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ACCESSIBILITY AND QUALITY OF MEDICAL CARE AS INDICATORS OF HEALTH SYSTEM SUSTAINABILITY: A LITERATURE REVIEW

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Introduction. Accessibility and quality of primary healthcare (PHC) are central determinants of health system sustainability. Persistent workforce shortages, excessive professional workload, inefficient resource use, and territorial inequalities continue to limit access, particularly in rural and remote areas.
Objective. To synthesize evidence on the principal financial, workforce, organizational, and digital determinants of accessibility and quality of medical care at the PHC level and to assess their contribution to health system sustainability.
Materials and Methods. A structured narrative literature review with a scoping approach was conducted using peer-reviewed publications, policy documents of the World Health Organization, the Organisation for Economic Co-operation and Development, and the United Nations, and regulatory materials of the Republic of Kazakhstan. The priority search period was 2017-2025; selected earlier foundational sources were retained. Sources were identified in Scopus, CyberLeninka, and official institutional websites. Seventy sources were included in the qualitative synthesis. Content, comparative, and systems analyses were used; no meta-analysis was performed.
Results. Accessibility and quality of PHC were shaped by interacting financial, workforce, organizational, territorial, and regulatory factors. Workforce shortages and high workload reduced service availability, especially in rural settings. Isolated financial incentives showed limited and inconsistent effects, whereas integrated workforce policies, social support, organizational redesign, intersectoral collaboration, telemedicine, and patient-oriented digital services were associated with improved continuity and reduced geographic barriers.
Discussion. The evidence indicates that accessibility and quality should be considered linked indicators of system sustainability rather than isolated performance measures. However, the evidence base is heterogeneous and includes observational studies, policy documents, and descriptive reports; therefore, findings support system-level associations and implementation priorities rather than definitive causal conclusions.
Conclusion. Equitable access to high-quality PHC requires coordinated financing, workforce development, organizational optimization, and digital transformation. Such integrated policies may strengthen PHC resilience and reduce territorial and social inequalities.
Keywords. primary healthcare; accessibility of medical care; quality of care; health workforce; rural health; digital health; telemedicine.

ДОСТУПНОСТЬ И КАЧЕСТВО МЕДИЦИНСКОЙ ПОМОЩИ КАК ПОКАЗАТЕЛИ УСТОЙЧИВОСТИ СИСТЕМЫ ЗДРАВООХРАНЕНИЯ: ОБЗОР ЛИТЕРАТУРЫ

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Актуальность. Доступность и качество первичной медико-санитарной помощи (ПМСП) являются ключевыми детерминантами устойчивости системы здравоохранения. Дефицит кадров, высокая профессиональная нагрузка,

недостаточная эффективность использования ресурсов и территориальное неравенство продолжают ограничивать доступ к медицинской помощи, особенно в сельских и отдаленных районах.
Цель. Обобщить данные об основных финансовых, кадровых, организационных и цифровых детерминантах доступности и качества медицинской помощи на уровне ПМСП и оценить их вклад в устойчивость системы здравоохранения.
Материалы и методы. Проведен структурированный нарративный обзор литературы с элементами scoping-подхода. Проанализированы рецензируемые публикации, программные документы Всемирной организации здравоохранения, ОЭСР и ООН, а также нормативные материалы Республики Казахстан. Приоритетный период поиска составил 2017-2025 гг.; отдельные более ранние основополагающие источники были сохранены. Поиск выполняли в Scopus, CyberLeninka и на официальных сайтах организаций. В качественный синтез включено 70 источников. Использованы контент-анализ, сравнительный и системный анализ; метаанализ не проводился.
Результаты. Доступность и качество ПМСП определялись взаимодействием финансовых, кадровых, организационных, территориальных и нормативных факторов. Дефицит кадров и высокая нагрузка ограничивали доступность услуг, особенно в сельской местности. Изолированные финансовые стимулы характеризовались ограниченным и неоднородным эффектом, тогда как комплексная кадровая политика, социальная поддержка, организационное перераспределение функций, межсекторальное взаимодействие, телемедицина и пациент-ориентированные цифровые сервисы были связаны с улучшением непрерывности помощи и снижением географических барьеров.
Обсуждение. Полученные данные показывают, что доступность и качество следует рассматривать как взаимосвязанные показатели устойчивости системы, а не как изолированные характеристики ее работы. Вместе с тем доказательная база неоднородна и включает наблюдательные исследования, программные документы и описательные отчеты, поэтому результаты отражают системные связи и приоритеты внедрения, но не доказывают прямую причинность.
Заключение. Равный доступ к качественной ПМСП требует согласованного развития финансирования, кадрового потенциала, организационных процессов и цифровой трансформации. Комплексная политика может повысить устойчивость первичного звена и уменьшить территориальное и социальное неравенство.
Ключевые слова. первичная медико-санитарная помощь; доступность медицинской помощи; качество медицинской помощи; кадровый потенциал; сельское здравоохранение; цифровое здравоохранение; телемедицина.

