International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1514-1518 www.ijprajournal.com ISSN: 2456-4494

An Observational Study on Availability, Price and Affordability of Some Essential Medicines of Anti-Cancer Drugs Based On Nlem-2022

B.Nivetha* , R.Ajay , M.Anitha , V.M.Devipriya , M.Muralitharan , S.Subash , R.Manivannan

Excel College of Pharmacy, Komarapalayam, Affiliated by The Tamil Nadu Dr.M.G.R.Medical University Chennai.

Date of Submission: 15-02-2025 Date of Acceptance: 25-02-2025

ABSTRACT

Essential medicines, especially anti-cancer medicines, remain a critical issue in healthcare, especially in low- and middle-income countries. This study assesses the availability, price variations and affordability of essential anti-cancer medicines in Salem and Erode districts of Tamil Nadu. A six-month observational study (October 2024–March 2025) was conducted in urban, semi-urban and rural areas, with data collected from pharmacies, hospital records and stakeholder interviews.

The study analyzed nine essential anti-cancer medicines – vinorelbine, doxorubicin, cisplatin, rituximab, nilotinib, azacitidine, bevacizumab, letrozole and vinblastine sulphate – based on their inclusion in the National List of Essential Medicines (NLEM) 2022 and the WHO Model List of Essential Medicines. Statistical analysis was performed using the PCNE 6.1 tool to assess disparities in availability and affordability.

The results indicate that there is significant variation in drug access, with letrozole (16 available) and cisplatin (13 available) being the most accessible, while nilotinib (1 available) and doxorubicin (3 available) were the most scarce. Affordability analysis revealed extreme price variations, ranging from Rs. 55 (letrozole) to Rs. 25,000 (bevacizumab). Drug availability was higher in urban areas, while rural areas faced severe shortages. Furthermore, private sector pharmacies stocked more anti-cancer drugs than public health facilities, which exacerbated access challenges.

These findings highlight the urgent need for policy interventions to ensure equitable distribution and affordability of anti-cancer drugs. Addressing financial and logistical barriers to improving access to cancer care is essential, especially for vulnerable populations.

KEYWORDS: Essential medicines, National List of Essential Medicines (NLEM), Policy interventions.

I. INTRODUCTION

The WHO EMLs serve as a framework for developing national EMLs, which then influence national formularies, prescribing practices, and price negotiation and procurement mechanisms. However, there is significant variation in the medicines listed on national EMLs[(1)]. The World Health Organization Model List of Essential Medicines (WHO EML) serves as a globally recognized, evidence-based reference for countries to design their national medicine lists, or National Medicine Lists (NMLs). The list was developed based on the understanding that some medicines are more important than others, thus classifying them as "essential", and emphasizes the need to improve access to these key medicines [(2)].

Essential medicines are defined as medicines that meet the critical health care needs of a population. Their selection is based on public health importance, proven efficacy and safety, and relative cost-effectiveness. The identification of these medicines follows a rigorous evidence-based methodology, emphasizing quality, safety, efficacy, and cost-effectiveness as primary criteria for selection [(3)].

Globally, while approximately one-third of the population lacks access to essential medicines, it is estimated that almost half of all medicines are prescribed, dispensed, or sold inappropriately, and around 50% of patients do not adhere to their prescribed regimens, with the most severe problems occurring in low- and middle-income countries (LMICs). Furthermore, despite the importance of ensuring that the right medicine is delivered to the right patient, less than half of countries have the basic policy frameworks needed to promote RUM [(4)].

The collaboration and level of engagement of health professionals is crucial for the effective

International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1514-1518 www.ijprajournal.com ISSN: 2456-4494

implementation of health promotion programs. We are part of a regional multidisciplinary research group focused on health promotion. The aim of this study was to improve our understanding of how to empower both health professionals and the general public. Improved training, improved coordination, and increased funding for health professionals are needed to effectively advocate for health. In addition, the contributions of volunteers, along with their motivation and commitment, are essential drivers in this effort [(5)].

AIM & OBJECTIVE

AIM:

To Study on Availability, Price and Affordability of some Essential Medicines of Anti-cancer drugs in two different districts of Tamil Nadu.

