Physical-chemical and treatment peculiarities of Azerbaijan mineral waters and their use in health tourism

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Abstract. In modern times, the efficient use of mineral waters is evaluated as a source bringing income for states in several world countries. This is because the efficient use of the mineral waters may bring an influx of tourists, which in turn lead to at least a partial reduction of the unemployment challenges and the expansion of the activities of catering establishments. Undoubtedly, mineral water contains dissolved salts, microelements, as well as some biologically active components, which have a therapeutic effect on the human body. These waters can be applied for drinking and for treatment, taking baths, bathing in the pools, inhalation and rinsing (in diseases of the upper respiratory tract), and washing the intestines (in diseases of the digestive system and metabolic disorders), as well as in gynecological diseases. It can be noted that when the amount of the active substances in mineral water is relatively lower, they are used as drinking water whereas when the amount of these substances is higher, they are used in the medical treatment of various diseases. There are also medical drinking waters, which should be used only for a certain period of time according to the doctor’s instruction and with a prescription. Regardless of having rich mineral water resources in Azerbaijan, only a small part of them is used. At the present moment, in order to develop medical tourism in Azerbaijan, the state has done certain work, sanatoriums, rest houses, boarding houses, balneological-treatment centers, resort polyclinics, rehabilitation centers and others are restored or new ones are built. However, these works are not carried out in a comprehensive manner and are fragmented. In this respect, in the presented article, the therapeutic-health importance of mineral waters, their physical, chemical and other properties, temperature indicators, classification, and their balneological-therapeutic properties were provided, and a map of mineral water resources of Azerbaijan is drawn up. In addition to these, the article provides extensive information about mineral waters such as Galaalti, Badamli, Sirab, Daridagh, Slavyanka, Istisu, Surakhani, Bilgah, Gotursu, Khaltan and others, which are major therapeutic and health importance in Azerbaijan, and it was elucidated that they can continuously lead to health tourism and socio-economic development by determining their potential opportunities.

Keywords: tourism, medical tourism, mineral waters, Galaalti, Daridagh, Istisu.

Фізико-хімічні та лікувальні особливості мінеральних вод Азербайджану та їх використання в оздоровчому туризмі

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Анотація. Сьогодні ефективне використання мінеральних вод оцінюється як джерело, що приносить дохід державам в ряді країн світу. Це пов’язано з тим, що ефективне використання мінеральних вод може призвести до припливу туристів, що, в свою чергу, призведе принаймні, до часткового скорочення проблем безробіття і розширення діяльності підприємств громадського харчування. Безумінно, мінеральна вода містить розчинені солі, мікроелементи, а також деякі біологічно активні компоненти, які надають лікувальну дію на організм людини. Ці води можна застосовувати для пияти в лікувальних цілях, прийняття ванн, купання в басейнах, інгаляцій і полоскань (при захворюваннях верхніх дихальних шляхів), промивання кишечника (при захворюваннях травної системи і порушеннях обміну речовин), а також при гінекологічних захворюваннях. Можна відзначити, що коли кількість активних речовин в мінеральній воді відносно менше, вони використовуються в якості
In today’s world, when determining the priority directions of a healthy lifestyle, the importance of medical tourism and its development remains the most urgent issue. The reason is that the medical tourism can contribute to the stable and dynamic economy of the country in addition to the restoration of human health. This type of tourism has high economic and social benefits. This is the reason why several world countries have tried to develop medical tourism based on local natural resources. However, developing medical tourism based on local resources is insufficient in some cases. Therefore, each country needs to have sustainable socio-economic potential, infrastructural capabilities, qualified personnel and so on.

Medical tourism is considered as one of the tourism dimensions and it can contribute to the stabilized and dynamic development of a country’s economy. Since it is cost-effective industry, most developing countries have focused on this industry and they are planning to develop this industry (Awodz and Pand, 2006). Medical tourism involves the movement of residents and non-residents within the country and abroad for a period of 20 hours to 6 months for the purpose of health and prevention of the human body from various diseases (Babkin, 2008). Medical tourism companies are integrated into the wider tourism industry. Culture, quality and availability of care influence medical tourism behavior (Connell, 2013). At the same time, medical tourism fully fits the concept of green consumer tourism, which is «an important factor in the formation of a sustainable development society» (Vysotska and Vysotskyi, 2022, p.182). The essential purpose of medical tourism is to concentrate on the tourist receiving treatment in a different place in the heart of nature. This not only creates a favourable condition for enjoying nature but also ensures the use of medical and health services.