МЕДИЦИНАЛЫҚ КӨМЕКТІҢ ҚОЛЖЕТІМДІЛІГІ МЕН САПАСЫ ДЕНСАУЛЫҚ САҚТАУ ЖҮЙЕСІ ТҰРАҚТЫЛЫҒЫНЫҢ КӨРСЕТКІШТЕРІ РЕТІНДЕ: ӘДЕБИЕТКЕ ШОЛУ

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Кіріспе. Алғашқы медициналық-санитариялық көмектің (АМСК) қолжетімділігі мен сапасы денсаулық сақтау жүйесі тұрақтылығының негізгі детерминанттары болып табылады. Кадр тапшылығы, жоғары кәсіби жүктеме, ресурстарды тиімсіз пайдалану және аумақтық теңсіздік, әсіресе ауылдық және шалғай аймақтарда, медициналық көмекке қолжетімділікті шектеуді жалғастыруда.
Мақсаты. АМСК деңгейінде медициналық көмектің қолжетімділігі мен сапасын айқындайтын негізгі қаржылық, кадрлық, ұйымдастырушылық және цифрлық факторлар туралы деректерді жинақтау және олардың денсаулық сақтау жүйесінің тұрақтылығына қосатын үлесін бағалау.
Материалдар мен әдістер. Scoping-тәсіл элементтері бар құрылымдалған нарративтік әдеби шолу жүргізілді. Рецензияланатын жарияланымдар, Дүниежүзілік денсаулық сақтау ұйымының, ЭЫДҰ мен БҰҰ-ның бағдарламалық құжаттары және Қазақстан Республикасының нормативтік материалдары талданды. Іздеудің басым кезеңі 2017-2025 жылдарды қамтыды; бұдан ертерек жарияланған жекелеген негіз қалаушы дереккөздер сақталды. Іздеу Scopus, CyberLeninka және ұйымдардың ресми сайттарында жүргізілді. Сапалық синтезге 70 дереккөз енгізілді. Контент-талдау, салыстырмалы және жүйелік талдау қолданылды; мета талдау жүргізілген жоқ.
Нәтижелер. АМСК-нің қолжетімділігі мен сапасы қаржылық, кадрлық, ұйымдастырушылық, аумақтық және нормативтік факторлардың өзара ықпалымен қалыптасты. Кадр тапшылығы мен жоғары жүктеме, әсіресе ауылдық жерлерде, қызметтердің қолжетімділігін шектеді. Жекелеген қаржылық ынталандыру шараларының

әсері шектеулі және біркелкі болмады, ал кешенді кадр саясаты, әлеуметтік қолдау, функцияларды ұйымдастырушылық қайта бөлу, салааралық ынтымақтастық, телемедицина және пациентке бағытталған цифрлық сервистер көмектің сабақтастығын жақсартумен және географиялық кедергілерді төмендетумен байланысты болды.

Талқылау. Қолжетімділік пен сапаны жүйе жұмысының оқшауланған көрсеткіштері емес, оның тұрақтылығының өзара байланысты өлшемдері ретінде қарастыру қажет. Дегенмен дәлелдер базасы әртекті және бақылаулық зерттеулерді, бағдарламалық құжаттарды және сипаттамалық есептерді қамтиды; сондықтан қорытындылар тікелей себептілікті емес, жүйелік байланыстар мен енгізу басымдықтарын көрсетеді.

Қорытынды. Сапалы АМСК-ге тең қолжетімділік қаржыландыруды, кадрлық әлеуетті, ұйымдастырушылық процестерді және цифрлық трансформацияны үйлестіріп дамытуды талап етеді. Кешенді саясат алғашқы буынның тұрақтылығын күшейтіп, аумақтық және әлеуметтік теңсіздікті азайтуы мүмкін.

