

Inequidades en la atención oncológica: determinantes sociales, retrasos diagnósticos y estrategias del sistema de salud para un acceso equitativo

Cancer Care Inequities: Social Determinants, Diagnostic Delays, and Health-System Strategies for Equitable Access

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RESUMEN

Las inequidades en el acceso al diagnóstico y tratamiento del cáncer continúan representando un desafío importante para los sistemas de salud contemporáneos, especialmente entre poblaciones afectadas por desventajas socioeconómicas, vulnerabilidad financiera, aislamiento geográfico, limitada alfabetización en salud y trayectorias asistenciales fragmentadas. El presente estudio analizó la interacción entre los determinantes sociales de la salud y las características estructurales de los sistemas sanitarios que influyen en el acceso oportuno a los servicios oncológicos. Se realizó una revisión documental, integrativa, descriptiva y analítica utilizando el Método Científico como marco metodológico. Se examinó evidencia científica internacional, latinoamericana y mexicana, organizada de acuerdo con determinantes socioeconómicos, geográficos, financieros, organizacionales y relacionados con los procesos asistenciales. Los resultados mostraron que los factores socioeconómicos constituyeron la dimensión más frecuentemente representada en la literatura revisada, seguidos estrechamente por las barreras organizacionales y propias del sistema de salud. La evaluación diagnóstica fue identificada como la etapa del continuo oncológico en la que se documentaron con mayor frecuencia las barreras de acceso, seguida del inicio del tratamiento y la continuidad asistencial. La fragmentación de los mecanismos de referencia, los tiempos prolongados de espera, la disponibilidad limitada de especialistas, las barreras financieras, la concentración geográfica de los servicios y las limitaciones de infraestructura diagnóstica fueron hallazgos recurrentes. La evidencia procedente de México mostró que pueden existir retrasos sustanciales después de que los pacientes ya han ingresado al sistema sanitario, lo que demuestra que la cobertura formal no garantiza necesariamente un acceso efectivo. Entre las estrategias del sistema de salud identificadas con mayor frecuencia se encontraron las rutas integradas de atención, los mecanismos rápidos de referencia y diagnóstico, el fortalecimiento de la capacidad diagnóstica, la protección financiera, la descentralización de determinados servicios y la navegación del paciente. Los hallazgos respaldan la hipótesis de que las inequidades en la atención oncológica derivan de la interacción acumulativa entre vulnerabilidad social y barreras modificables del sistema sanitario. La reducción de estas disparidades requiere intervenciones coordinadas y multinivel capaces de mejorar la oportunidad diagnóstica, el inicio del tratamiento, la continuidad asistencial, la accesibilidad geográfica y la protección financiera. La equidad en oncología debe entenderse, por tanto, como la capacidad de los sistemas de salud para proporcionar atención oportuna, continua, asequible y apropiada de acuerdo con la necesidad clínica, y no en función de la posición socioeconómica, el lugar de residencia o la capacidad financiera.

PALABRAS CLAVE

inequidades en cáncer, acceso oncológico, determinantes sociales de la salud, diagnóstico de cáncer, retraso terapéutico, desigualdades en salud, toxicidad financiera, barreras geográficas, navegación del paciente, sistemas de salud, atención oncológica, equidad en salud

ABSTRACT

Inequities in access to cancer diagnosis and treatment remain a major challenge for contemporary health systems, particularly among populations affected by socioeconomic disadvantage, financial vulnerability, geographic isolation, limited health literacy, and fragmented healthcare pathways. This study analyzed the interaction between social determinants of health and structural characteristics of healthcare systems that influence timely access to oncology services. A documentary, integrative, descriptive, and analytical review was conducted using the Scientific Method as the methodological framework. Scientific evidence from international settings, Latin America, and Mexico was examined and organized according to socioeconomic, geographic, financial, organizational, and healthcare-process determinants. The results showed that socioeconomic factors were the most frequently represented dimension in the reviewed literature, followed closely by organizational and health-system barriers. Diagnostic evaluation was identified as the stage of the cancer-care continuum in which access barriers were most frequently documented, followed by treatment initiation and continuity of care. Referral fragmentation, prolonged waiting times, insufficient specialist availability, financial barriers, geographic concentration of services, and diagnostic infrastructure limitations were recurrent findings. Evidence from Mexico demonstrated that substantial delays may occur after patients have already entered the healthcare system, emphasizing that formal coverage does not necessarily guarantee effective