OBJECTIVES:

The Main Objectives of this Study is

- To assess the availability of selected essential medicines of Anticancer drugs.
- To analyze the price variations in Anticancer drugs.
- Toevaluatetheaffordabilityofthesemedicinesacr ossthelowest, acceptable, and highest price ranges.
- To compare the availability of essential medicines in public and private healthcare sectors.
- To analyze the geographical distribution patterns of Anti- cancer drugs across urban, semi-urban, and rural areas.

II. METHODS AND MATERIALS

This six-month observational study (October 2024–March 2025) assesses the availability, affordability and cost analysis of medicines in rural, semi-urban and urban areas of Salem and Erode districts. Data is collected from pharmacy counters, pharmacists, owners and records. Medicines are categorized based on availability and affordability, and regional differences are analyzed. Interviews with hospital and pharmacy participants are conducted voluntarily, and informed consent is obtained. Data is collected using a standardized questionnaire, stored securely and documented according to existing literature to improve health resource delivery.

SELECTION OF MEDICINE

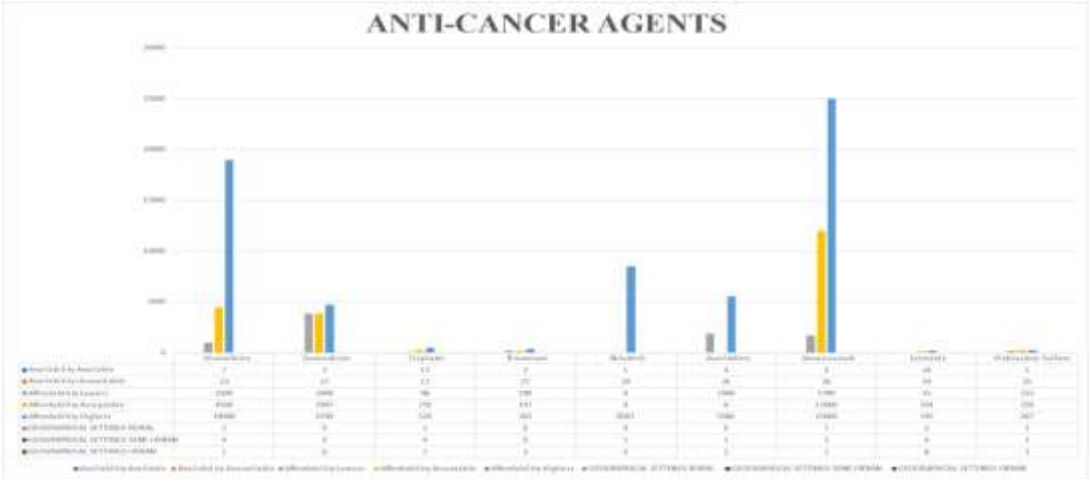
Aselectionofessentialmedicineswasrandomlychosen fromtherapeuticcategories:

Anticancer drugs, the selected medicines are Vinorelbine, Doxorubicin, Cisplatin, Rituximab, Nilotinib, Azacitidine, Bevacizumab, Letrozole, and Vinblastine Sulfate. The selection criteria were based on their inclusion in the National List of Essential Medicines (NLEM) of 2022 and their presence in the WHO Model List of Essential Medicines. Additionally, a discussion was conducted to finalize the drug selection.

STATISTICAL DATA ANALYSIS

For statistical analysis, drug availability and affordability data were recorded in an MS Excel workbook and analyzed using the PCNE 6.1 tool. Mean values and ranges were calculated, and summary statistics were used. Results were visualized using graphs to effectively illustrate key findings.

III. RESULT AND DISCUSSION



International Journal of Pharmaceutical Research and Applications
Volume 10, Issue 1 Jan - Feb 2025, pp: 1514-1518 www.ijprajournal.com ISSN: 2456-4494

Availability of Anti-Cancer Agents

The availability of anti-cancer drugs shows disparities. Letrozole (16 available, 14 unavailable) and Cisplatin (13 available, 17 unavailable) are relatively accessible. However, Nilotinib (1 available, 29 unavailable), Doxorubicin (3 available, 27 unavailable), and Rituximab (3 available, 27 unavailable) have critically low availability. High costs, supply chain issues, or procurement challenges may limit their access.

