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PATIENTS' PERCEPTIONS OF THE QUALITY AND ACCESSIBILITY OF REHABILITATION SERVICES FOR LUNG CANCER: A CROSS-SECTIONAL STUDY

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Abstract

Background. Rehabilitation is a crucial component of comprehensive oncological care, aimed at restoring functional capacity, improving quality of life, and supporting social reintegration in lung cancer patients. Despite significant progress in cancer management, access to rehabilitation services remains uneven, particularly between urban and rural populations.

Aim: to assess perceptions of patients with lung cancer regarding the quality, organization, and accessibility of rehabilitation services across different levels of healthcare in Kazakhstan.

Materials and Methods. A descriptive cross-sectional study was conducted from November 4, 2024 to February 4, 2025 in the Abay region of the Republic of Kazakhstan. The study included 124 patients diagnosed with lung cancer who had received or were undergoing medical rehabilitation. Data were collected through structured interviews and questionnaires assessing socio-demographic characteristics, satisfaction with rehabilitation, and perceptions of service accessibility and quality.

Results. The mean age of participants was 61.6 ± 9.5 years; 70.2% were of Kazakh nationality, and 66.9% resided in urban areas. Most respondents rated the organization of rehabilitation as satisfactory (41.1%) or good (29.0%), while 16.9% described it as excellent and 12.9% as unsatisfactory. Overall, 75.8% of patients reported being satisfied with rehabilitation services. Gender differences were not statistically significant ($p>0.05$), whereas urban residents demonstrated higher satisfaction compared to rural respondents ($p<0.05$).

Conclusions. Gender did not significantly influence patients' perceptions of rehabilitation quality or accessibility, while place of residence was identified as the main determinant. These results correspond with international data emphasizing spatial and systemic inequalities in rehabilitation access. Expanding patient-centered and digital rehabilitation programs, including tele-rehabilitation and regional service integration, may enhance equity, efficiency, and overall quality of oncological rehabilitation in Kazakhstan.

Keywords: *lung cancer, rehabilitation, accessibility, quality of care, patient satisfaction, public health, Kazakhstan.*

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Резюме

ВОСПРИЯТИЕ ПАЦИЕНТАМИ КАЧЕСТВА И ДОСТУПНОСТИ РЕАБИЛИТАЦИОННЫХ УСЛУГ ПРИ РАКЕ ЛЁГКОГО: ПОПЕРЕЧНОЕ ИССЛЕДОВАНИЕ

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Введение. Реабилитация является неотъемлемой частью комплексной онкологической помощи, направленной на восстановление функциональных возможностей, улучшение качества жизни и социальную реинтеграцию пациентов с раком лёгкого. Несмотря на достижения в лечении онкологических заболеваний, доступ к реабилитационным услугам остаётся неравномерным, особенно между городским и сельским населением.

Цель: оценить восприятие пациентами рака легких качества, организации и доступности реабилитационных услуг на разных уровнях здравоохранения в Казахстане.

Материалы и методы. Описательное поперечное исследование проведено в период с ноября 2024 года по февраль 2025 года в Абайской области Республики Казахстан. В исследование были включены 124 пациента с установленным диагнозом рак лёгкого, проходившие или завершившие курс медицинской реабилитации. Сбор данных осуществлялся методом стандартизированного опроса и анкетирования, включавшего оценку социо-демографических характеристик, удовлетворённости реабилитацией и восприятия качества и доступности услуг.

Результаты. Средний возраст участников составил 61,6 ± 9,5 года; 70,2 % были казахской национальности, 66,9 % проживали в городах. Большинство респондентов оценили организацию реабилитации как удовлетворительную (41,1 %) или хорошую (29,0 %), 16,9 % - как отличную, а 12,9 % -как неудовлетворительную. В целом 75,8 % пациентов сообщили об удовлетворённости полученными реабилитационными услугами. Различия между мужчинами и женщинами были статистически незначимыми (p > 0,05), тогда как городские жители чаще выражали удовлетворённость по сравнению с сельскими (p <0,05).

Выводы. Пол не оказывал значимого влияния на восприятие качества и доступности реабилитационных услуг, тогда как место проживания являлось ключевым фактором. Полученные результаты согласуются с международными данными, подчёркивающими пространственные и системные различия в доступе к реабилитации. Расширение пациент-ориентированных и цифровых форм реабилитации, включая телереабилитацию и интеграцию региональных служб, позволит повысить равенство, эффективность и качество онкологической реабилитации в Казахстане.