access. The most frequently identified health-system strategies included integrated care pathways, rapid referral and diagnostic mechanisms, strengthening of diagnostic capacity, financial protection, decentralization of selected services, and patient navigation. The findings support the hypothesis that cancer-care inequities arise from the cumulative interaction of social vulnerability and modifiable health-system barriers. Reducing these disparities requires coordinated, multilevel interventions capable of improving diagnostic timeliness, treatment initiation, continuity of care, geographic accessibility, and financial protection. Equity in oncology should therefore be understood as the capacity of health systems to provide timely, continuous, affordable, and appropriate care according to clinical need rather than socioeconomic position, place of residence, or financial capacity.

KEYWORDS

cancer inequities, oncology access, social determinants of health, cancer diagnosis, treatment delay, health disparities, financial toxicity, geographic barriers, patient navigation, health systems, cancer care, health equity

INTRODUCCIÓN

Cancer represents one of the most significant contemporary challenges for public health and health systems worldwide, not only because of its increasing epidemiological burden but also because of the profound inequalities that determine who is diagnosed early, who receives appropriate treatment, and who ultimately survives the disease. Global estimates for 2022 indicated approximately 20 million new cancer cases and 9.7 million cancer-related deaths, demonstrating the magnitude of the disease and the pressure it places on health services across different economic and geographic settings (Bray et al., 2024). However, the global cancer burden is not distributed uniformly. Differences in income, educational opportunities, geographic location, health insurance, availability of diagnostic technologies, specialist density, transportation, institutional capacity, and continuity of care can substantially modify the probability that a person will move successfully from the appearance of symptoms or an abnormal screening result to definitive diagnosis and timely treatment. Consequently, cancer outcomes cannot be understood solely through biological characteristics of tumors or advances in oncological therapies; they must also be examined through the social and structural conditions that determine effective access to care.

The concept of equity is particularly important in oncology because technological and therapeutic progress does not automatically translate into equivalent benefits for all populations. Modern oncology has experienced remarkable advances in molecular diagnosis, precision medicine, immunotherapy, targeted therapies, radiotherapy, minimally invasive surgery, genomic profiling, and supportive care. Nevertheless, socially and economically disadvantaged populations frequently experience a lower probability of benefiting from these innovations. Alcaraz et al. (2020) emphasize that improvements in cancer prevention, early detection, treatment, and survival have not been equally distributed among population groups and that socioeconomic disparities may persist or even widen when access to new health technologies depends on the availability of financial, institutional, geographic, or informational resources. This phenomenon illustrates a central paradox in contemporary cancer care: a health system may possess increasingly sophisticated therapeutic options while simultaneously maintaining substantial inequalities in the ability of patients to reach those services.

Social determinants of health provide an essential theoretical framework for understanding this paradox. These determinants encompass the social, economic, environmental, and structural circumstances that influence health opportunities throughout the life course. In cancer care, relevant determinants include income, education, employment conditions, housing stability, transportation, rural or urban residence, social support, health literacy, insurance coverage, migration status, neighborhood characteristics, and the organization of healthcare services. Their influence is not limited to cancer incidence; they may affect virtually every stage of the cancer-control continuum, including prevention, screening, recognition of symptoms, initial healthcare seeking, referral, diagnostic confirmation, staging, treatment selection, treatment adherence, rehabilitation, survivorship, and palliative care (Alcaraz et al., 2020; Symioti et al., 2023). Therefore, cancer disparities emerge from a complex interaction between individual circumstances and structural characteristics of healthcare systems rather than from isolated patient behaviors.