Түйінді сөздер. алғашқы медициналық-санитариялық көмек; медициналық көмектің қолжетімділігі; медициналық көмектің сапасы; кадрлық әлеует; ауылдық денсаулық сақтау; цифрлық денсаулық сақтау; телемедицина.

INTRODUCTION

Accessibility and quality of medical care are widely recognized as fundamental priorities of contemporary public health policy and as key determinants of population health outcomes. Ensuring equitable access to health services regardless of place of residence, socioeconomic status, or territorial characteristics represents a core principle of sustainable health system development and corresponds to international policy frameworks promoted by the World Health Organization, including the concepts of universal health coverage and health equity.

In the context of ongoing health system reforms, the issue of economic sustainability has become particularly important. Insufficient or unstable financing of the health sector may directly affect the quality and availability of medical services and contribute to the growth of out-of-pocket health expenditures among the population. These processes, in turn, tend to reinforce existing social and territorial inequalities in access to care. Such disparities are observed not only in rural areas but also in certain urban settings; however, they are most pronounced in regions characterized by limited health infrastructure and shortages of qualified health personnel.

Human resources for health remain one of the most critical factors influencing the accessibility and quality of medical services. Workforce shortages, uneven distribution of medical professionals between urban and rural areas, professional burnout, and limited attractiveness of working conditions create systemic barriers to effective health care delivery. In this regard, the role of state workforce policy is increasing, particularly in relation to the development of integrated strategies involving public authorities, educational institutions, and employers. Sustainable mechanisms for training, recruitment, and retention of health personnel are essential for strengthening the resilience and performance of health systems.

At the same time, improving accessibility and quality of medical care increasingly depends on the implementation of innovative organizational and technological solutions. The strengthening of primary health care, the digital transformation of health services, the introduction of telemedicine technologies, and the expansion of mobile models of care delivery are regarded as important tools for reducing territorial barriers and improving system efficiency, especially under conditions of limited resources.

Given the multidimensional nature of accessibility and quality of medical care, a comprehensive analytical assessment of these issues is of considerable relevance from the perspectives of public health, economic efficiency, and social equity. Such analysis is necessary to identify priority directions for health system modernization aimed at ensuring long-term sustainability and improving health outcomes among both rural and urban populations.

The aim of the present study was to analyze key determinants of accessibility and quality of medical care in contemporary health systems, with particular attention to workforce, financial, and organizational factors, and to identify priority directions for sectoral modernization in the context of urban–rural differences.

SCIENTIFIC NOVELTY

The scientific contribution of this review lies in considering accessibility and quality of medical care as interdependent indicators of health system sustainability and in integrating four analytical dimensions within a single framework: financing, workforce capacity, territorial organization of care, and digital transformation. Particular attention is given to the interaction of international evidence with the organizational and geographic context of the Republic of Kazakhstan.

MATERIALS AND METHODS

Review design

This study was designed as a structured narrative literature review with a scoping approach. This design was selected because the topic encompasses heterogeneous organizational, workforce-related, financial, territorial, and technological evidence that is not suitable for statistical pooling.

Information sources and search strategy

The evidence base comprised peer-reviewed scientific publications, international policy documents, and national regulatory materials. The principal sources were Scopus, CyberLeninka, and official websites of the World Health Organization, the Organisation for Economic Co-operation and Development, the United Nations, the Ministry of Health of the Republic of Kazakhstan, and the Office of the Prime Minister of the Republic of Kazakhstan. The priority search period was 2017-2025. Selected earlier sources were retained when they provided foundational concepts or evidence on primary healthcare, rural workforce policy, financing, and service organization.

Search concepts included combinations of the terms “primary healthcare,” “accessibility of medical care,” “quality of care,” “health system sustainability,” “health workforce,” “rural health,” “workload,” “financing,” “telemedicine,” “digital health,” and “Kazakhstan,” in English and Russian.