In order to achieve success in the field of medical tourism, research should be conducted, destinations should be determined, sustainable directions of development should be researched, and the natural components to be used in treatment should be indicated by studying the unique charms of the region within a structured framework. For this, the systematic model of medical tourism should be used (Ghanbaria et al., 2014 – Figure 1).

**Fig.1. Systematic model of the health tourism**

Natural recreation resources and increasing the effectiveness of treatment through them necessitate effective use of available resources, especially mineral water. Although Azerbaijan has a relatively smaller territory, it has rich natural resource potential. Among these natural resources, mineral waters occupy a special place and are one of primary sources for the development of medical tourism in the country. Mineral waters are used to restore the health of the population and organize their recreation, as well as can be used as drinking water.

Mineral waters have a certain synchronizing effect, that is, by improving the interaction of physiological systems, they increase their resistance to harm-
ful pathogenic effects. When using mineral water, a conditioned reflex is formed in various body systems. This becomes an external time sensor that captures and synchronizes biorhythms in the initial desynchronization conditions of the disease (Oransky, 2007). Even though mineral waters are extensively used in medical tourism in world practice, their involvement in exploitation and impact on regional sustainable development in Azerbaijan is not at the desired level.

The purpose of the investigation.

The essential goal of the scientific research of mineral waters in Azerbaijan is to determine expedients to restore the health of the population and develop health tourism. To achieve the goal, the following tasks have been set:

• to determine the distribution areas of mineral waters;
• to substantiate the territorial organization principles of efficient use of mineral waters;
• to study the efficiency indicators of the level of use of mineral waters;
• to investigate the role of mineral waters in the development of medical tourism.

Material and methods.

A number of scientists and specialists have conducted several investigations related to the mineral waters in Azerbaijan. Among them, K.N. Paffengolte reported on the geology and geochemistry of Ilisu mineral waters (Paffengolte, 1930). V.I. Olenov gave extensive information about mineral waters, characterized them in detail and explained their resort importance (Olenov, 1925). M.A. Qashgai gave information about the area where mineral waters are located, studied their chemical composition, temperature, discharge, gas content and other indicators, emphasized that mineral waters are affected by floods, landslides and avalanches, and especially noted that their «eyes» were caught during these events (Qashgai, 1952). Together with geologists and hydrogeologists, A.H. Askerov studied mineral water sources (noted which ones were located in or near the territory of the settlement), determined their number, composition and distribution areas, grouped mineral waters, calculated the number of people who came to mineral waters for treatment and recreation (Askerov, 1954). I.I.Taghiyev, I.Sh.Ibrahimova, A.M.Babayev systematized a lot of information about mineral waters, investigated the possibilities of using them in sanatoriums, spas and preventive areas for the purpose of treatment, about some important mineral waters, the chemical composition of their water, discharge, temperature, what purposes they are used for, similarity to the world’s famous mineral waters and other issues (Taghiyev et al., 2001).

Based on the aforementioned investigation, we have researched the role of mineral waters in medical tourism, their development trends, and balneological-treatment facilities operating on the basis of mineral waters in Azerbaijan.

Analyses were conducted using comparative-statistical analysis, historical, economic and social modeling and other methods in order to substantiate the efficient use of mineral waters, their territorial organization and their role in the development of medical tourism.

Result and discussion.

1. Mineral waters

Mineral waters are hot or cold underground waters that are naturally formed at different depths of the earth’s crust under appropriate geological conditions and are sometimes brought to the surface of the earth by themselves, sometimes by technical methods. Mineral water with a natural structure of carbon dioxide and radioactive elements contains at least 1000 mg/dm³ of dissolved minerals and elements (Ahmadov, 2018). There are two theories that explain the origin of mineral waters: 1) meteorological origin – penetration of rainwater to great depths; 2) magmatic origin – the result of the volcanism process (Nunes, 2021). According to their purpose, mineral waters are divided into a table, therapeutic-table and medicinal waters. According to the degree of mineralization, mineral waters are divided into 7 groups: low mineralization (fresh waters) – up to 1 g/dm³, weak – 1-2 g/dm³, low – 5 g/dm³, medium – g/dm³, high – 10-35 g/dm³, brackish and more brackish waters 35-150 g/dm³ and more. In balneology, brackish and more brackish waters are used for bathing and washing, and other mineral waters (low, weak, medium and high mineralization) are used as drinking water (Pavlova et al., 2018).

