Cancer Care in Jordan: Multidisciplinary Solutions Needed for Complex Disparities

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Introduction

Cancer is a major cause of death worldwide. Approximately 70% of cancer deaths occur in low- and upper-middle–income countries (LMICs, UMICs).[1,2] In these nations, cancer is often diagnosed at an advanced stage, with modern diagnostic tools and treatments frequently inaccessible. In contrast to the more than 90% treatment availability in high-income countries (HICs), <15% of such treatments are available in low-income countries.[3] The Middle East illustrates this problem, with countries ranging from advanced cancer care to those with limited or no cancer treatment capabilities.[4]

Jordan, a UMIC country with 11 million people and a 2.5% annual growth rate,[5,6] hosts a diverse population, including Palestinian, Syrian, and Iraqi refugees. This influx has substantially increased the burden on Jordan's health care system, straining its resources and capacity to provide adequate care for all residents. Unlike neighboring wealthy Gulf nations like Saudi Arabia, Qatar, and the UAE, Jordan has fewer resources to invest in health care.[7] Those countries fund extensive health care systems through their natural resources, providing residents with advanced medical care and technology.[8]

Health care in Jordan is relatively advanced, with a mix of public and private providers offering a wide range of services.[9] It has become a regional medical tourism hub, with institutions like the King Hussein Cancer Center (KHCC) and Royal Medical Services. However, managing health care costs and ensuring equitable access to medical services remain a challenge. The financial burden of health care for chronic conditions, such as cancer, can be significant for many families. This has led to a growing concern about financial toxicity from high out-of-pocket treatment cost, affecting patients' quality of life and potentially affecting treatment adherence.

Cancer: A Critical Public Health Challenge

The Jordan Cancer Registry, established in 1996, is the primary source for tracking cancer incidence and trends nationwide.[10] In 2022, cancer was the second leading cause of death in Jordan, with over 9,000 fatalities and nearly 13,000 new cases,[10,11] and based on data from the Global Burden of Disease data set, it has risen from 1980 to 2021 (Fig 1). Breast cancer has the highest incidence rate and is the leading cause of cancer-related mortality among females, contributing to 22.4% of deaths. Colorectal cancer has the highest incidence rate among males. However, mortality data show that lung cancer is the leading cause of cancer-related deaths (30%).[10,12]

The Role of Familial Structures and Financial Toxicity in Cancer Care

In Arab culture, family plays an essential role in health and health care. Cancer can be extremely stressful and even traumatic for both patients and their families, compounded by associated financial toxicity. This experience often disrupts family stability, impairs their ability to support their ill relative, and subsequently affects the patient's response to treatment. Supportive family helps patients manage various psychological and emotional challenges, alleviate anxiety and depression, and offer companionship.[13] In Arab countries, visiting sick relatives is seen as a moral and religious duty. Many believe that Allah (God) will reward them for fulfilling this