Ключевые слова: *рак лёгкого, реабилитация, доступность, качество медицинской помощи, удовлетворённость пациентов, общественное здравоохранение, Казахстан*

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Түйіндеме

НАУҚАСТАРДЫҢ САПА ТУРАЛЫ ҚАБЫЛДАУЫ ЖӘНЕ ӨКПЕНІҢ ҚАТЕРЛІ ІСІГІНЕ ОҢАЛТУ ҚЫЗМЕТТЕРІНІҢ БОЛУЫ: КӨЛДЕНЕҢ ЗЕРТТЕУ

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Кіріспе. Оңалту - бұл функционалдығын қалпына келтіруге, өмір сүру сапасын жақсартуға, өкпенің қатерлі ісігі бар науқастардың өмір сүру сапасын жақсартуға және әлеуметтік реинтеграциясының ажырамас бөлігі болып табылады. Қатерлі ісікпен емдеудегі аванстарға қарамастан, оңалту қызметтеріне қол жетімділік біркелкі емес, әсіресе қалалық және ауылдық популяциялар арасында біркелкі емес қалып отыр.

Зерттеу мақсаты: Өкпенің қатерлі ісігі кезінде пациенттердің сапасы, Қазақстандағы денсаулық сақтаудың әртүрлі деңгейлеріндегі оңалту қызметтерінің сапасы, ұйымдастырылуы және қол жетімділігі туралы бағалау.

Материалдар мен тәсілдер. Сипаттамалық-секциялық зерттеу 2024 жылғы қарашадан 202 ақпанға дейін Қазақстан Республикасының Абай ауданында жүргізілді. Зерттеуге медициналық оңалту курсынан өткен немесе аяқтаған өкпе қатерлі ісігі диагнозы қойылған 124 пациент кірді. Деректер жинау әлеуметтік-демографиялық сипаттамаларды бағалау, оңалту және қызметтердің сапасы мен қол жетімділігі туралы қанағаттанушылықты бағалауды, әлеуметтік-демографиялық сипаттамаларды қамтитын стандартталған сауалнамалық және сауалнаманы пайдалану арқылы жүзеге асырылды.

Нәтежиелер. Қатысушылардың орташа жасы 61,6 ± 9,5 жасты құрады; 70,2 пайызы қазақ ұлты болса, 66,9 пайызы қалаларда тұрды. Респонденттердің көпшілігі оңалту ұйымын қанағаттанарлық (41,1%) немесе жақсы (29,0%), 16,9% тамаша, 12,9% қанағаттанарлықсыз деп бағалады. Жалпы алғанда, пациенттердің 75,8%-ы алынған оңалту қызметтеріне қанағаттанатынын айтты. Ерлер мен әйелдер арасындағы айырмашылықтар статистикалық тұрғыда шамалы болды ($p > 0,05$), ал қала тұрғындары ауыл тұрғындарымен салыстырғанда қанағаттанушылық білдіру ықтималдығы жоғары болды ($p <0,05$).

Қорытындылар. Гендерлік фактор оңалту қызметтерінің сапасы мен қолжетімділігіне айтарлықтай әсер етпеген, ал тұрғылықты жері басты фактор болған. Бұл нәтижелер халықаралық деректерге сәйкес келеді және оңалтуға қолжетімділіктегі кеңістіктік және жүйелік айырмашылықтарды көрсетеді. Пациентке бағдарланған және цифрлық форматтарды кеңейту Қазақстандағы онкологиялық оңалтудың тиімділігін, сапасын және әділдігін арттыруы мүмкін.

Түйінді сөздер: *өкпе қатерлі ісігі, қалпына келтіру, қол жетімділік, медициналық көмектің сапасы, пациенттердің қанағаттанушылығы, денсаулық сақтау, Қазақстан.*

Дәйексөз үшін:

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Introduction

Lung cancer remains one of the leading causes of morbidity and mortality worldwide, accounting for 11.6% of all new cancer cases and 18.4% of all cancer deaths globally [20]. Despite advances in early detection and treatment, many patients continue to experience long-term consequences of the disease, including impaired respiratory function, psychological distress, and reduced quality of life [6,21]. Comprehensive rehabilitation has therefore become an essential component of multidisciplinary cancer care, aiming to restore functional capacity, promote social reintegration, and improve overall survival [17].

Evidence from international studies has shown that pulmonary and oncological rehabilitation significantly improves exercise tolerance, lung function, and quality of life among patients with lung cancer [8,16]. Pre- and postoperative rehabilitation programs can also reduce complications, shorten hospital stays, and facilitate recovery [3,5]. The American Thoracic Society and the European Respiratory Society emphasize the integration of rehabilitation interventions as standard care for patients with chronic respiratory and oncological diseases [13].

However, despite strong evidence, access to high-quality rehabilitation services remains uneven across the world. Many patients face barriers such as limited availability of specialized programs, inadequate infrastructure, shortage of trained professionals, and lack of patient awareness about rehabilitation benefits [18]. These disparities are particularly evident in low- and middle-income countries, including Kazakhstan, where healthcare systems are still developing and oncology rehabilitation is in the early stages of integration [7].