Balneological services are a specific product of the medical tourism market, because they include the following important components (Kureda and Yukhnovska, 2018):

- mineral waters with physical, chemical and other properties are a natural resource for recreation;
- the activity of treatment-health institutions specializing in balneological services, their material and technical base, financial and personnel support and capabilities;
- the activity of treatment-health facilities that provide balneological services in accordance with medical protocols, using mineral waters to discuss problems related to certain pathologies of the human body.

Azerbaijan is a country with abundant valuable mineral water resources. As a result of the research conducted in this field since the middle of the last century, more than a thousand mineral water sources with a consumption of more than 100 mln/l per day and operational resources varying around 20 thousand m³ per day have been discovered in the country. It includes hydrocarbonate, sulphide, nitrogenous, iron, iodine, bromine, arsenical, thermal, radioactive, resort-important waters rich in organic compounds, with different quantitative and qualitative indicators (Mehdiyev et al., 2016). These waters have great therapeutic and health importance. At the present moment, treatment and health centers based on mineral waters are operating in a number of regions of our republic, as well as in the city of Baku. However, their potential is overestimated.

1.1. Physical composition of mineral waters in Azerbaijan.

Mineral waters in Azerbaijan have different physical properties. Their temperature characteristics play a key role in differentiating waters from each other. Water in the Earth’s crust is usually at a temperature of 0-100°C (Aliyev, 2000). As a consequence of the conducted research, it was determined that the temperature of mineral waters in Azerbaijan varies between 4-97°C (Figure 2).

![Mineral water resources map of Azerbaijan](image)

Fig. 2. Mineral water resources map of Azerbaijan

The temperature of mineral waters is the same as the temperature of the human body, such waters are considered water of very valuable therapeutic value. Koturlu and Donuzutan hot waters belong to the highest temperature thermal waters in Azerbaijan. Based on the international balneological classification, mineral waters are grouped according to the following order by their temperature: cold waters (below 20°C); subthermal waters (20-37°C); thermal waters (37-42°C); hypothermal waters (above 42°C).
Generally speaking, each type of natural-recreational resource is selected only for its unique characteristics. They can be grouped according to their therapeutic properties, application, evolutionary patterns, and environmental criteria (Imrani and Valiyeva, 2021). The formation of mineral waters depends on their origin, physical and geographical conditions, geological structure, stratigraphy and other factors.

1.2. Chemical composition of mineral waters in Azerbaijan

Mineral waters differ from ordinary waters according to their chemical composition. The reason is the healing effect of mineral waters consists of chemical elements that determine their properties (Sylvia, 2009). These elements are determined by the composition of the rock in the area where the mineral waters come from. However, depending on geochemical processes, similar rock types can sometimes give rise to different types of mineral water. It also depends on the presence of mineralizing substances such as temperature, CO₂ concentration, redox conditions and the type of adsorption complex (Vanderara, 2003).

Mineral waters in Azerbaijan are divided into 10 groups according to their chemical composition: hydrocarbonate; hydrocarbonate-chlorinated; hydrocarbonate-chlorinated-sulfated; hydrocarbonate-sulfated; chlorinated-hydrocarbonate; chlorinated; chlorinated-sulfated; sulfate-chlorine; sulfate-hydrocarbonate; carbonated mineral waters (Aliyev et al., 1996). 300 of the existing mineral waters in Azerbaijan are acidic, 260 are bitter-salty, 180 are pure, 100 are salty and sour, 42 are bitter, 31 are chlorinated and have a metallic taste (Imrani and Zeynalova, 2014). The different taste of waters depends on their chemical composition and the nature of salts dissolved in them. Thus, the presence of chloride salt in water gives a salty taste, and the presence of carbon dioxide gives a sour taste. Alkaline salts give water a salty-bitter taste, sulfate salts are bitter, and sulfur gives an unpleasant smell of rotten eggs.