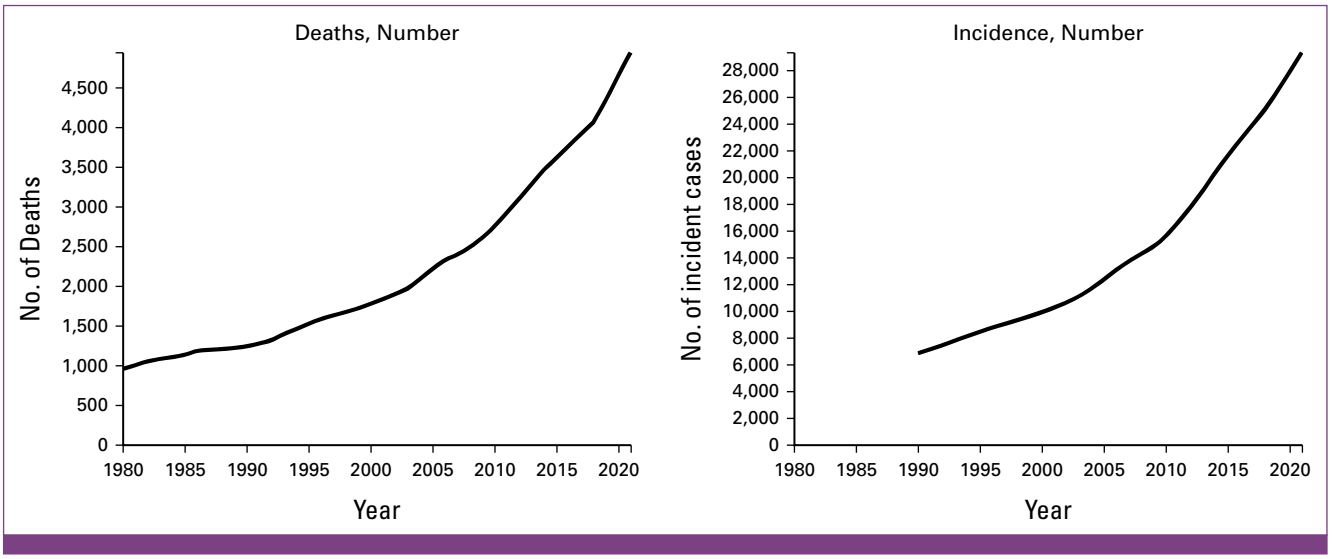

FIG 1. Rising trends in cancer incidence and mortality rates among patients in Jordan. The figure illustrates a noticeable increase in both the incidence and death rates among patients with cancer over the 30-year period, highlighting the growing burden of cancer. The figure is obtained with permission from the 2021 Global Burden of Disease (GBD) study.[41]

obligation.[14] This sense of duty compels families to provide and finance care, even under significant financial strain. Female caregivers often carry more of the burden because of the need to balance work and caregiving responsibilities. Watching a loved one endure physical and emotional challenges can evoke feelings of helplessness and emotional strain. In addition, the stigma surrounding cancer may result in social isolation and difficulties in accessing support. Financial toxicity adds another layer of hardship. The burden extends to income loss, with reduced work productivity. Unfortunately, in many Arab countries, there is no comprehensive state-sponsored social support system to compensate for this, leaving families to bear the financial strain on their own.[2]

The financial impact can be substantial, encompassing direct costs (such as out-of-pocket medical expenses) and indirect costs (such as productivity loss because of disability or premature death). Indirect economic burdens, in particular, represent a significant portion of the total cost of illness; they include the forgone value of economic output lost because of disease-related work absences (absenteeism), reduced productivity while at work (presenteeism), and premature death (mortality).[15] In Jordan, health care accounts for 8% of gross domestic product (GDP) expenditure,[16] higher than several UMICs, with 4%-7% of GDP.[17]

Financing Cancer Care Systems

Jordan's health care system consists of a mix of public, private, international, and charitable sectors, along with various councils and institutions.[18] KHCC is the primary facility for specialized cancer treatment in Jordan, catering to more than 60% of the nation's patients with cancer.[19] The centralized nature of cancer care services presents significant challenges. Diagnostic and treatment facilities are primarily located in major cities, leading to disparities for rural and underserved areas. Patients in rural areas may encounter difficulties in accessing specialized cancer care, increasing the financial burden and indirect cost as extended travel distances and transportation expenses lead to decreased service utilization and increased physician turnover rates. The insufficient public transportation and inadequate road infrastructure connecting rural and urban areas in Jordan impede interaction between these regions.[20]

Health Insurance Disparities

Approximately 65% of Jordanians have health insurance through the public sector, but coverage is lower among unemployed individuals, rural residents, and refugees.[21] The private sector accounts for one third of health care services that are often not covered by insurance.[22] Rural populations, making up about 20% of Jordanians, frequently lack access to government or private insurance, resulting in high out-of-pocket expenses.[23] These disparities underscore the urgent need for comprehensive policy reforms to address insurance coverage gaps and improve health care accessibility for all Jordanians.

Refugees in Jordan encounter numerous challenges regarding cancer care. Their health care heavily depends on humanitarian aid from United Nations and international agencies, which remains insufficient.[24] Research indicates that refugees often present with cancer at more advanced stages and receive suboptimal treatment because of factors such as interruptions in previous care, financial barriers, social marginalization, discrimination, and lack of necessary documentation.[25] Despite government subsidies, many refugees report high out-of-pocket expenses and lengthy

wait times. The medical services offered within refugee camps managed by governmental and nongovernmental organizations are typically basic, often lacking specialized providers and advanced equipment needed for diagnosis and multimodal therapy. Consequently, suspected cancer cases usually require referral to tertiary hospitals outside the camps after initial evaluation.[26] Refugees outside camps face further difficulties in accessing health care and navigating the system, highlighting the need for improved primary care services, insurance coverage, and transportation assistance for this vulnerable population.[27]