In Kazakhstan, lung cancer remains one of the top causes of cancer mortality, representing around 15-17% of all cancer deaths [1]. Although national health reforms have improved screening and diagnostic capacity, rehabilitation is often fragmented between primary, secondary, and tertiary care levels [23]. Recent policy efforts, such as the revision of rehabilitation care standards by the Ministry of Health in 2024, demonstrate progress toward a more patient-centred approach [14]. Yet, empirical data on the accessibility, quality, and patient satisfaction with rehabilitation services for lung cancer are limited.

Understanding patients' perceptions is essential for identifying barriers, improving the organization of medical rehabilitation, and ensuring equity in healthcare access. Cross-sectional studies provide an effective approach for assessing patients' experiences and satisfaction across different healthcare levels. Therefore, the present study was conducted in the Abay region of the Republic of Kazakhstan to evaluate the perceptions of lung cancer patients regarding the quality and accessibility of rehabilitation services. The results are expected to contribute to evidence-based recommendations aimed at strengthening rehabilitation care and improving health outcomes among oncology patients in Kazakhstan

Materials and Methods.

The study sample comprised all lung cancer patients undergoing treatment at the Public Utility Enterprise on the Right of Economic Management «Center for Nuclear Medicine and Oncology» under the Health Department of the Abay Region, Republic of Kazakhstan. Data collection was carried out from November 4, 2024, to February 4, 2025. The average time required to complete the questionnaire was 15 minutes.

Inclusion criteria required patients of both sexes, aged 18 years or older, with a confirmed diagnosis of lung cancer, the ability to communicate in Kazakh or Russian, and adequate cognitive function.

Exclusion criteria included lung cancer patients aged 18-70 who declined participation in the study, as well as individuals with confirmed mental health disorders.

A total of 124 patients met the inclusion criteria. Demographic characteristics and clinical data related to the disease, treatment, and rehabilitation were obtained from the patients and their medical records.

A structured questionnaire was developed by the authors based on the World Health Organization (WHO) recommendations on rehabilitation and adapted to regional health system conditions in Kazakhstan. The development process involved the following stages: Initial draft preparation based on WHO guidance and local policy documents. Expert review by a panel of five specialists in oncology, rehabilitation, and public health.. The questionnaire was translated into Kazakh and Russian languages, culturally and linguistically adapted in accordance with international standards. Pretesting on a group of 25 patients (not included in the main study) to assess clarity, cultural and linguistic appropriateness, and content relevance. The questionnaire was revised twice based on feedback from expert and pilot testing. The reliability, validity and sensitivity of the instrument were analyzed during validation. To check the reliability of the questionnaire, the internal consistency of the questionnaire was calculated by determining the Cronbach's &-coefficient. The questionnaire has high validity (Cronbach's > 0.7), indicating a satisfactory level of reliability of the questionnaire scales. Those respondents' answers that were incomplete were excluded from the study.

Statistical Analysis

Means and standard deviations (SD) were used to describe quantitative variables, while absolute (N) and relative (%) frequencies were used for qualitative variables. Pearson's chi-square (χ^2) test or Fisher's exact test, where applicable, was employed for proportion comparisons. Significance levels were two-tailed, with statistical significance set at $p < 0.05$. Statistical analyses were performed using SPSS version 24.0.

Results

The study included 124 patients who met the inclusion criteria and fully completed the questionnaire. In terms of gender, the majority of respondents were male 75.8% (N=94). The mean age was 61.6±9.5 years. The analysis of the sample by nationality demonstrated that the majority of respondents were of Kazakh ethnicity -70.2% (N = 87). Participants of Russian nationality accounted for 26.6% (N=33), while representatives of other nationalities comprised 3.2% (N = 4). Thus, the combined proportion of Kazakh and Russian respondents reached 96.8%, reflecting the general ethnodemographic structure of the population of the Republic of Kazakhstan.

The majority of respondents were urban residents (66.9%, N=83), while 33.1% (N=41) lived in rural areas. This distribution reflects the demographic pattern of

Kazakhstan, where urban populations have greater access to oncology and rehabilitation services concentrated in large cities.

The analysis of respondents' marital status revealed that the predominant proportion of participants were married (83.9%, N=104), whereas 16.1% (N=20) were single. The high share of married respondents likely reflects the age and social characteristics of the study population.

