World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

Check for updates

Access to Anticancer Medicines in Uzbekistan: A Comprehensive Review Article Based on Lessons from South Asia

Sajid Muhammad Arsalan Ali [1,*], Gavhar Sultonovna Omonova [2], Fuzail Ahmed [3] and Pillappagari Hampi [4]

[1] *Lecturer at department of pharmacology and clinical pharmacology. Urgench State Medical Institute, rphdrarsalan@gmail.com*
[2] *Head of Department at department of pharmacology and clinical pharmacology. Urgench State Medical Institute,*
[3] *Student at Urgench State Medical Institute, ahmedzailcmf@gmail.com*
[4] *Student at Urgench State Medical Institute, pillappagarihampi@gmail.com*

World Journal of Advanced Research and Reviews, 2026, 30(03), 699-705

Publication history: Received on 07 April 2026; revised on 08 June 2026; accepted on 10 June 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.30.3.1357

Abstract

Cancer has become one of the leading global health issues in lower- and middle-income countries (LMICs). Uzbekistan is no different. Like many developing countries, Uzbekistan has a greater cancer burden and limited affordable access to cancer treatment. This study derives lessons for the health and pharmaceutical sectors of Uzbekistan from the BMJ Open study "Determinants of Access to Anticancer Medicines in South Asia." The study analyzes the function of the National Essential Medicines Lists (NEMLs) and the medicine registration system, the role of local pharmaceutical production, the financing of health care and regional cooperation in determining access to cancer care. This study reviews structural barriers of financing, a reliance on imported medicines and regulatory obstacles, rural health care imbalances and a shortage of health care workers. Policymaking lessons from India, Bangladesh, Pakistan, Nepal, and Sri Lanka, show that medicine can be made more available and affordable through comprehensive, integrated policies. Uzbekistan has made extensive, positive changes to the modernization of health care and the pharmaceutical field, but significant access barriers to safe, effective cancer therapies and adequate health care remains. This study indicates that Uzbekistan needs a coordinated national policy which is focused on the (1) evidence-based medicine policies, (2) better regulation, (3) investment in local medicines manufacture, (4) comprehensive financing of health care, and (5) regional cooperation in Central Asia. Reforms focused on these factors would be beneficial for health care equity and improvement of cancer care outcomes.

Keywords: Cancer Care Access; Anticancer Medicines; Uzbekistan Healthcare System; Pharmaceutical Policy; Health Financing

1. Introduction

Cancer is one of the leading causes of death worldwide and continues to be a growing concern for healthcare systems, regardless of the development and income level of countries. The World Health Organization predicts a positive correlation and a significant increase in cases of cancer in the future. Factors explaining this phenomenon include urbanization, an aging population, exposure to environmental risk factors, tobacco, and an unhealthy diet and lifestyle (WHO & IARC, 2024; Jenei et al., 2022). The burden of cancer is disproportionately greater in low- and middle-income countries because of their under-resourced healthcare systems and lack of adequate cancer control interventions. Uzbekistan nvbnmb3has been undergoing rapid demographic and epidemiological changes over the last twenty years. Uzbekistan is experiencing a transition towards non-communicable diseases (NCDs) such as cancer, diabetes, and cardiovascular diseases which are replacing infectious diseases (Wilking et al., 2017). Hence, addressing cancer

* Corresponding author: Sajid Muhammad Arsalan Ali

prevention and control is a prerequisite for the healthcare system of Uzbekistan. This article focuses on the ongoing situation in the healthcare system of Uzbekistan which is in the midst of a reform process. The situation is similar to the one described in the South Asian study in terms of delayed access to cancer care, diagnostic challenges, and high costs borne by the patient for cancer treatment. The study acknowledged the importance of policy, finance, and local production in addressing the cancer treatment gap. This article aims to prioritize cancer care in Uzbekistan by analyzing the South Asian study and providing relevant policy options (Rim et al., 2022).