Socioeconomic status is among the most consistently identified determinants of unequal cancer outcomes. Individuals with limited financial resources may face direct costs associated with consultations, laboratory studies, imaging, biopsies, medications, surgery, radiotherapy, and hospitalization, as well as indirect costs related to transportation,

accommodation, childcare, loss of employment, or absence from work. Even when medical services are nominally covered by public insurance or universal health programs, these indirect expenditures may represent significant barriers. The resulting economic burden can produce what has been described as financial toxicity, in which the costs associated with cancer care negatively affect household economic stability, treatment adherence, quality of life, and healthcare decision-making (Beltrán Ponce et al., 2022). Financial toxicity should therefore not be interpreted merely as an adverse economic consequence of cancer but as a mechanism capable of generating or intensifying inequalities in treatment access.

Education and health literacy interact closely with socioeconomic conditions. Limited knowledge about cancer warning signs, screening recommendations, available services, or referral pathways can delay the recognition of potentially malignant symptoms and the decision to seek medical attention. Nevertheless, attributing diagnostic delays exclusively to insufficient patient knowledge risks overlooking the structural environment in which individual decisions occur. A patient may recognize the seriousness of a symptom yet postpone consultation because of inability to miss work, transportation difficulties, caregiving responsibilities, previous negative experiences with healthcare institutions, concerns regarding treatment costs, or the expectation of prolonged waiting times. Thus, individual behavior is frequently constrained by economic and institutional conditions rather than determined exclusively by personal preferences or beliefs (Unger-Saldaña et al., 2018).

Geographic inequalities constitute another major dimension of cancer-related inequity. Specialized oncology services tend to be concentrated in metropolitan areas and tertiary referral hospitals, while rural, remote, and socioeconomically marginalized communities may have limited access to pathology, radiology, surgical oncology, radiation oncology, medical oncology, nuclear medicine, molecular diagnostics, and specialized supportive services. Geographic distance can increase transportation costs, require repeated travel, disrupt employment and family responsibilities, and produce discontinuity between primary care and specialized institutions. The spatial concentration of oncology infrastructure therefore creates an important distinction between the theoretical availability of a service within a national health system and its practical accessibility to individuals living far from specialized centers. Effective access requires not simply the existence of a service but also the realistic ability of patients to reach, afford, navigate, and complete the required pathway of care.

The organization of the health system itself can substantially amplify or reduce these inequalities. Fragmented referral pathways, insufficient coordination between primary and specialized care, long waiting lists, repetitive consultations, duplication of diagnostic procedures, shortages of specialists, administrative authorization requirements, and limited diagnostic capacity can generate significant intervals between symptom recognition, first consultation, cancer confirmation, staging, and initiation of therapy. These delays are particularly important because diagnostic timeliness can determine the stage at which cancer is detected and influence the complexity, cost, therapeutic options, and potential effectiveness of treatment. Structural delays should therefore be considered a quality-of-care and health-equity problem rather than merely an administrative inconvenience.

Evidence from Mexico provides a particularly relevant illustration of this phenomenon. Bright et al. (2011), in an investigation of breast cancer care in Mexico City, identified substantial delays between the first primary healthcare consultation and definitive cancer diagnosis. Their findings suggested that referral processes between primary and specialized care represented a major component of the total diagnostic delay. Patients frequently required multiple healthcare visits before receiving diagnostic confirmation, indicating that contact with the health system did not necessarily guarantee timely progression through the diagnostic pathway. This distinction is critical: access should not be measured exclusively by whether a patient has entered a healthcare facility but also by whether the system is capable of converting that initial contact into timely diagnostic resolution and appropriate treatment.

Subsequent research in Mexico has reinforced the multidimensional nature of these delays. Unger-Saldaña et al. (2018), examining women referred to public cancer hospitals for breast cancer care, found that both socioeconomic and health-system factors contributed to prolonged intervals. Financial limitations, difficulty missing work, geographic residence, interpretation of symptoms, and characteristics of the healthcare pathway interacted in determining how quickly women progressed toward diagnosis. Importantly, diagnostic delay was considerably more frequent than prolonged patient delay, highlighting that the responsibility for late diagnosis cannot be placed predominantly on

patients. Such evidence supports a shift from explanatory models centered on individual behavior toward frameworks that examine the interaction between social vulnerability and institutional performance.