2. The therapeutic importance of mineral waters

In recent decades, the need for spa treatment and prevention worldwide is growing. As a result of the changed structure of morbidity and frequency of some socially significant diseases, due to overexertion and nervous fatigue, more and more importance is given to the application of resort factors (Kotsakov, 2021).

The local population has used the mineral waters of Azerbaijan for the purpose of treatment since ancient times and built health centers near them (Adilov et al., 1985). For example, in ancient times, people dug trenches around Khaltan, Jimi, Ilisu mineral waters and heated the water to restore their health. Baths made of rock fragments and forest materials have been preserved until today.

Depending on the type of mineral water and the amount of mineral salts in it, the presence of various elements (iodine, bromine, etc.) and gases (carbon, sulfur, radon), it has a certain physiological effect on the human body, and therefore it is used as a therapeutic method (Ahmadov, 2018). These waters are used in the treatment of rheumatic diseases, rickets, cardiovascular, nervous, skin-venereal, gastrointestinal and other diseases, in relieving fatigue and tension, diseases of the musculoskeletal system, the treatment of gastrointestinal tract, various types of neurology, metabolism, obesity, skin and other diseases. In addition to this, mineral waters are also a very convenient tool for carrying out recovery procedures after injuries, fractures and operations (Dargahov, 2004). In balneotherapy, mineral waters are widely used in the treatment of dystrophic-degenerative diseases of the musculoskeletal system, the correlation of structural changes in the cartilage (Nasibullin and Platonova, 2016).

Mineral waters have a physiological effect on the human body depending on the amount of mineral salts, iodine, bromine and other elements, gases

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Table 1. The number of mineral waters of Azerbaijan according to their temperature indicators

<table>
<thead>
<tr>
<th>International balneological classification</th>
<th>Classification of mineral waters</th>
<th>Temperature, °C</th>
<th>Number of mineral water springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold waters</td>
<td>Frigid (very cold) waters</td>
<td>0-7</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Cold (cool) waters</td>
<td>7-12</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td>Temperate waters</td>
<td>12-20</td>
<td>240</td>
</tr>
<tr>
<td>Subthermal waters</td>
<td>Warm waters</td>
<td>20-37</td>
<td>186</td>
</tr>
<tr>
<td>Thermal waters</td>
<td>Hot waters</td>
<td>37-42</td>
<td>136</td>
</tr>
<tr>
<td>Hypothermal waters</td>
<td>Scorching (very hot) waters</td>
<td>42-64</td>
<td>124</td>
</tr>
</tbody>
</table>

such as carbon, sulfur, radon and others. These waters differ from each other in terms of their operational resources and therapeutic importance. Both drinking and balneologically important mineral waters are rich in trace elements and have a direct effect on endogenous pacemakers.

In Azerbaijan, some mineral waters are used to treat numerous diseases. For example, Turshsu (Shusha city) water is carbonated, bicarbonated, contains magnesium, sodium, calcium and used in the treatment of cardiovascular, anemia, liver, bile ducts, gall bladder; Istsus (Kalbajar district) water is hyperthermal, contains carbon dioxide, hydrocarbonate, chloride, sulfate, sodium and used in the treatment of gastrointestinal, metabolic disorders, nervous system, movement organs, gynecological, urological diseases; Galaalti (Shabran district) water is calcium-sodium and used in the treatment of liver, bile duct inflammation, urinary stone, chronic inflammation of the kidney, uric acid diatheses; Vaykhyr (Babek district) chlorinated-hydrocarbonate-sodium water is used in the treatment of chronic gastritis, diathesis, diabetes; Nahajir (Babek district) water is carbonated, bicarbonate-sodium and used in the treatment of gastrointestinal and anemia; Sirab (Babek district) water is carbonated, bicarbonated, sodium-calcium, and is used for the treatment of diseases of the gastrointestinal tract, urinary tract, and metabolic disorders (table 2).