Eligibility criteria

Eligible sources included peer-reviewed original studies, reviews, analytical reports, strategic policy documents, official statistical materials, and regulatory documents that addressed at least one of the following domains: accessibility or quality of medical care; PHC organization; workforce capacity, distribution, workload, recruitment, or retention; healthcare financing; urban-rural inequalities; organizational models; telemedicine; or digital health. English- and Russian-language sources were considered. Publications focused exclusively on clinical diagnosis or treatment without implications for health system organization were excluded. Clearly duplicated, off-topic, and insufficiently informative records were not used in the synthesis.

Data extraction and synthesis

For each included source, information was extracted on the country or setting, source type, population or health system level, principal determinant, reported accessibility or quality outcome, and the main organizational implication. Seventy sources were included in the qualitative synthesis. Content analysis was used to identify thematic categories; comparative analysis was used to examine urban-rural and cross-country differences; and systems analysis was used to interpret interactions between financing, workforce, organization, and digital transformation. No meta-analysis was performed because of substantial heterogeneity in designs, definitions, populations, and outcomes.

Review outcomes

The primary review outcome was the identification of structural determinants associated with accessibility and quality of medical care at the PHC level. Secondary outcomes included territorial inequalities, workforce availability and retention, professional workload and burnout, financing mechanisms, organizational models of service delivery, continuity of care, patient-oriented digital services, and the potential contribution of telemedicine to reducing geographic barriers.

Critical appraisal

The evidence was appraised qualitatively with attention to source type, methodological transparency, directness of the reported outcomes, and relevance to the review questions. Greater interpretive weight was assigned to systematic reviews, multicenter studies, official surveillance or policy documents, and studies with clearly defined

methods. A single formal risk-of-bias instrument was not applied because the synthesis included markedly heterogeneous scientific and policy sources.

Safety and ethical considerations

The review was non-interventional and used only published or publicly available aggregate information. No patient-level data, biological materials, or personal data were processed. Safety was considered analytically, including patient-safety risks associated with reduced access, fragmented continuity of care, excessive staff workload, digital exclusion, and information-security risks. Formal ethics committee approval and informed consent were not required.

RESULTS

System-level determinants and international context

Ensuring accessible and high-quality medical care remains a major global public health challenge. According to assessments by the World Health Organization, insufficient investment in the training and support of the health workforce, shortages of medical personnel, migration of qualified specialists, and the uneven territorial distribution of resources significantly limit the effectiveness of health systems [1].

In addition, deteriorating infrastructure, restricted opportunities for continuing professional development, and organizational deficiencies in service delivery contribute to diagnostic and therapeutic errors and negatively affect the quality of medical care, particularly in low- and middle-income countries [2–3]. Increasing epidemiological pressures and demographic changes further intensify the demand for health services, while financing mechanisms continue to play a central role in shaping models of care provision and determining broader social policy priorities [4]. Primary health care (PHC) is widely recognized as a key level for improving access to medical services among socially vulnerable population groups. Patients with chronic diseases, older adults living alone, people with disabilities, and individuals with low income are more likely to experience barriers to timely care. Strengthening communication and feedback between patients and primary care providers has been shown to improve service utilization patterns, reduce the burden on emergency medical services, and enhance the effectiveness of dispensary follow-up. Patient surveys are increasingly used as tools for sociological assessment and quality management at the PHC level, allowing for a better understanding of population health needs and contributing to improvements in organizational aspects of service delivery [5].

The COVID-19 pandemic has further exposed structural weaknesses in health systems and highlighted the need for comprehensive policy responses aimed at protecting population health [6]. Evidence from studies employing various quality control approaches indicates persistent systemic imbalances in governance and service provision, exacerbated by increased demand for medical care during the pandemic. Sustainable improvements in service quality require integrated strategies, including workforce development, transparent incentive mechanisms, rational distribution of responsibilities between physicians and mid-level medical personnel, and the strengthening of institutional quality assurance systems. The effectiveness of health reforms also depends on the active involvement of the scientific community and professional stakeholders in evidence-based decision-making processes [7]. Comparative reviews demonstrate substantial variation in healthcare quality and accessibility indicators across countries. In line with the priorities of the World Health Organization and the United Nations Sustainable Development Goals, quality of care is an essential component of universal health coverage, and SDG target 3.8 emphasizes equitable access to essential health services, medicines, and vaccines together with protection from financial risk [8]. Many countries have undertaken large-scale reforms aimed at strengthening workforce capacity, expanding digital health services, and improving health-system innovation. The scope and pace of implementation differ across national contexts, but international experience consistently indicates that digital transformation is most effective when supported by governance, infrastructure, financing, and workforce development [9]. Earlier research has also summarized extensive

international experience in optimizing healthcare financing and organizational models, including expansion of publicly funded coverage, rationalization of financing mechanisms, and improvement of governance structures to enhance efficiency and reduce duplication of expenditure [10].