The analysis of respondents' educational level showed that the largest proportion of participants had secondary specialized education (44.4%, N=55), followed by those with general secondary education (37.1%, N = 46). Respondents with higher education accounted for 17.7% (N=22), and only 0.8% (N=1) reported another type of education. Overall, the study sample was characterized by a predominance of individuals with secondary and vocational qualifications, which corresponds to the general educational profile of the adult population in Kazakhstan.

The analysis of respondents' social status revealed that more than half of the participants were retirees (50.8%, n = 63). Workers constituted 18.5% (N=23), while employees represented 8.9% (N=11) and unemployed individuals-8.1% (N=10). Persons with disabilities accounted for 12.9% (N=16), and only 0.8% (N=1) were students (Figure 1).

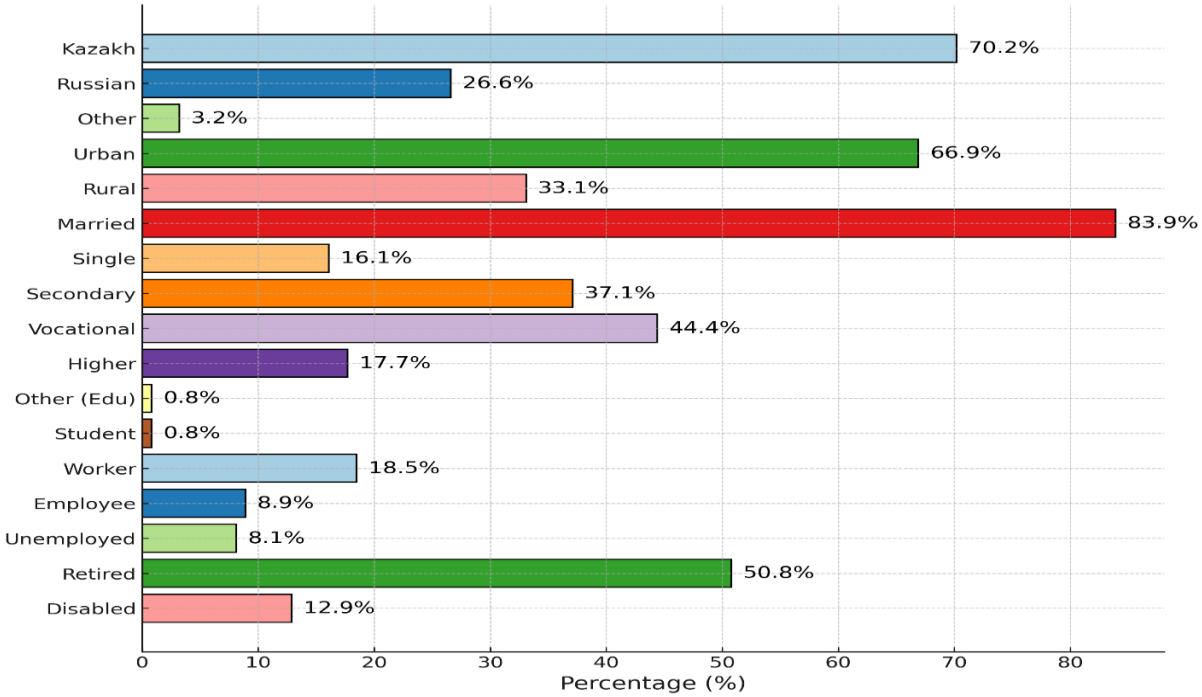


Figure 1. Socio-demographic characteristics of respondents.

The socio-demographic analysis was conducted with a focus on gender-related differences across key characteristics, including nationality, place of residence, marital status, and social status. The comparative distribution of these variables by gender is presented in Table 1.

Table 1.

Socio-demographic characteristics of respondents by gender

Indicator	Category	Male N (%)	Female N (%)	Total N (%)	p-value
Nationality	Kazakh	69 (79.3)	18 (60.0)	87 (70.2)	0.352
	Russian	22 (66.7)	11 (33.3)	33 (26.6)	
	Other	3 (75.0)	1 (25.0)	4 (3.2)	
Place of residence	Urban	57 (68.7)	37 (90.2)	83 (66.9)	0.008
	Rural	26 (31.3)	4 (9.8)	41 (33.1)	
Marital status	Married	78 (75.0)	26 (86.7)	104 (83.9)	0.633
	Single	16 (80.0)	4 (13.3)	20 (16.1)	
Social status	Retired	47 (74.6)	16 (25.4)	63 (50.8)	0.250
	Worker	21 (91.3)	2 (8.7)	23 (18.5)	
	Disabled	11 (68.8)	5 (31.3)	16 (12.9)	
	Employee	6 (54.5)	5 (45.5)	11 (8.9)	
	Unemployed	8 (80.0)	2 (20.0)	10 (8.1)	
	Student	1 (100.0)	0 (0.0)	1 (0.8)	

A statistically significant relationship was observed between gender and place of residence ($p < 0.05$). Urban residents predominated among both men and women; however, the proportion of female respondents living in cities (90.2%) was markedly higher than that of men (68.7%). Conversely, a larger proportion of men resided in rural areas (31.3%) compared to women (9.8%).