Table 2. Balneological and therapeutic properties of mineral waters in Azerbaijan

<table>
<thead>
<tr>
<th>Use of mineral waters</th>
<th>Reserve of mineral waters, ml/day</th>
<th>Name of mineral water deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td>In cardiovascular diseases</td>
<td>10609</td>
<td>Astara, Baghirsag, Turshsu, Arkivan, Daridagh, Meshasu, Minkand, Kalbajar, Ilisu, Surakhani and others</td>
</tr>
<tr>
<td>In diseases of nervous systems</td>
<td>6309</td>
<td>Baghirsag, Kalbajar, Daridagh, Chagan, Buzovna, Ilisu, Surakhani, Meshasu and others</td>
</tr>
<tr>
<td>In gastrointestinal diseases</td>
<td>4648</td>
<td>Badaml, Yukhari and Ashagi Ilisu, Turshsu, Yukhari and Ashagi Shirlan, Dashkasan, Slavyanka, Sirab, Vaykhir, Nahajir and others</td>
</tr>
<tr>
<td>In skin diseases</td>
<td>252</td>
<td>Buzovna, Bilgah, Astara, Arkvan, Surakhani, Mardakan, Ilisu, Chagan, Gotursu, Khaltan and others</td>
</tr>
<tr>
<td>In gynecological diseases</td>
<td>1802</td>
<td>Baghirsag, Astara, Buzovna, Bilgah, Kalbajar, Nabrani, Surakhani, Mardakan, Meshasu, Chagan, Khaltan, Arkvan, Ilisu and others</td>
</tr>
<tr>
<td>In diseases of the kidney and bile ducts</td>
<td>15.7, 365</td>
<td>Galaalti, Badaml, Galaalti</td>
</tr>
<tr>
<td>In diseases of the musculoskeletal system</td>
<td>1948, 1670</td>
<td>Buzovna, Bilgah, Mardakan, Meshasu, Ilisu, Surakhani, Chagan, Chukhuryurd, Khaltan, Nabrani, Gotursu, Elisa and others</td>
</tr>
<tr>
<td>Table mineral waters</td>
<td>3951</td>
<td>Badaml, Gotursu, Sirab, Mozchay, Garasu, Tutkhun, Sirab, Vaykhir, Slavyanka, Ilisu and others</td>
</tr>
</tbody>
</table>

Note: The table was prepared based on the research of F.Sh. Aliyev and K.Z. Zeynalova.

Important measures have been developed for the efficient use of Azerbaijan mineral waters. There are prospective projects for using these waters in the production of iodine, bromine, boron, soda and other mineral salts in the chemical industry. The distribution of mineral water deposits on the territory and their physical and chemical characteristics are closely related to the geostuctural conditions of the territory. One of the characteristic features of the geostuctural conditions is that it promotes the development of a homogeneous hydrogeochemical process that creates conditions for the formation of waters that are similar to each other in terms of chemical composition and degrees of mineralization.

In the organization of health resorts the sanitary influence of the area on the organism should be taken into account stipulating a range of geographical facts, phenomena and their characteristics, such as geographical location, geological structure, climatic conditions, water basin availability and its water properties, etc. The main resort factors are landscape and climatic conditions, and the presence of therapeutic mud and mineral waters. The area possessing healing properties, which is used for sanitary and preventive purposes, is called a resort (Kosova, et al., 2019).

In the Republic of Azerbaijan, the resort business is traditionally an important part of the state’s socio-economic policy. As a result of the state policy in this area, a developed resort complex has been created that meets mass demand. The organization of the resort business as an economically and socially important activity ensures the development of several regions of the country, the creation of infrastructure,
the employment of the population, and the development of service areas. The sanatorium-resort system created in the country also implements fairly important national socio-economic functions in terms of organization of public recreation, health restoration and treatment.

There are convenient natural conditions for organizing resort business in the territory of Azerbaijan. The organization of recreation and treatment facilities, their protection zones and other resort infrastructure in such areas is extremely important. Back in 1926, a decision was made to build a sanatorium at the source of Istisu mineral water in the Kalbajar district, and in 1928, the sanatorium was put into operation. Due to its chemical composition and physical properties, this water is the same as the world-famous Karlovy Vary (Czech Republic) mineral water.

Istisu balneological resort is located in the northwestern part of the Karabakh plateau at an altitude of 2200 m, on the right bank of the Tartar river, in an area rich in alpine plants. Its water is hydrothermal, and contains carbon dioxide, hydrocarbonate-chloride-sulfate-sodium. The water of the mineral springs is drunk and taken in the bath for the purpose of treatment. People suffering from gastrointestinal diseases, metabolic disorders, as well as musculoskeletal system, nervous system, gynecological and some urological diseases can be treated here. The salts obtained from the water of the springs are useful in the treatment of chronic constipation, liver, gallbladder, gastritis and other diseases. Istisu mineral springs consist of 12 springs (Medical tourism in Azerbaijan, 2021). The potential reserve of these springs and the attractiveness of the nature of the area where they are located are favorable for the creation of a spa-treatment complex. At the moment, the groundbreaking ceremony of the construction of a novel and world-class treatment-health center was held here, and the sanatorium-resort facility is planned to operate in the near future.