2. Cancer Burden in Uzbekistan

In recent years, Uzbekistan has seen a notable increase in the diagnosis of several cancer types, with some of the most prevalent being breast, cervical, colorectal, lung, stomach, and hepatic cancers. Risk factors contributing to the growing disease burden are smoking, the chronic consumption of unhealthy diets, air pollution, occupational exposures, and some types of viral infections (Burkitbayev et al., 2026). Amongst the many challenges plaguing the healthcare system of Uzbekistan, the late diagnosis of cancer is most concerning. Seeking medical help only when symptoms are pronounced is a practice that results in unfavorable treatment and high mortality outcomes. The lack of programs for the early screening of cancer and the inadequate distribution of specialized healthcare services also contribute to late diagnosis. Since gaining independence, Uzbekistan has made key investments particularly in the modernization of healthcare infrastructure and the establishment of numerous new healthcare technology and training facilities (Rim, Lee, Musaev, Volichevich, Pazlitdinovich, Lee, et al., 2022). Since these investments, the healthcare infrastructure of Uzbekistan has improved significantly, particularly in urban areas, especially in the capital and a few regional cities. As a result, urban-rural disparities still exist. Most cancer services are concentrated in the capital city and urban centers, meaning rural patients must travel long distances for specialized treatment. In addition to the already long distances that cancer patients have to travel to get treatment, financial barriers also limit access to cancer care. Although some services are subsidized by the state, most patients still pay directly for medicines, and diagnostics and treatment services. Because of these factors, costly targeted therapies and immunotherapies are often beyond the reach of low-income patients (Juraev & Ahn, 2023). These challenges have also been observed in many South Asian countries with high medicine prices and poorly financed healthcare systems resulting in the limited access of patients to life-saving therapies.

3. National Essential Medicines Lists and Policy Alignment

A global, evidence-based guide launched by the World Health Organization (WHO) is the basis for country-specific essential medicines priorities. WHO's guide is the basis for National Essential Medicines Lists (NEMLs) developed by each country to reflect local healthcare challenges, disease burdens, and resource limits. Each list influences national decisions on the funding and supply of medicines at healthcare facilities. The study published by BMJ Open shows that NEML incorporation of anticancer medicines among South Asian countries is largely disparate. Pakistan includes every anticancer medicine recommended by WHO, whereas no medicines are included by Afghanistan. The study found that the degree to which each country includes anticancer medicines is determined by their political will, healthcare financing, the capacity of institutions, and the planning of regulations (Saxena et al., 2026).

Uzbekistan can learn a lot from this study, and the first insight is that the national medicines list must be revised regularly. Medicines for treating cancer are being developed and improved at a rapid pace. Targeted therapies and immunotherapies are a new global standard. Outdated medicines provide patients with inadequate treatment. The second key insight from the study is that Uzbekistan must create a balance among the international recommendations, the available resources to the country, and the current healthcare needs. To not include new cancer medicines that are developed is a risk to equity in the healthcare system and the outcomes for survival (Yang et al., 2023).

The third insight is that new medicines must be actively incorporated into the medical systems of the country, and not left as a recommendation. The NEMLs must actually be used in conjunction with purchasing, health financing, and supply chain management. The South Asian study determined that the incorporation of a medicine into the NEML does not guarantee access to that medicine. Therefore, Uzbekistan Integrated Policy planning is a must for medicine listing and the financing and delivery of health services (Yang et al., 2023)

4. Regulatory Systems and Medicine Registration

The demand for healthcare products relies heavily on medicine registration. Regulatory authorities need to protect consumer safety, effectiveness, and the overall quality of market medicines. Long and inefficient registration procedures can prevent patients from getting important therapies.