Similar inequalities can also be identified in pediatric oncology. Zapata-Tarrés et al. (2020), studying children with cancer without social security coverage in multiple Mexican hospitals, reported that healthcare-service-related factors contributed substantially to delays in diagnosis and treatment. Longer waiting times, multiple consultations, characteristics of the first healthcare contact, diagnostic procedures, and socioeconomic context affected the duration of the care pathway. These findings demonstrate that unequal access is not restricted to a particular cancer type or adult population. Rather, it represents a broader systems problem capable of affecting different age groups and oncological conditions, although the specific barriers may vary according to disease characteristics, geographic context, institutional organization, and social vulnerability.

At the regional level, Latin America and the Caribbean face a particularly complex cancer-equity challenge. The region combines demographic aging, epidemiological transition, increasing incidence of several malignancies, substantial socioeconomic inequality, heterogeneous health financing models, and significant differences in technological and specialist capacity. Goss et al. (2013) described important deficiencies and inequalities in cancer control throughout Latin America, emphasizing the need for coordinated national strategies, improved prevention and early detection, adequate financing, expansion of specialized services, stronger registries, better professional training, and rational allocation of oncology resources. Although several countries have expanded health coverage, formal coverage does not necessarily guarantee timely or comprehensive cancer care when diagnostic and therapeutic capacity remains geographically concentrated or institutionally fragmented.

This distinction between **health coverage** and **effective access** is fundamental. A person may be legally entitled to cancer services and nevertheless face months of diagnostic delay, long-distance travel, unavailable medications, insufficient radiotherapy capacity, fragmented referrals, or out-of-pocket expenditures that prevent treatment completion. Consequently, evaluating oncology equity requires moving beyond conventional indicators such as insurance enrollment or the nominal existence of services. It requires examining timeliness, affordability, continuity, quality, comprehensiveness, and the capacity of patients to obtain the full sequence of services required from suspicion of cancer to definitive treatment.

The problem is particularly relevant in low- and middle-income countries, where limitations in infrastructure and health financing frequently coexist with rising cancer incidence. Farmer et al. (2010) challenged the assumption that comprehensive cancer care is unattainable in resource-constrained settings and argued that expanded access can be achieved through rational organization of services, strengthening of health systems, strategic financing, appropriate use of essential medicines, decentralization of selected interventions, and integration of cancer control into broader health-system development. This perspective is important because it changes the conceptual focus from scarcity alone to the way resources are organized and distributed. Limited resources undoubtedly constrain cancer care, but inequitable allocation, fragmentation, inefficient referral systems, and lack of prioritization can further magnify those limitations.

Accordingly, interventions designed to reduce cancer disparities must operate at multiple levels. Strategies focused exclusively on encouraging patients to seek care earlier are insufficient when diagnostic capacity, referral coordination, affordability, or specialist availability remain inadequate. Effective interventions may include strengthening primary-care recognition of warning signs, establishing rapid diagnostic referral pathways, reducing administrative barriers, decentralizing diagnostic procedures where clinically appropriate, implementing teleoncology, expanding pathology and imaging capacity, guaranteeing access to essential medicines, improving transportation support, reducing catastrophic household expenditure, integrating interoperable health information systems, and using standardized indicators to monitor waiting times and treatment abandonment. These strategies recognize that equity requires changes not only in patient behavior but also in institutional design and health policy.

Patient navigation represents one example of a health-system intervention capable of reducing barriers between identification of a possible malignancy and diagnostic or therapeutic resolution. Navigation programs can assist patients with appointment coordination, communication between institutions, transportation, financial resources, understanding of clinical instructions, and transitions between different levels of care. Evidence indicates that

navigation may reduce socioeconomic disparities in diagnostic resolution, particularly among populations facing economic and organizational barriers (Rodday et al., 2015). Its relevance lies in addressing a frequently neglected dimension of cancer access: patients are often expected to coordinate highly complex healthcare pathways across multiple institutions at precisely the moment when they are experiencing physical symptoms, psychological distress, uncertainty, and financial pressure.

Nevertheless, navigation and other patient-level interventions cannot replace structural reform. Contemporary evidence increasingly supports a multilevel approach in which individual, community, healthcare-provider, institutional, and policy determinants are analyzed simultaneously. Syrnioti et al. (2023) describe cancer disparities as the product of intersecting social determinants, while Beltrán Ponce et al. (2022) emphasize that unequal access, financial toxicity, and characteristics of the oncology workforce contribute to differences in the receipt of high-quality and guideline-concordant care. These findings reinforce the need to understand inequity as a system property produced through interacting mechanisms rather than as the consequence of a single socioeconomic variable.