One of our sanatoriums with its natural conditions, wonderful landscape and convenient location is the Galaalti «Galaalti Hotel & SPA» treatment-recreation complex operating on the base of the Galaalti mineral water located in the Shabar district.

According to the results of research conducted on the hydrogeological, physical-chemical, and biochemical properties of Galaalti mineral water, the amount of organic substances in Galaalti water varies from 4 to 10 mg per dm3. This indicator is between 5-10 mg/dm3 in Naftusya water of Truskavets resort. The presence of 4.7-7.9 mg/dm3 of bitumen and 0.3-0.7 mg/dm3 of naphthenic acid in Galaalti water indicates its petroleum origin. Moreover, Galaalti water contains volatile phenols, humic substances, fatty acids, resin and others. Galaalti water is rich in ions that have a positive effect on the human body. Galaalti is distinguished by its sharp smell and taste. The water temperature varies between 9-13°C depending on the seasons (Shahverdiyev and Mammadova, 2013).

At present, the «Galaalti Hotel & SPA» treatment-recreation complex actively participates in the medical tourism market of Azerbaijan. In addition to the restoration of health in the complex, the number and quality of services provided to tourists are considered important as well. There are 240 rooms in the «Galaalti Hotel & SPA» treatment-recreation complex. The treatment health center can serve more than 340 tourists at the same time.

As a small model of the «Galaalti Hotel & SPA» treatment-recreation complex, Surakhani Medical Rehabilitation Centre, which operates in Baku, can be cited as an example. Every year mostly local and partly foreign citizens restore their health in the center to get treatment for skin, joints, nervous system, gynecological, urological and other diseases. The complex offers mineral water bath, hydrotherapy, massage, mud treatment, shower and other services. According to its chemical parameters, Surakhani mineral waters are analogously identical to Matesa water (Mammadov and Namazova, 2015).

A treatment-recreation complex of the same name operates near the water source called Istisu in the Khachmaz district. The water that comes from underground to the surface at a temperature of 72-74°C is considered an indispensable tool in the treatment of a number of diseases. People with rheumatism, musculoskeletal disorders, skin and kidney diseases come here to restore their health. The depth of the healing waters varies between 1-2 km. It is primarily rich in iodine, phosphorus, magnesium, and sulfuric acid.

In addition to the above-mentioned large sanatoriums, «Caucasus Thermal & Spa Hotel», Istisu «Fatmeyi Zahra», «Yanar bulag» in Masalli district, «Shafia» in Gakh, «Qamarvan» in Gabala, and «Khadat» in Khachmaz can be cited as examples. Currently, in Baku city, although mineral waters, such as Surakhanı, which has a reserve of 510000 l/day, Mardakan, which has a reserve of 620000 l/day, Buzovna, which has a reserve of 80000 l/day, Bilgh, which has a reserve of 280000 l/day, Pirshagi, which has a reserve of 35000 l/day, and Shikhov, which has a reserve of 150000 l/day, and others have wide possibilities of application in the direction of treatment and tourism, they are not used effectively.
Conclusion.

1. Mineral waters have a therapeutic effect on the human body, which is determined by the physical and chemical composition of the water, its temperature, and the presence of minerals and gases in the water. Taking this approach as a basis, the geographical distribution of high-flow mineral waters with different physical and chemical compositions in Azerbaijan was studied, and their importance for medical tourism (possibility of using them in the treatment of which diseases) was structured.

References


2. The favorable economic-geographical position, climatic features, attractive landscapes, rich mineral waters and other advantages of Azerbaijan create conditions for the establishment of balneological-treatment facilities. Owing to its balneological-therapeutic properties, the use of mineral waters for spa and preventive purposes is directly related to their exploitation reserve. Only in this case, it is doable to develop medical tourism on the basis of mineral waters. At this time, special permits should be given to spa and prevention facilities, and people should be admitted to relevant procedures only under the supervision of doctors.