The BMJ Open study identified major regulatory issues in South Asia. Many countries had delays associated with lack of institutional capacity, the number of inspectors, complex documentation, and procedures for new medicines. There was even a cost and profitability disincentive on the part of suppliers toward registration of the oncology medicines. Uzbekistan has made considerable progress in reforming the pharmaceuticals to improve its regulation and its appeal to foreign investment. Many of the reforms that the government has put in place to attract foreign investment involve the modernization of the licensing and regulatory system which incorporates stricter controls and quality assurance. Unfortunately, many of the oncology medicines that are available in Uzbekistan are still being imported from Russia, India, Turkey, China, and various European countries (Hassen et al., 2024).

Delays in procurement and the medicine registration processes can be a source of increased shortages in hospitals and pharmacies. The small size of the domestic market can also prevent foreign manufacturers from profitability. Nepal and Sri Lanka are similar to this problem, where suppliers were reluctant to import expensive oncology medicines because of lower patient demand. Uzbekistan should be able to regulate and approve more accessible oncology medicines if they rely more on international regulatory bodies. They can also implement expedited and prioritized regulatory pathways for cancer medicines using international standards and pharmacovigilance systems which can also improve safety and Uzbekistan's regulatory processes (Adhikari et al., 2024).

5. Local Pharmaceutical Production and Industrial Policy

One of the most significant findings of the South Asian study was the relationship between local pharmaceutical production and improved access to anticancer medicines. Countries with stronger manufacturing capacity tended to include more medicines in their NEMLs and had greater availability of generic and biosimilar products. India represents one of the world's largest producers of generic medicines and biosimilars. Its pharmaceutical industry has reduced treatment costs domestically while supplying affordable medicines internationally. Bangladesh has also developed a strong pharmaceutical sector supported by industrial policy and export-oriented manufacturing. Uzbekistan has increasingly recognized the strategic importance of pharmaceutical self-sufficiency. Government reforms have established pharmaceutical free economic zones and incentives for domestic production. Local manufacturers have expanded production of basic medicines and some generic products (Shukar et al., 2026). However, domestic production of advanced anticancer medicines remains limited. Manufacturing oncology products requires highly specialized facilities, quality assurance systems, trained personnel, and access to raw materials. Many active pharmaceutical ingredients continue to be imported, creating dependence on foreign suppliers.

However, increased domestic production can bring several advantages. For example, local pharmaceuticals can reduce import dependency, cut drug prices, increase supply chain resilience, and generate skilled jobs. In times of global crises, such as the coronavirus pandemic, nations dependent on imports have been witnessing medicine shortages. Local production is beneficial for access to healthcare, national security, and economic development. On the other hand, the South Asian study has warned that increased production in the absence of strict regulation may raise quality concerns. Hence, Uzbekistan should focus on developing laboratory infrastructure, bioequivalence testing, and regulatory oversight (Socal et al., 2021).

6. Financial Barriers and Healthcare Financing

Financial constraints are one of the biggest obstacles to cancer treatment in Uzbekistan. Oncology care is expensive as it requires sophisticated diagnostics, surgery, radiotherapy, chemotherapy, supportive medicines and long-term monitoring. Many households incur catastrophic health expenditures following a diagnosis of cancer. The South Asian study found that the financial barriers affected all stages of medicine access. Governments could not afford costly medicines, suppliers were reluctant to register products in smaller markets, and hospitals struggled with procurement. In Uzbekistan too, a similar dynamic is at play.

Many cancer patients still have high out-of-pocket costs. Some of the treatments available are paid for by the state, but the newer ones are often not available. Travel, accommodation and indirect costs add to the total economic burden, creating a particular disadvantage for rural families (Smith et al., 2019).

In order to solve these problems, Uzbekistan may need to improve the financing mechanisms of public health. Strategies could include expanding health insurance systems, increasing oncology budgets and negotiating lower prices for medicines with pharmaceutical companies. Governments can also promote the use of biosimilars and generic medicines to reduce costs while still ensuring the quality of treatment. Another important strategy is prevention and early detection. Screening programs for breast cancer, cervical cancer and colorectal cancer can reduce the mortality and the

cost of treatment of the advanced stages of disease. Thus, public awareness campaigns are important components of long-term cancer control.

