<th>Tertiary indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sense of accessibility</td>
<td>Citizen Awareness</td>
<td>Subjective willingness to receive information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The level of education of the public</td>
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<tr>
<td></td>
<td></td>
<td>Richness of public information reception channels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ability of the public to receive information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluation of past public services</td>
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</tbody>
</table>
In summary, the second dimension of basic public health service accessibility evaluation is the sense of accessibility dimension, which is influenced by the demand of basic public health services. The demand elements that specifically affect the accessibility of basic public health services include citizen perception, service experience and service expectation.

### 3.3. Analyzing the supply implementation dimension of accessibility evaluation from the perspective of supply and demand

The supply implementation dimension of basic public health service accessibility evaluation refers to the match between the efforts made by the supplying organizations to meet the public demand and the degree of public demand satisfaction. In other words, the supply implementation dimension is to judge the adequacy between the basic public health service system and the public in terms of the relationship between supply and demand of basic public health services.

Then, the supply implementation dimension needs to cover the evaluation of both supply and demand dimensions, such as whether access to services is convenient, the effectiveness of the utilization of basic public health service programs and the implementation of basic public health service activities match public demand, as shown in Table 3.

#### Table 3. Evaluation index system of supply implementation dimension

<table>
<thead>
<tr>
<th>First level dimension</th>
<th>Secondary indicators</th>
<th>Tertiary indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply implementation</td>
<td>Convenience</td>
<td>Average distance of patients to health services (m)</td>
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<td></td>
<td></td>
<td>Average time for patients to travel to health services (hours)</td>
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<td></td>
<td>The effectiveness of the utilization</td>
<td>Resident health file creation rate (%)</td>
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<td></td>
<td></td>
<td>National immunization program vaccination rate (%)</td>
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<tr>
<td></td>
<td></td>
<td>Systematic management rate of children under 3 years old (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health management rate of children under 7 years old (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maternal system management rate (%)</td>
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<tr>
<td></td>
<td></td>
<td>Postnatal visit rate (%)</td>
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<td></td>
<td></td>
<td>Health management rate of the elderly over 65 years old (%)</td>
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<tr>
<td></td>
<td></td>
<td>Health checklist completeness rate (%)</td>
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<tr>
<td></td>
<td></td>
<td>Standardized management rate of hypertensive patients (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standardized management rate of diabetic patients (%)</td>
</tr>
<tr>
<td>Implementation of service activities</td>
<td>Number of promotional materials distributed (copies)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Whether to broadcast health education audio and video materials</td>
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<td></td>
<td></td>
<td>Whether to set up health information boards</td>
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<td></td>
<td></td>
<td>Number of health consultation activities on Health Promotion Day (times)</td>
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<tr>
<td></td>
<td></td>
<td>Number of health education lectures organized (times)</td>
</tr>
</tbody>
</table>

In summary, the third dimension of the accessibility evaluation of basic public health services is the supply implementation dimension. The supply implementation dimension is specifically influenced by the relationship between supply and demand of basic public health services, including the degree of convenience, the effectiveness of utilization of basic public health service programs, and the implementation of basic public health service activities.

#### 3.4. Analysis of the relationship among the dimensions of accessibility evaluation of basic public health services in China

The three dimensions of the basic public health service accessibility evaluation dimension: government supply dimension, the sense of accessibility dimension and supply implementation dimension are interrelated and influence each other. As shown in Figure 2 below. The government supply dimension is the basic dimension and plays a fundamental role; the sense of accessibility dimension is the key dimension and plays a critical role; and the supply implementation dimension is the core dimension and plays a central regulatory role.
The government supply dimension exists as a fundamental dimension in the evaluation of the accessibility. Without government supply, i.e., if the supply of service personnel, financial resources, and infrastructure construction provided by the state is not sufficient, then the subsequent accessibility to citizens and the implementation of supply will certainly be affected by this. For example, although the allocation of medical resources in many jurisdictions is relatively saturated, and it is relatively convenient to seek medical treatment for common and multiple diseases, there are still long queues for specialist consultation and hospitalization in some large hospitals, and the problem of difficulty in seeing a doctor still plagues the people in the jurisdiction to some extent. Only by guaranteeing an adequate supply of basic public health services can the public accept basic public health services behaviourally or even inwardly.

The sense of accessibility analysis of accessibility evaluation, on the other hand, constitutes a key dimension that plays a critical role in the government supply and supply implementation of basic public health services. For example, the age range of people using basic public health services, from infants to the elderly, requires different equipment and service methods for different age groups. A “one-size-fits-all” approach to service delivery does not improve efficiency, but rather undermines citizens’ sense of accessibility. Therefore, the sense of accessibility analysis influences government supply and implementation through critical evaluations of the products and activities of basic public health services.

The supply implementation of basic public health service accessibility evaluation is the core dimension of the evaluation system, which is related to whether the services provided by urban and rural basic medical and health institutions can be directly translated into practical service utilization. For example, if the rate of health files creation is low, it may cause duplicate registration of residents’ health information, resulting in a waste of human, material and financial resources of government supply, and also making residents feel bored, which is not conducive to the efficient use of government supply and frustrates citizens’ sense of accessibility. Therefore, the supply implementation dimension can play a timely feedback role in government supply and citizens’ sense of accessibility.

Figure 2 Relationship between evaluation dimensions

by Analyzing and judging the degree of convenience, the effectiveness of the utilization of basic public health service programs and the implementation of basic public health service activities. It can be seen that the three dimensions influence each other and play their respective roles, systematically constituting the evaluation dimensions of accessibility of basic public health services in China.

4. CONCLUSION

From the perspective of accessibility, this study takes into account the connotation and special attributes of basic public health services in China, and constructs a system for evaluating the accessibility of basic public health services in China from three evaluation dimensions: government supply, the sense of accessibility and supply implementation. The government supply dimension refers to whether the supply dimension of basic public health services, such as the supply of human, financial, and infrastructure resources, meets the public’s expectation of basic public health services. The sense of accessibility refers to whether the service content, service level, and service attitude of basic public health services provided by urban and rural basic medical and health institutions meet the public’s expectation of health services. Supply implementation refers to whether the supply and demand dimensions of basic public health services, such as the degree of convenience, the effectiveness of the utilization of basic public health service programs and the implementation of basic public health service activities, match the public’s needs. The evaluation system for the accessibility of basic public health services is formed on the basis of the analysis of each.

The evaluation dimensions constructed in this study break through the way scholars analyzed accessibility from objective, theoretical and spatiotemporal perspectives in the past, combining spatiotemporal and non-spatiotemporal factors, objective and subjective factors, with a high degree of comprehensiveness and professionalism. At the same time, the extremely practical nature also makes it possible to objectively evaluate the accessibility of basic public health services in China. Thus, we can improve the accessibility of basic public health services in a more targeted manner, further enhance the quality of services, and effectively prevent citizens’ health problems while improving their sense of well-being, satisfaction, and access.

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