The analysis of respondents' nationality by gender demonstrated that individuals of Kazakh ethnicity predominated in both male (79.3%) and female (60.0%) groups, reflecting the general ethnodemographic profile of Kazakhstan. Participants of Russian nationality constituted 26.6% of the total sample, while representatives of other ethnic groups accounted for 3.2%. No statistically significant difference in nationality distribution between male and female respondents was identified ($p > 0.05$), indicating that the ethnic composition of the study group was relatively balanced across genders.

The distribution of marital status did not differ significantly by gender ($p > 0.05$). Married individuals predominated in both male and female groups (75.0% and 86.7%, respectively). These findings indicate the absence of a statistically significant association between gender and marital status in the studied group.

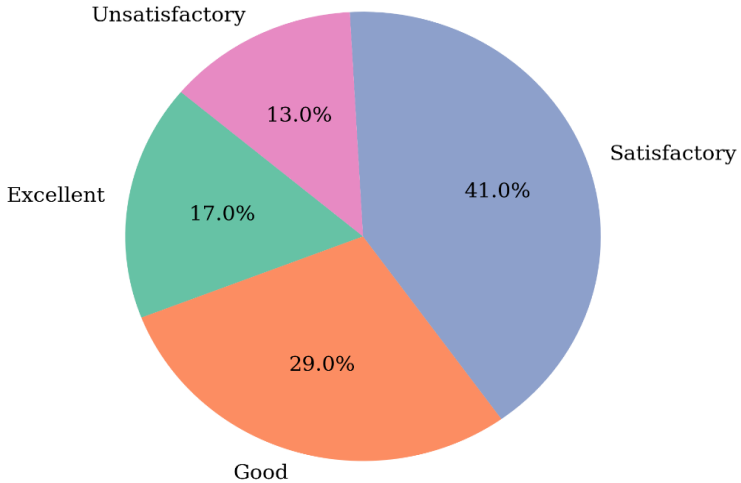
The analysis of respondents' social status demonstrated that retirees represented the largest proportion of the sample (50.8%, N=63), followed by workers (18.5%, N=23) and persons with disabilities (12.9%, N=16). Employees accounted for 8.9% (N=11), unemployed individuals for 8.1% (N=10), and only one respondent (0.8%) was a student. The difference in social status distribution between genders was not statistically significant ($p > 0.05$), indicating that both male and female respondents were predominantly retirees. This finding corresponds to the age structure of the studied group and highlights the presence of socially vulnerable populations, including retirees and persons with disabilities.

The clinical profile of respondents was analyzed to assess gender-related differences in self-rated health, comorbidity, and disability status among patients with lung cancer. The assessment of self-rated health showed that the majority of participants evaluated their condition as satisfactory (46.8%) or good (22.6%). Only 11.3% of respondents reported their health as excellent, while 19.4% described it as poor. Among men, 44.7% rated their health as satisfactory and 18.1% as poor, compared to 53.3% and 23.3% among women, respectively. The difference between genders was not statistically significant ($p> 0.05$), indicating a generally comparable perception of health status across the studied group. Comorbidities were reported by 37.9% (N=47) of respondents, including 35.1% of men and 46.7% of women. The majority of both male (64.9%) and female (53.3%) participants had no chronic concomitant diseases. The gender difference in the prevalence of comorbidities was not statistically significant ($p> 0.05$), suggesting similar levels of chronic disease burden among both sexes. Regarding disability status due to lung cancer, 78.2% of respondents reported no disability, while 21.0% had a second-group disability and only 0.8% were classified as first-group disabled. Among men, 77.7% had no disability and 21.3% had second-group disability; among women, the respective figures were 80.0% and 20.0%**.** No statistically significant differences were observed between genders ($p > 0.05$), indicating that disability distribution was similar across the sample. Overall, the results demonstrate that gender did not significantly influence key clinical parameters among patients with lung cancer. The comparable patterns observed for self-rated health, comorbidities, and disability status suggest that both men and women face similar clinical conditions and rehabilitation needs within the healthcare context of Kazakhstan.

The respondents' perceptions of the quality, organization, and accessibility of rehabilitation services for cancer patients were analyzed in relation to gender.

Analysis of satisfaction with received rehabilitation treatment revealed that 75.8% of respondents were satisfied with the care provided, while 24.2% expressed dissatisfaction. Among men, 74.6% reported being satisfied compared to 76.9% of women. The absence of statistically significant gender differences ($p>0.05$) suggests that both male and female patients expressed comparable levels of satisfaction, reflecting an overall positive evaluation of rehabilitation services for lung cancer patients in Kazakhstan.