A major gap in the existing literature is therefore not the absence of evidence demonstrating cancer disparities, but the persistent fragmentation of the explanations and proposed responses. Numerous studies identify specific associations between socioeconomic status, geography, insurance, race or ethnicity, education, financial burden, and cancer outcomes; other investigations focus on delays within particular institutions or cancer types. However, less attention is sometimes given to how these determinants accumulate throughout the complete oncological pathway and how health systems can intervene simultaneously at several points of vulnerability. A patient exposed to poverty, geographic isolation, insufficient health literacy, fragmented referral networks, and high indirect costs does not experience these factors independently. Instead, disadvantages may compound sequentially, increasing the probability that an initial delay generates subsequent diagnostic, therapeutic, and financial consequences.

This study is grounded in the hypothesis that inequities in access to cancer diagnosis and treatment result from the cumulative interaction of social determinants and modifiable health-system barriers, and that interventions addressing only one component of the care pathway are less likely to produce sustained improvements in equity than coordinated multilevel strategies. It is further hypothesized that socioeconomic disadvantage, geographic barriers, financial vulnerability, limited health literacy, fragmented referral systems, and unequal distribution of oncology resources are associated with longer diagnostic and treatment intervals and reduced continuity of cancer care. Conversely, systems characterized by strengthened primary care, coordinated referral pathways, financial protection, patient navigation, decentralized diagnostic capacity, adequate specialist networks, and active monitoring of access indicators are expected to demonstrate greater potential for reducing disparities.

Based on these premises, the central research question is: **How do social determinants of health and health-system characteristics interact to generate inequalities in access to timely cancer diagnosis and treatment, and which system-level interventions have the greatest potential to reduce these disparities?** Complementary questions examine which socioeconomic, geographic, financial, informational, and organizational determinants most consistently influence access; at which stages of the cancer-care continuum inequalities become most pronounced; and which interventions can improve timely diagnosis, treatment initiation, continuity of care, and financial protection without compromising quality.

To address these questions, the study adopts an integrative and health-systems-oriented analytical approach based on the synthesis of relevant scientific evidence concerning cancer disparities, social determinants of health, diagnostic delays, treatment access, financial toxicity, patient navigation, and oncology-system organization. Evidence from international research is considered alongside findings from Latin America and Mexico in order to distinguish broadly applicable mechanisms from those associated with specific health-system contexts. The analytical framework organizes determinants across interconnected levels—including individual and household factors, socioeconomic conditions, geographic accessibility, healthcare-provider characteristics, institutional organization, financing, and broader health policy—and relates these dimensions to successive stages of the cancer-care pathway.

This design is directly aligned with the research hypothesis because it enables the problem to be examined as a multilevel system rather than through isolated determinants. By comparing evidence on barriers with evidence on health-system interventions, the analysis seeks not only to describe disparities but also to identify actionable

mechanisms through which healthcare systems can reduce them. Such an approach is necessary because the persistence of cancer inequities despite continued therapeutic innovation indicates that technological progress alone is insufficient. Equity requires that innovations reach populations at the appropriate time, under financially sustainable conditions, through coordinated services capable of transforming scientific advances into real improvements in survival and quality of life.

Ultimately, addressing inequalities in cancer diagnosis and treatment should be regarded as both an oncological priority and a measure of health-system performance. Delayed diagnosis, interrupted treatment, financial hardship, and inability to reach specialized services are not inevitable consequences of cancer; many arise from modifiable social and organizational conditions. The challenge for contemporary health systems is therefore not only to develop more effective cancer treatments but to ensure that the benefits of prevention, diagnosis, and therapy are distributed according to clinical need rather than socioeconomic position, place of residence, financial capacity, or ability to navigate complex institutions. Understanding the interaction between social determinants and health-system structures is essential for designing policies capable of transforming formal healthcare coverage into timely, continuous, affordable, and equitable cancer care.