Health care funding in UMICs largely relies on two main sources: out-of-pocket payments by patients or their families, either directly at the point of care or through private insurance, and public spending through government-managed insurance. Out-of-pocket payments are often the least fair and efficient method, frequently leading to financial distress for families. In UMICs, these expenditures represent approximately 50% of total health spending, whereas in HICs, they account for about 14%.[28] Costs associated with maintenance treatment and inability to work because of illness can increase financial toxicity for patients and their families, adversely affecting household income. These expenses often compel families to leave their jobs, allocate funds for in-home caregiving, or purchase additional medical equipment not covered by insurance, thereby exacerbating their economic burden. This financial strain is compounded by the psychological distress and impaired quality of life that accompany a terminal cancer diagnosis.

Palliative care in Jordan is relatively advanced compared with other Middle Eastern countries.[29] However, several cultural challenges hinder its effectiveness, such as the fear of addiction to pain medications among patients, families, and health care. In addition, there is limited awareness of the financial and informational support aspects of palliative care. Study results revealed that only 45% of patients had some knowledge of palliative care.[30] In addition, a lack of knowledge about pain management among health care professionals further complicates care.[31] Insufficient health policies and palliative services exacerbate these issues, along with the reluctance of families and physicians to refer patients to palliative care, viewing it as a failure of treatment.[29]

Solutions and Future Directions

Electronic medical records (EMRs) could significantly enhance health care quality and reduce costs.[32] A review of various studies found that 78% of the studies show an increase in health care quality and 56% demonstrate a reduction in costs.[32,33] However, the level of EMR adoption in Jordan is relatively low. One study shows that only 10.3% of hospitals use EMRs, whereas 15.5% have basic systems. The majority (74.2%) had not implemented EMRs because of a lack of funding and resources.[34] Financial concerns are a major barrier to EMR adoption. However, studies suggest that EMRs can yield long-term cost savings in primary care settings. A cost-benefit study estimated that implementing EMRs in ambulatory primary care settings could generate a net financial benefit of $86,400 in US dollars (USD) per provider over 5 years, primarily because of savings in drug expenditures, optimized radiology utilization, improved charge capture, and reduced billing errors. Net benefits could range from $8,400 (USD) to $140,100 (USD), with extreme scenarios varying from a net cost of $2,300 (USD) to a net benefit of $330,900 (USD). These findings underscore the potential financial return on investment in EMRs.[35] To maximize benefits, national strategic plans are needed to guide the goals and implementation of EMR systems in all hospitals across Jordan.

Recent global health initiatives have aimed to enhance oncology care for refugees within these camps by strengthening partnerships between humanitarian organizations and national cancer treatment centers. These collaborations are designed to provide more integrated and accessible cancer care for refugees.[36] Mobile clinics connected to KHCC have already proven to be effective, screening over 5,000 patients annually in underserved areas since 2018,[16] lowering the costs on patients, and facilitating earlier disease detection.[21] Expanding this effort by adding infusion units to the mobile clinics would be a great idea, allowing for more comprehensive cancer care in these underserved areas.

A study demonstrated that 25,496 telehealth visits resulted in substantial savings, including 3.8 million round trip travel miles, 75,055 driving hours, and up to $222.8 (USD) in cost savings per visit. These savings stem from reduced transportation, parking, lodging, and lost productivity costs. Mobile clinics also mitigate the burden of travel, particularly for rural patients who often face long commutes.[37]

Public financing systems or insurance schemes that allow prepayment and pooling offer better financial protection and lead to more equitable health financing structures. The move toward Universal Health Coverage (UHC) in LMICs aims to create a system where public funds are pooled to provide protection for families from the financial strain of out-of-pocket medical expenses. Countries are taking different approaches to achieving UHC. For instance, in Latin America and the Caribbean, several middle-income countries like Colombia, Peru, and Mexico have expanded public insurance to cover nonsalaried workers, the unemployed, those not in the labor force, and low-income individuals.[28] Thailand's implementation of UHC in 2002 is also an excellent example. The National Health Security Act extended coverage to informal workers and low-income individuals.[38] This reform significantly reduced out-of-pocket health care expenses and improved access to services for poorer populations. Thailand's UHC led to increased life expectancy and greater satisfaction with health care.[39] These examples may prove to be insightful for cancer system planning in Jordan. Expanding public insurance to cover low-income and informal workers reduces financial burdens and ensures equitable access to health care. By pooling public funds and

promoting consistent health benefits, Jordan can make significant strides toward UHC, shielding families from the financial strain of medical expenses.