When asked whether physicians had informed them about special rehabilitation exercises or measures, the majority (75.8%) confirmed receiving such information, while 24.2% indicated that they had not been informed. Among men, 78.0% received physician guidance, compared to 73.8% of women. No statistically significant difference was found ($p>0.05$), suggesting equal dissemination of rehabilitation-related information among both genders.



Note: Pearson's $\chi^2 = 3.006$, df = 3, p = 0.391 — no statistically significant difference between genders.

Figure 2. Respondents' assessment of the organization of medical Rehabilitation services for cancer patients in Kazakhstan.

The assessment of the organization of medical rehabilitation in Kazakhstan showed that most respondents rated it as satisfactory (41.1%) or good (29.0%), while 17.0% described it as excellent and 12.9% as unsatisfactory. Among men, 37.2% rated the system as satisfactory and 30.9% as good, compared to 53.3% and 23.3% among women, respectively. The difference in evaluations between genders was not statistically significant ($p>0.05$), indicating a generally moderate and uniform perception of rehabilitation system organization across both groups.

Overall, the analysis revealed that gender did not significantly affect respondents' perceptions of rehabilitation quality, satisfaction with treatment, or access to professional information. Both male and female participants expressed moderate satisfaction with rehabilitation services and similar awareness levels, indicating consistent delivery and accessibility of rehabilitation care across gender groups in Kazakhstan.

Discussion

This study examined the perceptions of lung cancer patients regarding the organization, accessibility, and quality of rehabilitation services in Kazakhstan, emphasizing gender differences. The majority of respondents rated rehabilitation organization as satisfactory (41.1%) or good (29.0%), and 75.8% expressed satisfaction with the care received. A statistically significant association was observed only between gender and place of residence, with a higher proportion of women living in urban areas.

The predominance of urban respondents reflects a wider global trend in healthcare accessibility. Studies conducted in the United States show that fewer than half of the population have convenient access to pulmonary rehabilitation centers, with rural patients facing the greatest barriers [10]. Qualitative studies confirm that rural oncology patients encounter difficulties related to travel, delayed diagnosis, and limited awareness of available services [2]. These findings are consistent with our data, suggesting that spatial determinants-rather than gender-play a more substantial role in shaping access to rehabilitation.

The absence of statistically significant gender differences in perceived quality, satisfaction, and physician counseling is in line with global literature. Several systematic reviews demonstrate that, when rehabilitation programs are equally accessible, men and women report similar benefits in terms of functional improvement, quality of life, and psychosocial adaptation [11,19]. Thus, equitable service distribution appears to neutralize gender-based disparities in rehabilitation outcomes.

Nevertheless, nearly one in four respondents reported not being informed about rehabilitation exercises or measures. Similar informational barriers are described in many international studies, where insufficient physician guidance and limited patient awareness hinder participation in pulmonary rehabilitation programs [9, 15]. Addressing these informational gaps through physician education and structured patient counseling is critical for improving program engagement.

The demographic structure of our sample-dominated by retirees and married individuals - suggests that social stability and family support may contribute to higher satisfaction levels. However, rural residents remain vulnerable to under-utilization due to transportation and infrastructural limitations. Comparable findings from other countries underline the effectiveness of home-based or digital rehabilitation programs in overcoming geographic barriers [12]. Implementation of tele-rehabilitation or hybrid models may therefore improve access and continuity of care in Kazakhstan.

To enhance rehabilitation services, several steps are recommended: strengthen referral pathways between oncology and rehabilitation centers, particularly for rural populations; introduce standardized physician training and patient education modules; develop tele-rehabilitation networks to ensure access across all regions; and integrate patient-reported outcomes into national monitoring systems. These directions correspond with the WHO "Rehabilitation 2030" framework, which emphasizes equitable and continuous rehabilitation services across care levels [22].

Limitations

The strength of this study lies in its focus on patient-reported experiences and gender-specific analysis, supported by a nationwide online design. Limitations include the cross-sectional nature of the data. Despite these constraints, the results align with international patterns, reinforcing their external validity.

Conclusion

The study demonstrated that gender was not a significant factor influencing patients' perceptions of the quality or accessibility of rehabilitation services for lung cancer in Kazakhstan. In contrast, geographic residence emerged as a key determinant, reflecting regional disparities in access to rehabilitation care. These findings align with international evidence emphasizing the role of systemic and spatial factors in ensuring equity of rehabilitation services. The development of patient-centered, digitally supported, and tele-rehabilitation models could improve accessibility, efficiency, and overall quality of oncological rehabilitation across all levels of healthcare delivery.