Accessibility and quality of medical care are widely regarded as strategic priorities of national health systems. The effective functioning of inpatient facilities providing round-the-clock care plays an important role in addressing these challenges, particularly through the optimization of hospital admission departments, which significantly influence overall institutional efficiency. Innovative approaches based on the principles of lean health care have been proposed to improve patient triage and routing according to the severity of clinical conditions, thereby enhancing both organizational performance and service accessibility [11].

Health system performance is closely linked to broader socio-economic development. When the state acts as the primary stakeholder in the organization and financing of health services, reductions in public health expenditure may adversely affect service quality and overall access to care. Such reductions may also contribute to the expansion of private health care markets, increase financial barriers for vulnerable population groups, and undermine public health programmes, including vaccination initiatives. In some contexts, decreased public financing has been associated with the introduction of user fees for health services, further reinforcing inequalities in access [12].

Comparative analyses of health system development in Russia and other countries have revealed persistent structural challenges despite improvements in selected health indicators. These challenges are largely attributed to inadequate material and technical infrastructure, workforce shortages, and insufficient technological modernization. Proposed reform priorities include strengthening human resource capacity, improving remuneration systems for health professionals, and gradually increasing health expenditure as a share of gross domestic product. Chronic underfunding of the health sector has remained a key issue, evolving from earlier financing approaches to more recent policies aimed at system optimization [13–14].

At the same time, global trends indicate a rapid expansion in the implementation of digital health technologies. International evidence suggests that telemedicine and other digital interventions can improve access to diagnostic and specialist services, enhance continuity of care, and support the management of chronic diseases, particularly for populations living in remote and underserved areas. In this context, digital health solutions are increasingly recognised as important instruments for strengthening health system performance and improving equity in access to care [15].

Sociological studies conducted in the Russian Federation during the COVID-19 period also revealed substantial barriers to accessing diagnostic services, subsidized medications, specialized outpatient cardiology care, and rehabilitation services. These findings highlight the need to improve health literacy, strengthen awareness of patient rights, and simplify access to consultative and diagnostic services within health systems [16].

Socio-economic transformations affecting rural areas have also influenced the accessibility and quality of medical care. Declines in agricultural production and deteriorating living conditions in rural communities have been associated with reduced availability of health services and negative impacts on population health. Although progress has been observed in achieving universal health coverage and reducing catastrophic health expenditures, the increasing share of out-of-pocket payments continues to contribute to financial vulnerability. These challenges underscore the importance of prioritizing public financing, strengthening intersectoral collaboration, and implementing targeted measures to support rural health systems [17–18].

Territorial and workforce determinants

Evidence from regional studies indicates significant disparities in the provision of health services between urban and rural populations. In many rural areas, limited availability of physicians, insufficient development of primary health care infrastructure, and

inadequate material and technical resources continue to hinder the effective delivery of medical services. These structural constraints necessitate the development of context-specific policy approaches aimed at improving workforce distribution, enhancing system performance, and strengthening territorial health planning [19].

The formation of sustainable workforce policy requires coordinated efforts across multiple sectors. International experience demonstrates that shortages and imbalances in the health workforce are widespread across countries and regions, negatively affecting population health outcomes. To address these challenges, various strategies have been implemented, including financial incentives, educational support programmes, and measures aimed at improving social integration and living conditions for health professionals in underserved areas. Cross-country analyses emphasize the importance of supporting physicians not only professionally but also socially and at the community level [20–21].

A sufficient number of qualified and motivated health workers, available in appropriate locations, remains a fundamental prerequisite for effective health system functioning. International reports highlight the need for comprehensive approaches to workforce recruitment and retention in rural and remote areas, including educational, regulatory, and financial interventions as well as professional and personal support mechanisms. Workforce shortages continue to represent one of the main barriers to achieving equitable access to medical care and advancing the goals of universal health coverage [22–24].