7. Regional Cooperation and Central Asian Perspectives

The BMJ Open study highlighted the need for regional collaboration and pooled manufacturing strategies. Pharmaceutical markets often are small and fragmented, lacking the purchasing power to negotiate affordable prices or attract large-scale investment. Central Asian countries are facing the same problems. The domestic pharmaceutical markets of Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan are relatively small. Thus, there could be substantial economic and health care dividends from regional cooperation (Li et al., 2026).

Joint procurement systems could let governments negotiate lower prices for expensive oncology drugs. Harmonisation of regulatory standards could cut duplication and ease cross-border registration of medicines. Foreign investment and transfer of technology can also be promoted through collaborative manufacturing projects. Regional health diplomacy could further fortify health resilience. Better cancer care outcomes could be achieved through shared training programs, oncology research collaborations and coordinated public health efforts. Uzbekistan, as one of the region's largest economies and populations, has the potential to play a leading role in promoting regional pharmaceutical cooperation.

8. Human Resources and Healthcare Infrastructure

Access to anticancer medicines and effective treatment requires an integrated health system and skilled professionals including, among others, oncologists, pharmacists, medical and radiation staff, pathologists, and regulatory experts. The South Asian study attributed limited health system performance to inadequate skilled personnel. Weak regulatory staff delayed medicine registration, and a lack of oncology staff resulted in inadequate treatment. Uzbekistan has the same staff shortages, especially in rural areas. This implies the need to invest in medical and continuous education. Training more oncology staff and more pharmacy staff and supporting joint international academic programs will raise the health system performance. Joint programs with foreign universities and cancer centers will allow advanced clinical training and the transfer of new technologies. Improvements and investments in the related infrastructures will be required. Uzbekistan is in the process of improving the infrastructure for oncology treatment and will need to continue to invest to meet future requirements (Shukar et al., 2026b).

9. Discussion

This review highlights that access to anticancer medicines in Uzbekistan is shaped by interconnected policy, regulatory, financial, and industrial factors, similar to the patterns identified across South Asian LMICs in the BMJ Open study. The findings demonstrate that National Essential Medicines Lists (NEMLs), medicine registration systems, and local pharmaceutical production collectively determine the availability and affordability of cancer therapies. Although Uzbekistan has made significant progress in healthcare modernization and pharmaceutical reform, major barriers to equitable cancer care continue to exist (Barrios et al., 2022).

One of the key lessons from the South Asian experience is that inclusion of medicines in national policies alone does not guarantee patient access. Countries such as Pakistan demonstrated stronger alignment with the WHO Essential Medicines List through regular updates and policy commitment, while weaker systems such as Afghanistan reflected the consequences of limited institutional capacity and prolonged healthcare instability. Uzbekistan appears to occupy an intermediate position, where reforms are ongoing but implementation gaps remain. Similar to Nepal and Sri Lanka, Uzbekistan still faces dependence on imported oncology medicines, lengthy registration procedures, and limited access to innovative therapies, particularly targeted treatments and immunotherapies (Zaidi et al., 2013).

The review also emphasizes the importance of efficient medicine regulation. Delays in registration, procurement, and approval processes reduce timely access to life-saving treatments. Uzbekistan has improved its pharmaceutical regulatory framework and attracted foreign investment; however, imported medicines still dominate the oncology market. Dependence on imports increases vulnerability to supply disruptions, high prices, and shortages, especially during global crises. Therefore, adopting expedited regulatory pathways, harmonizing standards with international agencies, and strengthening pharmacovigilance systems could significantly improve medicine availability and quality assurance (Nasir et al., 2025).