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References:

1. *Akhmedullin R., Aimyshev T., Zhakhina G., Yerdessov S., Beyembetova A., Ablayeva A., Biniyazova A., Seyil T., Abdukhakimova D., Segizbayeva A., Semenova Y., Gaipov A.* In-depth analysis and trends of cancer mortality in Kazakhstan: a joinpoint analysis of nationwide healthcare data 2014-2022. BMC Cancer. 2024 Oct 31;24(1):1340. doi: 10.1186/s12885-024-13128-2. PMID: 39482619; PMCID: PMC11526534.

2. *Ali N., Nelson D., McInnerney D., Quaife S.L., Laparidou D., Selby P., Kane R., Civello S., Skinner D., Pogson Z., Peake M.D., Harding-Bell A., Cooke S.* A systematic review on the qualitative experiences of people living with lung cancer in rural areas. Support Care Cancer. 2024 Feb 6;32(3):144. doi: 10.1007/s00520-024-08342-4. PMID: 38316704; PMCID: PMC10844412.

3. *Avancini A., Sartori G., Gkountakos A., Casali M., Trestini I., Tregnago D., Bria E., Jones L.W., Milella M., Lanza M., Pilotto S.* Physical Activity and Exercise in Lung Cancer Care: Will Promises Be Fulfilled? Oncologist. 2020 Mar;25(3):e555-e569. doi: 10.1634/theoncologist.2019-0463. Epub 2019 Nov 26. PMID: 32162811; PMCID: PMC7066706.

4. *Bekturova A., Saryan A., Kunirova G.* Patients' and nurses' perception of the Hospice-On-Wheels service in Kazakhstan: a qualitative study. Ecancermedicalscience. 2024 Dec 12;18:1818. doi: 10.3332/ecancer.2024.1818. PMID: 40171469; PMCID: PMC11959122.

5. *Cavalheri V., Tahirah F., Nonoyama M., Jenkins S., Hill K.* Exercise training for people following lung resection for non-small cell lung cancer - a Cochrane systematic review. Cancer Treat Rev. 2014 May;40(4):585-94. doi: 10.1016/j.ctrv.2013.11.001. Epub 2013 Nov 13. PMID: 24268442.

6. *Cruz Mosquera F.E., Murillo S.R., Naranjo Rojas A., Perlaza C.L., Castro Osorio D., Liscano Y.* Effect of Exercise and Pulmonary Rehabilitation in Pre- and Post-Surgical Patients with Lung Cancer: Systematic Review and Meta-Analysis. Medicina (Kaunas). 2024 Oct 22;60(11):1725. doi: 10.3390/medicina60111725. PMID: 39596911; PMCID: PMC11595816.

7. *Haruna U.A., Oladunni A.A., Abdulkadir A.K., Umar A.B., Musa S.S., Afolabi E.O., Almazan J., Lucero-Prisno Iii D.E.* Towards attaining universal health coverage in Kazakhstan: Challenges and important next steps. Health Promot Perspect. 2025 May 6;15(1):3-8. doi: 10.34172/hpp.025.43529. PMID: 40453688; PMCID: PMC12125506.

8. *Holland A.E., Cox N.S., Houchen-Wolloff L., Rochester C.L., Garvey C., ZuWallack R., Nici L., Limberg T., Lareau S.C., et al.* Defining Modern Pulmonary Rehabilitation. An Official American Thoracic Society Workshop Report. Ann Am Thorac Soc. 2021 May;18(5):e12-e29. doi: 10.1513/AnnalsATS.202102-146ST. PMID: 33929307; PMCID: PMC8086532.

9. *Jia Y., Cheng G., Wang H. et al.* Barriers and facilitators to implementing pulmonary rehabilitation guidelines in China: a qualitative study using implementation science frameworks.Health Res Policy Sys 23, 51 (2025). https://doi.org/10.1186/s12961-025-01330-y

10. Kahn P.A., Mathis W.S. Accessibility of Pulmonary Rehabilitation in the US. JAMA Netw Open. 2024 Feb 5;7(2):e2354867. doi: 10.1001/jamanetworkopen.2023.54867. PMID: 38315487; PMCID: PMC10844999.

11. *Li C., Meng H., Wei Y., Liang Y., Xu Y., Huang X., Liang W., Quan J., Wu S., Wei X.* Postoperative outcomes of preoperative exercise training in patients with operable non-small cell lung cancer: a systematic review and meta-analysis. Front Oncol. 2025 Sep 12;15:1563478. doi: 10.3389/fonc.2025.1563478. PMID: 41018094; PMCID: PMC12463627. Eur Respir J. 2024; 63(2): 240–255.