For example, in the United States, approximately one-fifth of the population resides in rural areas, while only a small proportion of physicians practice in these settings. Although a range of incentive programmes has been introduced to address this imbalance, their long-term effectiveness remains insufficiently evaluated. Mapping and analysis of such programmes in relation to designated workforce shortage areas can help identify regional disparities and inform the development of more targeted workforce policies [25].

Professional isolation, high workloads, limited access to continuing education, and restricted career development opportunities have been identified as major factors reducing the attractiveness of long-term rural medical practice. These challenges are further compounded by organizational and managerial constraints within rural health services. Studies focusing on young physicians have shown that factors such as rural background, family status, housing provision, and employment in primary care settings may influence motivation for sustained rural practice, highlighting the need for scientifically grounded approaches to workforce selection and retention [26–30].

Despite growing attention to workforce sustainability, further systematic research is required to evaluate the effectiveness of retention strategies and to identify interventions capable of reducing preventable staff attrition. In many African countries, for example, severe shortages of health personnel continue to limit the delivery of basic health services, emphasizing the global scale of the human resources crisis in health care [31–32]. Long-standing policy initiatives in countries such as Japan, including programmes combining tuition-free medical education with mandatory rural service, illustrate potential approaches to improving workforce distribution in underserved regions [33].

International experience demonstrates considerable diversity in the organization of health care systems aimed at improving accessibility of services. For example, India operates a three-tier health care structure designed to ensure population coverage through primary, secondary, and tertiary levels of care. However, despite this structured approach, significant shortages of specialists in rural areas have been reported, with inequalities in workforce distribution increasing over time. These challenges illustrate the persistent difficulty of achieving equitable access to medical care even in systems with formally established service hierarchies [34–36].

In the Republic of Kazakhstan, the accessibility of medical care remains a major public health challenge due to the country's vast territory, low population density in many regions, and the presence of numerous remote settlements.

Geographic dispersion creates structural barriers to the effective organization of primary health care services, contributes to inequalities in access to medical resources, and complicates the distribution and retention of health workforce in rural areas [37–38].

Evidence from various countries confirms that uneven distribution of medical personnel in rural areas represents a long-standing systemic problem. In the United Kingdom, for example, multiple strategies aimed at attracting and retaining general practitioners have been implemented; however, none has fully resolved workforce imbalances, indicating the need for comprehensive combinations of financial and non-financial incentives. Similar trends have been observed in Germany, where demographic changes, professional migration, and growing demand for medical services are expected to increase the risk of physician shortages in the medium term. Studies conducted in rural regions of Germany also emphasize logistical barriers to accessing care and highlight the potential role of mixed service delivery models, including telemedicine, in improving accessibility [39–44].

In countries with a high proportion of rural population, such as the Kyrgyz Republic, strengthening primary health care is considered a strategic priority for achieving universal health coverage and improving population health outcomes. International policy frameworks, including the Alma-Ata and Astana Declarations, emphasize the importance of intersectoral collaboration, community participation, and sustainable system development in addressing territorial inequalities in access to medical services [45–47].

Research conducted in the Russian Federation further underscores the importance of human resource capacity in ensuring the sustainability of rural health systems. Workforce shortages in primary care, challenges in ensuring continuity of care, and socio-economic determinants of physician migration remain key factors influencing service accessibility. Incentive measures such as housing provision, transportation support, and regional development programmes have been shown to influence employment decisions among young medical professionals [48–50].

In recent years, increasing attention has been given to the well-being of health care workers, particularly in rural settings. Professional stress and emotional burnout represent important factors affecting workforce retention and overall system sustainability. Although awareness of these issues has grown in the post-COVID-19 period, research on effective support interventions for rural medical personnel remains limited and requires further development [51].

Another determinant of accessibility and quality of medical care is the high workload of outpatient physicians. Time-and-motion studies indicate that a substantial proportion of working time is devoted to administrative and auxiliary tasks, reducing the efficiency of clinical practice and contributing to workforce shortages. High workloads combined with insufficient financial incentives negatively affect the attractiveness of employment in rural health care and may influence the health status of medical personnel themselves [52–54].

Demographic dynamics also play an important role in shaping demand for health services. In certain rural regions of Kazakhstan, rapid population growth and a high proportion of young residents create additional pressure on primary health care systems, particularly when service organization standards remain unchanged despite increasing population density. These trends further intensify workforce deficits and highlight the need for flexible and context-specific approaches to health system planning [55].