Another major finding is the strategic role of local pharmaceutical production. Evidence from India and Bangladesh demonstrates that domestic manufacturing of generic medicines and biosimilars can reduce treatment costs and

improve medicine accessibility. Uzbekistan has initiated pharmaceutical industrial reforms and established free economic zones to support local production, but advanced anticancer medicine manufacturing remains limited. Expanding domestic production capacity could improve supply chain resilience, reduce import dependence, and strengthen national health security. Nevertheless, this expansion must be accompanied by strict quality control systems, laboratory infrastructure, and skilled regulatory oversight to ensure medicine safety and effectiveness (Nasir et al., 2025).

Financial barriers remain one of the most critical challenges for cancer care in Uzbekistan. Despite partial state support, many patients continue to experience high out-of-pocket expenditures for diagnostics, medicines, travel, and long-term treatment. Similar financial constraints were observed throughout South Asia, where insufficient healthcare financing restricted both medicine procurement and patient access. Expanding public health financing, strengthening insurance coverage, negotiating medicine prices, and increasing the use of affordable biosimilars and generics may help reduce the economic burden on patients. In addition, investment in early detection and screening programs could lower long-term treatment costs and improve survival outcomes (Cho & Haverkort, 2023).

The study further underscores the importance of regional cooperation. Central Asian countries share relatively small pharmaceutical markets and similar healthcare challenges. Collaborative procurement systems, harmonized regulatory standards, and regional manufacturing initiatives could increase bargaining power and improve access to affordable oncology medicines. Uzbekistan is well positioned to lead regional pharmaceutical and healthcare cooperation due to its growing economy and strategic role within Central Asia (Cho & Haverkort, 2023).

Finally, healthcare infrastructure and workforce shortages continue to affect cancer care delivery. Access to anticancer medicines depends not only on availability of drugs but also on trained oncologists, pharmacists, laboratory specialists, and regulatory professionals. Rural-urban disparities in healthcare infrastructure remain substantial in Uzbekistan, limiting access for patients outside major cities. Continued investment in healthcare infrastructure, professional training, and international academic collaboration will therefore be essential for strengthening oncology services nationwide (Islam et al., 2025).

Overall, this review demonstrates that improving access to anticancer medicines in Uzbekistan requires an integrated national strategy combining evidence-based medicine policy, regulatory reform, sustainable financing, local pharmaceutical production, workforce development, and regional cooperation. Addressing these interconnected determinants can contribute to more equitable cancer care and improved public health outcomes in Uzbekistan.

10. Conclusion

Cancer represents an increasingly pronounced public health issue in Uzbekistan. Improving access to medications can lower mortality rates and enhance quality of life. It can also achieve fairer healthcare systems. The BMJ Open examination of South Asia can teach us about the National Essential Medicines Lists, the medicine registration process, the local production of medicines, and the financing of healthcare. Uzbekistan has undertaken significant efforts to modernize healthcare and reform pharmaceuticals. There are still many barriers, including expensive medicines, chronic imports, rural healthcare inequities, and a lack of local advanced oncology treatments.

Reforming third generation policies and regulations should focus on evidence-based healthcare, quality assurance of manufactured pharmaceuticals, and modern financing policies alongside increased cooperation within the region of Central Asia. This will be complemented by efforts to modernize and build healthcare infrastructure and train healthcare personnel before and while offering services. With a coordinated and integrated national strategy, Uzbekistan will be able to improve access to affordable and effective anticancer medicines and build a healthcare system that offers more services to more healthcare needs in the future.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

[1] WHO,IAfRoC. Cancer tomorrow. 2024 Available: https://gco.iarc.fr/tomorrow/en/dataviz/trends?types=0&sexes=1_2&mode=population&group_populations=1&multiple_populations=1&multiple_cancers=1&cancers=39&populations=4_50_64_144_356_462_524_586&apc=cat_ca20v1.5_ca23v-1.5&group_cancers=1

[2] Adhikari, B., Ranabhat, K., Khanal, P., Poudel, M., Marahatta, S. B., Khanal, S., Paudyal, V., & Shrestha, S. (2024). Procurement process and shortages of essential medicines in public health facilities: A qualitative study from Nepal. PLOS Global Public Health, 4(5), e0003128. https://doi.org/10.1371/journal.pgph.0003128