Other drugs, such as Bevacizumab and Azacitidine (4 available, 26 unavailable), also exhibit restricted access. Plant-derived chemotherapy agents like Vinorelbine (7 available) and Vinblastine Sulfate (5 available) highlight further gaps in access.

Affordability of Anti-Cancer Agents

Anti-cancer drug costs range from Rs.55 (Letrozole) to Rs.25,000 (Bevacizumab). Biologic agents such as Bevacizumab and Nilotinib are expensive, whereas generic drugs like Cisplatin (Rs.98-520) and Vinblastine Sulfate (Rs.225-267) are more affordable.

Some drugs, like Vinorelbine (Rs.1,000-19,000) and Bevacizumab (Rs.1,700-25,000), show extreme price variations, likely due to brand differences and supply factors. The high cost of targeted therapies such as Rituximab and Nilotinib creates financial barriers for patients needing advanced treatments.

Geographical Distribution of Anti-Cancer Agents

Anti-cancer drug accessibility is higher in urban settings. Cisplatin (7), Letrozole (8), and Rituximab (3) are more available in urban areas. Semi-urban settings show moderate access, with Vinorelbine (4), Cisplatin (4), and Letrozole (6) available. Rural areas have limited access, with drugs like Cisplatin (2) and Letrozole (2) available but advanced therapies such as Doxorubicin and Rituximab largely absent.

PERCENTAGE BASED AVILABILITY IN PRIVATE AND PUBLIC SECTOR

PERCENTAGE OF ANTICANCER AGENTS IN PUBLIC AND PRIVATE SECTOR			
S.NO	**Percentage**	**Public Sector**	**Private Sector**
1	75%	-	-
2	50%	-	Cisplatin
			Letrozole
3	25 - 1%	-	Vinorelbine
			Doxorubicin
			Rituximab
			Nilotinib
			Azacitidine
			Bevacizumab
			Vinblastine Sulfate

Availability of Anti-Cancer Agents in Public and Private Sectors

A significant disparity exists in anti-cancer drug distribution. Moderately available agents (50%) in the private sector include Cisplatin and Letrozole, but their absence in the public sector indicates financial or logistical constraints. Low-availability drugs (25%-1%) are exclusively found in private healthcare settings, highlighting accessibility issues in public hospitals.

IV. CONCLUSION

The study highlights significant disparities The availability of anti-cancer agents varies significantly, with essential drugs like Letrozole and Cisplatin being relatively accessible, while others, including Nilotinib, Doxorubicin, and Rituximab, are critically scarce. The limited availability of targeted therapies and biologics, such as Bevacizumab and Azacitidine, suggests challenges related to high costs, procurement difficulties, and supply chain constraints.

Affordability remains a major concern, with drug prices ranging from Rs.55 for Letrozole to Rs.25,000 for Bevacizumab. While some generic drugs like Cisplatin and Vinblastine Sulfate remain relatively affordable, extreme price variations in drugs like Vinorelbine and Bevacizumab may hinder accessibility, particularly for patients requiring advanced treatments.

Geographical disparities further impact drug availability, with urban areas having better

access to essential anti-cancer agents compared to semi-urban and rural regions, where advanced therapies are largely unavailable. Additionally, the public sector faces significant shortages, with most anti-cancer drugs primarily available in private healthcare settings. These findings highlight the urgent need for policy interventions to enhance the equitable distribution and affordability of anti-cancer medications, ensuring comprehensive cancer care across all healthcare sectors

REFERENCE:

[1]. Perlino C, Daniel H, Cadwallader AB. Which Drugs Should Be on the Essential Medicines List- AMA Journal of Ethics. 2024 Apr 1;26(4):282-8.https://journalofethics.ama-assn.org/article/which-drugs-should-be-essential-medicines-list/2024-04.

[2]. Peacocke EF, Myhre SL, Foss HS, Gopinathan U (2022) National adaptation and implementation of WHO Model List of Essential Medicines: A qualitative evidence synthesis. PLoS Med 19(3): e1003944.