Cost-effectiveness assessments help determine the feasibility of expanding health interventions within financial constraints. A global study evaluating cost-effectiveness thresholds found that the per-quality-adjusted life-year (QALY) threshold varied widely across countries, from $87 (USD) in low-income nations to $95,958 (USD) in high-income settings like the United States. In 97% of the 174 countries analyzed, the cost-effectiveness threshold per QALY was less than one GDP per capita, reinforcing the idea that financial feasibility should be a guiding factor in UHC implementation.[40] Jordan could adopt a similar system by expanding public insurance to cover low-income and informal workers, using strategic cost-effectiveness assessments. Jordan could adopt a similar approach, using cost-effectiveness analyses to strategically expand public insurance coverage while ensuring long-term financial stability.

In conclusion, while Jordan's health care system has made significant advancements, the psychosocial and financial burdens of cancer care reveal the urgent need for targeted interventions to support patients and their families. Addressing financial toxicity is essential to alleviating the broader impacts of cancer on Jordanian society. Continuous efforts must focus on improving the efficiency of cancer care and support systems. This approach will help Jordan develop a more resilient and supportive health care framework for both patients and their families.

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REFERENCES

1. Sung H, Ferlay J, Siegel RL, et al: Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 71:209-249, 2021
2. Almagharbeh WT, Al Motlaq M, Taher Almagarbeh RNE: Family needs of critically ill patients in Central Jordan: A family perspective. Am J Biomed Sci Res 1:217-221, 2019
3. Mula-Hussain L, Mahdi H, Ramzi ZS, et al: Cancer burden among Arab world males in 2020: The need for a better approach to improve outcome. JCO Glob Oncol 10.1200/GO.21.00407
4. Silbermann M, Pitsillides B, Al-Alfi N, et al: Multidisciplinary care team for cancer patients and its implementation in several Middle Eastern countries. Ann Oncol 24:vii41-47, 2013 (suppl 7)
5. The Department of Statistics Jordan: Jordan Statistical Year Book 2022, 2024
6. The World Bank Group: Data for Jordan, 2017
7. International Monetary Fund: World Economic Outlook Database, 2021. https://www.imf.org/en/Publications/WEO/weo-database/2021
8. Ministry of Public Health: National Health Strategy, 2021. https://www.moph.gov.qa/english/strategies
9. Alloubani A, Abdelhafiz IM, Saleh AA: Relative and global health: A comparative study between healthcare systems of Jordan and France. World Health Popul 16:9-19, 2016
10. Jordan Cancer Registry, M.E.C.C., National Cancer Institute (United States): Jordan Cancer Incidence Report 2011, Amman, Jordan. 2011
11. Ferlay J, Ervik M, Lam F, et al: Global Cancer Observatory: Cancer Today. 2024. https://gco.iarc.who.int/media/globocan/factsheets/populations/400-jordan-fact-sheet.pdf
12. Abdel-Razeq H, Attiga F, Mansour A: Cancer care in Jordan. Hematol Oncol Stem Cell Ther 8:64-70, 2015
13. Koltai J, Bierman A, Schieman S: Financial circumstances, mastery, and mental health: Taking unobserved time-stable influences into account. Soc Sci Med 202:108-116, 2018