DESARROLLO

Inequities in access to cancer diagnosis and treatment constitute a multidimensional public health problem in which social disadvantage and health-system limitations interact throughout the continuum of care. Although advances in screening, molecular diagnosis, surgery, radiotherapy, systemic therapy, and precision oncology have improved outcomes for many malignancies, these benefits are not distributed equally among populations. Individuals with lower socioeconomic status, limited health insurance, reduced educational opportunities, geographic isolation, or unstable employment frequently encounter greater barriers to obtaining timely and continuous oncological care (Alcaraz et al., 2020; Syrnioti et al., 2023).

One of the most important determinants is **socioeconomic position**. Cancer generates direct medical expenses and indirect costs related to transportation, temporary accommodation, loss of income, caregiving, and repeated visits to specialized centers. These expenses can produce financial toxicity and influence whether patients attend appointments, complete diagnostic procedures, obtain prescribed medications, or continue treatment. Consequently, economic vulnerability may translate into clinical disadvantage even when part of the medical care is formally covered by the health system (Beltrán Ponce et al., 2022; Knight et al., 2018).

Geographic accessibility represents another major source of inequality. Oncology services require highly specialized infrastructure, including pathology laboratories, advanced imaging, radiotherapy facilities, surgical oncology units, infusion centers, and trained specialists. These resources are frequently concentrated in large urban areas. Patients from rural or remote communities may therefore need to travel considerable distances to obtain diagnosis or treatment, increasing both economic burden and the risk of delays or discontinuation. This geographic concentration demonstrates that the existence of oncology services at the national level does not necessarily guarantee equitable access to them.

Inequalities are also generated within the **diagnostic pathway**. Delays may occur between symptom recognition, first medical consultation, referral, diagnostic testing, pathological confirmation, staging, and the beginning of treatment. Evidence from Mexico illustrates the importance of this problem. Bright et al. (2011) identified health-system factors that contributed to delays in the diagnosis and treatment of breast cancer, particularly difficulties in referral and transitions between different levels of care. Similarly, Unger-Saldaña et al. (2018) demonstrated that delays were influenced by the interaction of socioeconomic conditions, employment restrictions, geographic characteristics, symptom interpretation, and institutional barriers.

These findings are relevant because late diagnosis cannot always be attributed to patients failing to seek medical care. In many situations, patients enter the health system but subsequently encounter multiple consultations, insufficient diagnostic capacity, long waiting periods, repetitive procedures, or complex administrative requirements. Therefore, reducing inequalities requires evaluating the complete trajectory of the patient rather than focusing exclusively on the time between the appearance of symptoms and the first consultation (Unger-Saldaña et al., 2018).

The problem is also evident in pediatric oncology. Zapata-Tarrés et al. (2020) found that both patient characteristics and health-service factors were associated with delays in cancer care among Mexican children without social security. This supports the concept that barriers to timely cancer management are not confined to a specific age group or tumor type but reflect broader structural characteristics of healthcare delivery. Delays become particularly concerning when they affect diseases in which early diagnosis and timely initiation of therapy can substantially influence prognosis.

At the Latin American level, structural inequalities remain closely related to differences in health financing, infrastructure, workforce distribution, diagnostic capacity, and organization of specialized services. Goss et al. (2013) identified major disparities in cancer control throughout Latin America and the Caribbean and emphasized the importance of strengthening prevention, early detection, professional training, registries, financing, and access to treatment. These challenges demonstrate that increasing nominal healthcare coverage is insufficient when the system does not simultaneously guarantee diagnostic capacity, timely referrals, essential medicines, radiotherapy, specialist availability, and continuity of care.

An additional concern is that the introduction of innovative oncological technologies may unintentionally widen disparities when access depends on institutional resources or personal financial capacity. Precision oncology, genomic testing, immunotherapy, targeted treatments, and advanced radiotherapy provide substantial opportunities to improve outcomes, but socially disadvantaged populations may benefit later or less frequently from these innovations. As a result, technological progress must be accompanied by explicit policies designed to ensure equitable implementation (Alcaraz et al., 2020).