[3]. Jelicic Kadic A, Zanic M, Skaricic N, Marusic A (2014) Using the WHO Essential Medicines List to Assess the Appropriateness of Insurance Coverage Decisions: A Case Study of the Croatian National Medicine Reimbursement List. PLoS ONE 9(10): e111474. https://doi.org/10.1371/journal.pone.0111474

[4]. Faisel Dula Sema, Esubalew Delie Asres & Belaynesh DubaleWubeshet (2021) Evaluation of Rational Use of Medicine Using WHO/INRUD Core Drug Use Indicators at Teda and Azezo Health Centers, Gondar Town, Northwest Ethiopia, Integrated Pharmacy Research and Practice, 51-63, DOI: 10.2147/IPRP.S316399 https://doi.org/10.2147/IPRP.S316399

[5]. Monclús, M., Sot, M., Jiménez, J., Serrat, J., Jiménez, S., Garriga, T., Morell, N., Torres, L., & Coll, M., 2019. Health Promotion: a multidisciplinary analysis of the factors affecting practices of professionals. European Journal of Public Health. https://doi.org/10.1093/eurpub/ckz186.443

[6]. Church, N., & McKillip, J., 2021. Antibiotic resistance crisis: challenges and imperatives. Biologia, 76, pp. 1535 - 1550. https://doi.org/10.1007/s11756-021-00697-x.

[7]. Pasarkar, N., Waghmare, S., & Kamble, H., 2021. ANTIBIOTIC RESISTANCE: A REVIEW. International Journal of Engineering Applied Sciences and Technology. https://doi.org/10.33564/ijeast.2021.v06i08.016.

[8]. Kairigo, P., Ngumba, E., Sundberg, L., Gachanja, A., & Tuhkanen, T., 2020. Occurrence of antibiotics and risk of antibiotic resistance evolution in selected Kenyan wastewaters, surface waters and sediments.. The Science of the total environment, 720, pp. 137580 .https://doi.org/10.1016/j.scitotenv.2020.137580.

[9]. Rima, M., Rima, M., Fajloun, Z., Sabatier, J., Bechinger, B., &NAmino acids, T., 2021. Antimicrobial Peptides: A Potent Alternative to Antibiotics. Antibiotics, 10. https://doi.org/10.3390/antibiotics10091095.

[10]. Jian, Z., Zeng, L., Xu, T., Sun, S., Yan, S., Yang, L., Huang, Y., Jia, J., & Dou, T., 2021. Antibiotic resistance genes in bacteria: Occurrence, spread, and control. Journal of Basic Microbiology, 61, pp. 1049 - 1070. https://doi.org/10.1002/jobm.202100201.

[11]. Maier, L., Goemans, C., Wirbel, J., Kuhn, M., Eberl, C., Pruteanu, M., Müller, P., García-Santamarina, S., Cacace, E., Zhang, B., Gekeler, C., Banerjee, T., Anderson, E., Milanese, A., Löber, U., Forslund, S., Patil, K., Zimmermann, M., Stecher, B., Zeller, G., Bork, P., &Typas, A., 2021. Unravelling the collateral damage of antibiotics on gut bacteria. Nature, 599, pp. 120 - 124. https://doi.org/10.1038/s41586-021-03986-2.

[12]. Hawkins, O., Scott, A., Montgomery, A., Nicholas, B., Mullan, J., Van Oijen, A., &Degeling, C., 2022. Comparing public attitudes, knowledge, beliefs and behaviours towards antibiotics and antimicrobial resistance in Australia, United Kingdom, and Sweden (2010-2021): A systematic review, meta-analysis, and comparative policy analysis. PLoS ONE, 17.

https://doi.org/10.1371/journal.pone.0261917.

[13]. Tripathi, S., & Biswal, B., 2020. Piperlongumine, a potent anticancer phytotherapeutic: Perspectives on contemporary status and future possibilities as an anticancer agent.. Pharmacological research, pp. 104772 .https://doi.org/10.1016/j.phrs.2020.104772.