[3] Barrios, C., De Lima Lopes, G., Yusof, M. M., Rubagumya, F., Rutkowski, P., & Sengar, M. (2022). Barriers in access to oncology drugs — a global crisis. Nature Reviews Clinical Oncology, 20(1), 7–15. https://doi.org/10.1038/s41571-022-00700-7

[4] Burkitbayev, Z., Akhmedullin, R., Zharlyganova, D., Manatova, A., Kuanysh, Z., Shalekenov, S., Kim, A., & Gaipov, A. (2026). Cancer trends in Central Asia from 1990 to 2021: Analysis of the global burden of disease study. Electronic Journal of General Medicine, 23(2), em718. https://doi.org/10.29333/ejgm/17973

[5] Cho, M. J., & Haverkort, E. (2023). Out-of-Pocket health care expenditures in Uzbekistan: progress and reform priorities. In IntechOpen eBooks. https://doi.org/10.5772/intechopen.110022

[6] Hassen, H. K., Mekasha, Y. T., Tegegne, A. A., & Ozalp, Y. (2024). A narrative review on problems in product quality, regulatory system constraints, and the concept of quality by design as a solution for quality assurance of African medicines. Frontiers in Medicine, 11, 1472495. https://doi.org/10.3389/fmed.2024.1472495

[7] Islam, M. R., Siddiqua, S. M., Mina, S., Ayub, S. B. A., Islam, R., Saha, B., Rahman, M. H., Khatun, N., Craver, A., & Ahsan, H. (2025). Cancer care in Bangladesh: an urgent need for strategic intervention and comprehensive reform. Discover Health Systems, 4(1). https://doi.org/10.1007/s44250-025-00283-x

[8] Jenei, K., Aziz, Z., Booth, C., Cappello, B., Ceppi, F., De Vries, E. G. E., Fojo, A., Gyawali, B., Ilbawi, A., Lombe, D., Sengar, M., Sullivan, R., Trapani, D., Huttner, B. D., & Moja, L. (2022). Cancer medicines on the WHO Model List of Essential Medicines: processes, challenges, and a way forward. The Lancet Global Health, 10(12), e1860–e1866. https://doi.org/10.1016/s2214-109x(22)00376-x

[9] Juraev, Z., & Ahn, Y. (2023). Analysis of healthcare spending in Uzbekistan: economic implications and policy recommendations. Preprints.org. https://doi.org/10.20944/preprints202307.1078.v1

[10] Lee, K. S., Ming, L. C., Lean, Q. Y., Yee, S. M., Patel, R. P., Taha, N. A., & Kassab, Y. W. (2019). Cross-border collaboration to improve access to medicine: Association of Southeast Asian Nations Perspective. Journal of Epidemiology and Global Health, 9(2), 93–97. https://doi.org/10.2991/jegh.k.190506.001

[11] Li, Z., Zhang, S., Xu, Q., & Liu, B. (2026). Medicine price and affordability in China and selected ASEAN countries: a cross-country comparison with forward-looking implications for regional pooled procurement. BMC Medicine. https://doi.org/10.1186/s12916-026-04886-w

[12] Nasir, M., Perveen, R. A., & Rahman, M. A. (2025). Antibiotics in national essential medicine list: alignment with WHO-AWaRe framework in Bangladesh and South Asian perspectives. International Journal of Basic & Clinical Pharmacology. https://doi.org/10.18203/2319-2003.ijbcp20253755

[13] Rim, C. H., Lee, W. J., Musaev, B., Volichevich, T. Y., Pazlitdinovich, Z. Y., Lee, H. Y., Nigmatovich, T. M., & Rim, J. S. (2022). Comparison of breast cancer and cervical cancer in Uzbekistan and Korea: The first report of the Uzbekistan–Korea Oncology Consortium. Medicina, 58(10), 1428. https://doi.org/10.3390/medicina58101428