DISCUSSION

Integrated interpretation

Overall, the accessibility of medical care in rural areas is determined by a complex interaction of demographic, organizational, workforce-related, and regulatory factors, requiring comprehensive and regionally tailored management decisions. Despite ongoing structural reforms, emotional burnout among medical workers continues to represent a significant challenge affecting both rural and urban health care organizations. Systemic limitations in financing, labor organization, and intersectoral coordination may reduce the

sustainability of primary health care workforce capacity and ultimately influence service availability [56–57].

Organizational and digital implications

At the same time, improving the accessibility and efficiency of primary health care remains a key priority in the context of health system modernization. Persistent challenges include workforce constraints, fragmentation of service delivery processes, and suboptimal resource utilization. Addressing these issues requires comprehensive assessment of real working conditions in primary care settings and the development of practical organizational solutions aimed at enhancing patient-centeredness and system sustainability.

Empirical studies on the organization of outpatient care demonstrate opportunities for improving service efficiency through redistribution of professional responsibilities and the delegation of selected tasks to mid-level medical personnel. Such approaches may contribute to improved accessibility and quality of pediatric and general medical services [58].

Contemporary management models emphasize the importance of centralized organizational and methodological frameworks supported by medical information systems. The formalization of medical services and the use of digital technologies can improve process transparency, enhance coordination of care, and strengthen management capacity within health care organizations [59].

Digital transformation is increasingly recognized as a key driver of accessibility improvements. The development of patient-centered digital platforms facilitates communication between citizens and health care providers, expands organizational capacity, and supports the implementation of modern communication tools for patient engagement. When integrated into rational system architecture, digital solutions may contribute to cost reduction through automation of routine processes, personalization of care pathways, and optimization of service provision [60–61].

In Kazakhstan, targeted policy measures aimed at strengthening primary health care and reducing territorial disparities include initiatives focused on digital and organizational modernization. For example, the pilot project “Online Medicine” has been introduced to expand telemedicine services in rural and remote areas, reinforce continuity of care, and address workforce and geographic barriers to access [62–63].

The implementation of digital models of health care delivery is consistent with global public health priorities, including the United Nations Sustainable Development Goals (SDG 3), the concept of universal health coverage, and the principle of equity promoted by the World Health Organization. The expansion of telemedicine and other digital health services contributes to reducing disparities in access to quality medical care regardless of geographic location or socio-economic status. In this context, digital transformation is increasingly regarded as an important mechanism for improving system efficiency, continuity of care, and patient engagement [64–68].

An analysis of the evolution of the health care system in the Republic of Kazakhstan since independence demonstrates a gradual strengthening of institutional capacity and an expanding role of public health approaches in population health management, taking into account regional demographic and territorial characteristics. Despite persistent structural challenges, particularly workforce shortages and unequal access to services in rural areas, the modernization of rural health care has been identified as a strategic national priority [69].

To address these challenges, a set of systemic policy measures has been introduced to improve the sustainability of the primary health care workforce. These measures include mandatory service requirements for medical graduates, financial and social incentives aimed at attracting young professionals to underserved regions, expansion of state-funded medical education quotas, and increased residency grants with a focus on rural practice. At the same time, ongoing initiatives in digital transformation and the development of transport medicine—such as mobile medical units, medical trains, and air ambulance services—are intended to enhance the organizational capacity of rural health systems. Collectively, these interventions create more favorable conditions for improving equity in

access to health services and strengthening population health outcomes in geographically dispersed settings [70].

PRACTICAL IMPLICATIONS

Health policy should avoid treating workforce shortages, financing constraints, service fragmentation, and digital transformation as separate problems. The evidence supports coordinated packages combining workforce planning and retention, social and professional support, redistribution of selected functions within PHC teams, stable financing, patient-oriented digital services, and telemedicine models adapted to local infrastructure and population needs.

STRENGTHS AND LIMITATIONS

A strength of the review is the integrated analysis of financial, workforce, organizational, territorial, and digital determinants and the explicit consideration of the Kazakhstan context. The synthesis combines international scientific evidence with national regulatory and policy materials and preserves the distinction between access, quality, and system sustainability.