[14]. Petroni, G., Buqué, A., Zitvogel, L., Kroemer, G., & Galluzzi, L., 2020. Immunomodulation by targeted anticancer agents.. Cancer cell. https://doi.org/10.1016/j.ccell.2020.11.009.

[15]. Asma, S., Acaroz, U., Imre, K., Morar, A., Shah, S., Hussain, S., Arslan-Acaroz, D., Demirbaş, H., Hajrulai-Musliu, Z., Istanbullugil, F., Soleimanzadeh, A., Morozov, D., Zhu, K., Herman, V., Ayad, A., Athanassiou, C., & Ince, S., 2022. Natural Products/Bioactive Compounds as a Source of Anticancer Drugs. Cancers, 14. https://doi.org/10.3390/cancers14246203.

[16]. Yue, S., Luo, M., Liu, H., & Wei, S., 2020. Recent Advances of Gold Compounds in Anticancer Immunity. Frontiers in Chemistry, 8. https://doi.org/10.3389/fchem.2020.00543.

[17]. Naeem, A., Hu, P., Yang, M., Zhang, J., Liu, Y., Zhu, W., & Zheng, Q., 2022. Natural Products as Anticancer Agents: Current Status and Future Perspectives. Molecules, 27. https://doi.org/10.3390/molecules27238367.

[18]. Doi, M., Tanaka, H., Ohoto, T., Miura, N., Sakurai, Y., Hatakeyama, H., & Akita, H., 2023. Reactivation of Anticancer Immunity by Resetting Interorgan Crosstalk in Immune-Suppressive Cells with a Nanoparticulated Anti-Inflammatory Drug.. Small, pp. e2205131 .https://doi.org/10.1002/smll.202205131.

[19]. Baindara, P., & Mandal, S., 2020. Bacteria and bacterial anticancer agents as a promising alternative for cancer therapeutics..Biochimie. https://doi.org/10.1016/j.biochi.2020.07.020.

[20]. Coutinho, E., Tauro, S., Dhokchawle, B., Mohite, P., Nahar, D., & Nadar, S., 2023. Natural Anticancer Agents: Their Therapeutic Potential, Challenges,s and Promising Outcomes.. Current medicinal chemistry. https://doi.org/10.2174/0929867330666230502113150.

[21]. Olatunde, O., Yong, J., Lu, C., & Ming, Y., 2023. A Review on Shikonin and Its Derivatives as Potent Anticancer Agents Targeted against Topoisomerases.. Current medicinal chemistry. https://doi.org/10.2174/0929867330666230208094828.

[22]. Guggisberg, J., Schumacher, M., Gilmore, G., & Zylla, D., 2021. Cannabis as an Anticancer Agent: A Review of Clinical Data and Assessment of Case Reports.. Cannabis and cannabinoid research. https://doi.org/10.1089/can.2021.0045.

[23]. Gazzaniga, G., Villa, F., Tosi, F., Pizzutilo, E., Colla, S., D'Onghia, S., Di Sanza, G., Fornasier, G., Gringeri, M., Lucatelli, M., Mosini, G., Pani, A., Siena, S., Scaglione, F., & Sartore-Bianchi, A., 2022. Pneumatosis Intestinalis Induced by Anticancer Treatment: A Systematic Review. Cancers, 14. https://doi.org/10.3390/cancers14071666.

[24]. Mohammadi, E., Tabatabaei, M., Habibi-Anbouhi, M., &Tafazzoli-Shadpour, M., 2021. Chemical inhibitor anticancer drugs regulate mechanical properties and cytoskeletal structure of non-invasive and invasive breast cancer cell lines: Study of effects of Letrozole, Exemestane, and Everolimus.. Biochemical and biophysical research communications, 565, pp. 14-20 .https://doi.org/10.1016/j.bbrc.2021.05.083.

[25]. Eghtedari, M., Porzani, S., &Nowruzi, B., 2021. Anticancer potential of natural peptides from terrestrial and marine environments: A review. Phytochemistry Letters, 42, pp. 87-103. https://doi.org/10.1016/J.PHYTOL.2021.02.008.