12. *Lu T., Deng T., Long Y., Li J., Hu A., Hu Y., Ouyang L., Wang H., Ma J., Chen S., Hu J.* Effectiveness and Feasibility of Digital Pulmonary Rehabilitation in Patients Undergoing Lung Cancer Surgery: Systematic Review and Meta-Analysis. J Med Internet Res. 2024 Nov 11;26:e56795. doi: 10.2196/56795. PMID: 39527799; PMCID: PMC11589499.

13. Mayer R.S., Engle J. Rehabilitation of Individuals With Cancer. Ann Rehabil Med. 2022 Apr;46(2):60-70. doi: 10.5535/arm.22036. Epub 2022 Apr 30. PMID: 35508925; PMCID: PMC9081390.

14. Ministry of Health of the Republic of Kazakhstan. Rehabilitation Care Standards Revised in Kazakhstan. [Internet]. Astana: Government of Kazakhstan; 2024. Available from: https://primeminister.kz/en/news/rehabilitation-care-standards-revised-in-kazakhstan-29288

15. *Qin H., Jia P., Yan Q., Li X., Zhang Y., Jiang H., Yang H., Li L.* Barriers and facilitators to pulmonary rehabilitation in COPD: a mixed-methods systematic review. BMC Pulm Med. 2025 Jul 3;25(1):314. doi: 10.1186/s12890-025-03769-9. PMID: 40611129; PMCID: PMC12224770.

16. *Rochester C.L., Alison J.A., Carlin B., Jenkins A.R., Cox N.S., Bauldoff G., Bhatt S.P., Bourbeau J., Burtin C., Camp P.G., Cascino T.M., Dorney Koppel G.A., et al.* Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. Am J Respir Crit Care Med. 2023 Aug 15;208(4):e7-e26. doi: 10.1164/rccm.202306-1066ST. PMID: 37581410; PMCID: PMC10449064.

17. *Schmitz K.H., Campbell A.M., Stuiver M.M., Pinto B.M., Schwartz A.L., Morris G.S., Ligibel J.A., Cheville A., Galvão D.A., et al.* Exercise is medicine in oncology: Engaging clinicians to help patients move through cancer. CA Cancer J Clin. 2019 Nov;69(6):468-484. doi: 10.3322/caac.21579. Epub 2019 Oct 16. PMID: 31617590; PMCID: PMC7896280.

18. *Silver J.K.* Cancer prehabilitation and its role in improving health outcomes and reducing health care costs. Semin Oncol Nurs. 2015 Feb;31(1):13-30. doi: 10.1016/j.soncn.2014.11.003. Epub 2014 Dec 3. PMID: 25636392.

19. *Spruit M.A., Singh S.J., Garvey C., ZuWallack R., Nici L., Rochester C., Hill K., Holland A.E., Lareau S.C., Man W.D., Pitta F., Sewell L., Raskin J., Bourbeau J., Crouch R., Franssen F.M., et al.* ATS/ERS Task Force on Pulmonary Rehabilitation. An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. Am J Respir Crit Care Med. 2013 Oct 15;188(8):e13-64. doi: 10.1164/rccm.201309-1634ST. Erratum in: Am J Respir Crit Care Med. 2014 Jun 15;189(12):1570. PMID: 24127811.

20. *Sung H., Ferlay J., Siegel R.L., Laversanne M., Soerjomataram I., Jemal A., Bray F.* Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021 May;71(3):209-249. doi: 10.3322/caac.21660. Epub 2021 Feb 4. PMID: 33538338.

21. *Wang J., Deng N., Qi F., Li Q., Jin X., Hu H.* The effectiveness of postoperative rehabilitation interventions that include breathing exercises to prevent pulmonary atelectasis in lung cancer resection patients: a systematic review and meta-analysis. BMC Pulm Med. 2023 Jul 27;23(1):276. doi: 10.1186/s12890-023-02563-9. PMID: 37501067; PMCID: PMC10375623.

22. World Health Organization. Rehabilitation 2030: A Call for Action. Geneva: WHO; 2023.

23. *Yessenbayev D., Khamidullina Z., Tarzhanova D., Orazova G., Zhakupova T., Kassenova D., Bilyalova Z., Igissinova G., Sayakov U., Dzhumabayeva F., Imankulova A., Idrissov K., Urazova S., Omarbekov A., Turebayev D., Adaibayev K., Kozhakhmetov S., Rustemova K., Telmanova Z., Kudaibergenova I., Igissinov N.* Epidemiology of Lung Cancer in Kazakhstan: Trends and Geographic Distribution. Asian Pac J Cancer Prev. 2023 May 1; 24(5):1521-1532. doi: 10.31557/APJCP.2023.24.5.1521. PMID: 37247271; PMCID: PMC10495898.

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