14. Ahmad F, Muhammad M, Abdullah AA: Religion and spirituality in coping with advanced breast cancer: Perspectives from Malaysian Muslim women. J Relig Health 50:36-45, 2011
15. Rashdan O: Estimating the indirect economic burden of cancer in Jordan: A retrospective observational study. BMJ Open 14:e082025, 2024
16. Mansour R, Abdel-Razeq H, Al-Hussaini M, et al: Systemic barriers to optimal cancer care in resource-limited countries: Jordanian healthcare as an example. Cancers 16:1117, 2024
17. Donkor A, Atuwo-Ampoh VD, Yakanu F, et al: Financial toxicity of cancer care in low- and middle-income countries: A systematic review and meta-analysis. Support Care Cancer 30:7159-7190, 2022
18. The Hashemite Kingdom of Jordan High Health Council: The National Strategy for Health Sector in Jordan 2016–2020, 2016
19. Halasa YA, Zeng W, Chappy E, et al: Value and impact of international hospital accreditation: A case study from Jordan. East Mediterr Health J 21:90-99, 2015
20. Gharaibeh AA, Alhamad MN, Al-Hassan DA, et al: The impact of the spatial configuration of socioeconomic services on rural–urban dependencies in Northern Jordan. GeoJournal 87:4475-4490, 2022
21. Khader Y, Al Nsour M, Abu Khudair S, et al: Strengthening primary healthcare in Jordan for achieving universal health coverage: A need for family health team approach. Healthcare 11:2993, 2023
22. WHO: The National Strategy for Health Sector in Jordan, 2015–2019, 2015. http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/jordan/jordan_national_health_sector_strategy_2015-2019_.pdf
23. Hagen-Zanker J, Ulrichs M, Holmes R: What are the effects of cash transfers for refugees in the context of protracted displacement? Findings from Jordan. Int Soc Security Rev 71:57-77, 2018
24. Spiegel PB, Cheaib JG, Aziz SA, et al: Cancer in Syrian refugees in Jordan and Lebanon between 2015 and 2017. Lancet Oncol 21:e280-e291, 2020
25. Abdel-Razeq H, Tamimi F, Abdel-Razeq N, et al: Late presentation and suboptimal treatment of breast cancer among Syrian refugees: A retrospective study. J Int Med Res 49:03000605211018448, 2021
26. UNHCR: Global Trends: Forced Displacement in 2023, Copenhagen, Denmark, 2024
27. Ay M, Arcos González P, Castro Delgado R: The perceived barriers of access to health care among a group of non-camp Syrian refugees in Jordan. Int J Health Serv Plann Adm Eval 46:566-589, 2016
28. Knaul F, Horton S, Yerramilli P, et al: Financing cancer care in low-resource settings, in Cancer: Disease Control Priorities, Volume 3. Washington, DC, The International Bank for Reconstruction and Development/The World Bank, 2015
29. Khader K: Cultural challenges in implementing palliative care services in Jordan. Palliat Med Hosp Care Open J 1:S68-S72, 2017
30. Al-Atiyyat N, Ibraheemi AA, Rababa M, et al: Public awareness of palliative care: A nationally representative sample of Jordanian adults. J Pain Symptom Manage 68:123-131, 2024
31. Al-Qadire M, Omran S, Tayyem M: Palliative care in Jordan: Accomplishments and challenges, in Palliative Care to the Cancer Patient: The Middle East as a Model for Emerging Countries. Nova Science Publishers, Inc, 2014, pp 111-123
32. Uslu A, Stausberg J: Value of the electronic medical record for hospital care: Update from the literature. J Med Internet Res 23:e26323, 2021
33. Bar-Dayan Y, Saed H, Boaz M, et al: Using electronic health records to save money. J Am Med Inform Assoc 20:e17-e20, 2013
34. Tubaishat A, Al-Rawajfah OM: The use of electronic medical records in Jordanian hospitals: A nationwide survey. Comput Inform Nurs 35:538-545, 2017
35. Wang SJ, Middleton B, Prosser LA, et al: A cost-benefit analysis of electronic medical records in primary care. Am J Med 114:397-403, 2003
36. Lecadet C: Refugee politics: Self-organized 'government' and protests in the Agamé refugee camp (2005–13). J Refugee Stud 29:187-207, 2016
37. Patel KB, Turner K, Alishahi Tabriz A, et al: Estimated indirect cost savings of using telehealth among nonelderly patients with cancer. JAMA Netw Open 6:e2250211, 2023
38. Towse A, Mills A, Tangcharoensathien V: Learning from Thailand's health reforms. BMJ 328:103-105, 2004
39. Gruber J, Hendren N, Townsend RM: The great equalizer: Health care access and infant mortality in Thailand. Am Econ J Appl Econ 6:91-107, 2014
40. Pichon-Riviere A, Drummond M, Palacios A, et al: Determining the efficiency path to universal health coverage: Cost-effectiveness thresholds for 174 countries based on growth in life expectancy and health expenditures. Lancet Glob Health 11:e833-e842, 2023
41. IHME: Global Burden of Disease Results Tool. 2021. https://vizhub.healthdata.org/gbd-results/?params=gbd-api-2021-public/7879ae43a58eb1da65ce7a77b10ba722