[14] Rim, C. H., Lee, W. J., Musaev, B., Volichevich, T. Y., Pazlitdinovich, Z. Y., Nigmatovich, T. M., & Rim, J. S. (2022). Challenges and suggestions in management of lung and liver cancer in Uzbekistan: the second report of the Uzbekistan–Korea Oncology Consortium. International Journal of Environmental Research and Public Health, 19(18), 11727. https://doi.org/10.3390/ijerph191811727

[15] Saxena, E., Kohler, J. C., Thorpe, K. E., & Persaud, N. (2026). Assessing the national essential medicines list selection processes: Instrument development and testing. PLoS ONE, 21(2), e0342750. https://doi.org/10.1371/journal.pone.0342750

[16] Shukar, S., Hussain, I., Iqbal, A., Rahimi, A., Shirol, G. M., Shirzad, I., Tenzin, J., Dewan, S. M. R., Mishra, S. K., Saeed, A., Babar, Z., Yang, C., & Fang, Y. (2026a). Determinants of access to anticancer medicines in South Asia: a multimethod study. BMJ Open, 16(5), e115068. https://doi.org/10.1136/bmjopen-2025-115068

[17] Shukar, S., Hussain, I., Iqbal, A., Rahimi, A., Shirol, G. M., Shirzad, I., Tenzin, J., Dewan, S. M. R., Mishra, S. K., Saeed, A., Babar, Z., Yang, C., & Fang, Y. (2026b). Determinants of access to anticancer medicines in South Asia: a multimethod study. BMJ Open, 16(5), e115068. https://doi.org/10.1136/bmjopen-2025-115068

[18] Smith, G. L., Lopez-Olivo, M. A., Advani, P. G., Ning, M. S., Geng, Y., Giordano, S. H., & Volk, R. J. (2019). Financial Burdens of Cancer Treatment: A Systematic Review of Risk factors and Outcomes. Journal of the National Comprehensive Cancer Network, 17(10), 1184–1192. https://doi.org/10.6004/jnccn.2019.7305

[19] Socal, M. P., Sharfstein, J. M., & Greene, J. A. (2021). The pandemic and the supply chain: gaps in pharmaceutical production and distribution. American Journal of Public Health, 111(4), 635–639. https://doi.org/10.2105/ajph.2020.306138

[20] Tawfik, E. A., Tawfik, A. F., Alajmi, A. M., Badr, M. Y., Al-Jedai, A., Almozain, N. H., Bukhary, H. A., Halwani, A. A., Awadh, S. a. A., Alshamsan, A., Babhair, S., & Almalik, A. M. (2021). Localizing pharmaceuticals manufacturing and its impact on drug security in Saudi Arabia. Saudi Pharmaceutical Journal, 30(1), 28–38. https://doi.org/10.1016/j.jsps.2021.12.002

[21] Wilking, N., Lopes, G., Meier, K., Simoens, S., Belgium, K. L. L., Van Harten, W., & Vulto, A. (2017). Can we Continue to Afford Access to Cancer Treatment? European Oncology & Haematology, 13(02), 114. https://doi.org/10.17925/eoh.2017.13.02.114

[22] Yang, L., Atakhanova, N., Arellano, M. T. C., Mohamed, M. Y., Hani, T., Fahdil, A. A., Castillo-Acobo, R. Y., Juyal, A., Hussein, A. K., Amin, A. H., Pecho, R. D. C., & Akhavan-Sigari, R. (2023). Translational research of new developments in targeted therapy of colorectal cancer. Pathology - Research and Practice, 252, 154888. https://doi.org/10.1016/j.prp.2023.154888

[23] Zaidi, S., Bigdeli, M., Aleem, N., & Rashidian, A. (2013). Access to essential medicines in Pakistan: policy and health systems research concerns. PLoS ONE, 8(5), e63515. https://doi.org/10.1371/journal.pone.0063515