The review also has important limitations. The search was limited to Scopus, CyberLeninka, and selected official institutional sources and therefore may not have captured all relevant literature. The protocol was not prospectively registered, exhaustive record counts and independent duplicate screening were not documented, and no PRISMA-ScR flow diagram was generated. The review included heterogeneous primary studies, reviews, policy documents, and descriptive reports, and a single formal risk-of-bias instrument was not applied. Some sources were published before the priority period because of their foundational relevance. Differences in health-system organization, definitions, and indicators limit direct comparison and generalization. Most evidence supports associations and implementation considerations rather than definitive causal effects.

CONCLUSIONS

The findings of this review indicate that the accessibility and quality of health care services are closely associated with the sustainability of financial and organizational mechanisms within health systems. Insufficient public investment in health care may lead to deterioration in service quality, increased out-of-pocket expenditures, and the widening of social and territorial inequalities in access to medical care.

The effective modernization of health systems requires the development of intersectoral collaboration involving coordinated efforts among governmental authorities, health care organizations, educational institutions, employers, and the private sector. Such integrated approaches represent an essential prerequisite for addressing workforce shortages, improving service organization, and enhancing overall system performance.

Human resources for health remain one of the most critical determinants of accessibility, particularly in rural and remote areas. Policy priorities should therefore include continuous professional development of medical personnel, the implementation of targeted incentive programmes aimed at recruitment and retention, and the improvement of working conditions for both physicians and nursing staff across different levels of care.

Innovative organizational and digital solutions, including the optimization of patient routing, expansion of telemedicine services, and broader digital transformation of health care delivery, have significant potential to improve continuity, efficiency, and equity of access to medical services. These measures are especially relevant in countries characterized by large territories and uneven population distribution.

Ensuring the long-term sustainability of health systems requires a gradual increase in health sector financing combined with efforts to improve the efficiency of resource utilization. Strengthening the material and technical infrastructure of health care organizations and reducing socio-economic barriers to service utilization are important conditions for improving population health outcomes.

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DECLARATIONS

Ethics approval and consent to participate. This review was based exclusively on published and publicly available aggregate data and did not involve patients, research participants, biological materials, or personal data. Ethics committee approval and informed consent were not required.
Safety considerations. No clinical intervention was performed. Safety was considered analytically, including risks related to delayed or unequal access, fragmentation of care, excessive workforce burden, digital exclusion, and information security.
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ДЕКЛАРАЦИИ

Этическое одобрение и согласие на участие. Обзор основан исключительно на опубликованных и общедоступных агрегированных данных и не предусматривал взаимодействия с пациентами или участниками исследований, использования биологического материала либо обработки персональных данных. Одобрение этического комитета и получение информированного согласия не требовались.
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Доступность данных. Все данные, использованные для нарративного синтеза, содержатся в тексте статьи и цитируемых источниках. Отдельный общедоступный набор первичных данных не создавался.
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ДЕКЛАРАЦИЯЛАР

Этикалық мақұлдау және зерттеуге қатысуға келісім. Шолу тек жарияланған және жалпыға қолжетімді жинақталған деректерге негізделді және пациенттермен немесе зерттеуге қатысушылармен өзара әрекеттесуді, биологиялық материалды пайдалануды немесе дербес деректерді өңдеуді көздеген жоқ. Этикалық комитеттің мақұлдауы және ақпараттандырылған келісім алу талап етілмеді.
Қауіпсіздік. Клиникалық араласу жүргізілген жоқ. Қауіпсіздік мәселелері талдамалық тұрғыдан қарастырылып, уақтылы немесе тең қолжетімділіктің болмауы, медициналық

көмектің фрагментациясы, кадрлық жүктеменің шамадан тыс болуы, цифрлық шеттетілу және ақпараттық қауіпсіздік тәуекелдерін қамтыды.

Мүдделер қақтығысы. Авторлар жариялауды талап ететін мүдделер қақтығысының жоқ екенін мәлімдейді.

Қаржыландыру. Зерттеу мемлекеттік, коммерциялық немесе коммерциялық емес ұйымдардан мақсатты қаржыландыру алған жоқ.

Деректердің қолжетімділігі. Нарративтік синтез үшін пайдаланылған барлық деректер мақала мәтінінде және сілтеме жасалған дереккөздерде қамтылған. Бастапқы деректердің жеке жалпыға қолжетімді жиынтығы жасалған жоқ.

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