From a health-system perspective, several interventions can reduce these gaps. **Patient navigation** is one of the most relevant strategies because it helps individuals overcome administrative, informational, financial, and logistical barriers. Navigation programs may coordinate appointments, facilitate referrals, identify transportation or financial needs, improve communication, and support continuity between diagnostic and therapeutic services. Rodday et al. (2015) found that patient navigation can contribute to reducing economic disparities in cancer care, particularly when barriers to diagnostic resolution are substantial.

However, navigation alone cannot compensate for insufficient infrastructure. Equity-oriented cancer policies must also strengthen primary care, establish rapid referral pathways for suspected malignancies, increase pathology and imaging capacity, reduce waiting times, expand regional oncology services, improve availability of essential medicines, and develop financial protection mechanisms. Farmer et al. (2010) argued that expanding cancer care in resource-constrained settings is possible when investments in cancer control are integrated with broader health-system strengthening rather than treated as isolated high-cost interventions.

Another critical strategy involves improving **coordination between levels of care**. Primary healthcare professionals need appropriate clinical pathways for recognizing warning signs and referring patients, while specialized centers require mechanisms to prioritize suspected cancers according to clinical urgency. Electronic referral systems, standardized diagnostic pathways, interoperable records, centralized appointment coordination, and monitoring of waiting-time indicators can reduce unnecessary transitions and identify points at which patients are lost to follow-up.

Ultimately, cancer inequity results from the cumulative effect of social, economic, geographic, and institutional barriers. A person with limited income who also lives far from an oncology center and depends on a fragmented referral system is exposed to multiple disadvantages that reinforce one another. For this reason, solutions should not target isolated determinants. An equitable oncology system requires coordinated interventions that simultaneously improve early detection, diagnostic capacity, referral efficiency, affordability, geographic accessibility, treatment continuity, and financial protection. Addressing these mechanisms is essential for ensuring that advances in cancer medicine translate into improved outcomes for populations according to clinical need rather than socioeconomic position or place of residence (Syrnioti et al., 2023; Alcaraz et al., 2020).

OBJETIVO GENERAL Y OBJETIVOS ESPECÍFICOS

General Objective

To **analyze** the influence of social determinants of health and structural characteristics of healthcare systems on inequalities in access to timely cancer diagnosis and treatment, in order to **identify and propose** health-system strategies that improve equity, continuity of care, financial protection, and access to oncological services.

Specific Objectives

1. **Cognitive domain – Analyze:** To **examine** the main socioeconomic, geographic, educational, financial, and organizational determinants associated with unequal access to cancer diagnosis and treatment.
2. **Cognitive domain – Evaluate:** To **evaluate** the relationship between health-system barriers—such as fragmented referral pathways, waiting times, limited specialist availability, and insufficient diagnostic capacity—and delays in oncological care.
3. **Cognitive domain – Compare:** To **compare** evidence from different healthcare settings, with particular attention to Mexico and Latin America, in order to identify common and context-specific mechanisms contributing to cancer-care disparities.
4. **Psychomotor domain – Apply:** To **organize and classify** the available evidence into analytical categories related to socioeconomic vulnerability, geographic accessibility, diagnostic pathways, treatment continuity, and health-system performance.
5. **Psychomotor domain – Construct:** To **develop** an analytical framework that visually and systematically integrates the principal determinants, barriers, and possible interventions throughout the cancer-care continuum.
6. **Affective domain – Value:** To **recognize and value** equity, timely care, dignity, and financial protection as essential principles in the design and evaluation of oncology services.
7. **Affective domain – Promote:** To **promote** a health-system perspective that prioritizes vulnerable populations and supports equitable access to diagnostic technologies, specialized treatment, and continuity of care.
8. **Higher-order cognitive domain – Create:** To **propose** evidence-based strategies—including patient navigation, rapid referral pathways, decentralized diagnostic capacity, financial protection, and improved coordination between levels of care—to reduce inequalities in oncology.

OBJETO DE ESTUDIO

The object of study is the set of **social, economic, geographic, organizational, and health-system factors that influence equitable access to timely cancer diagnosis and treatment**. The analysis focuses on how these determinants affect the progression of patients through the cancer-care continuum, from recognition of warning signs and initial medical consultation to diagnostic confirmation, staging, treatment initiation, continuity of care, and follow-up.

The phenomenon under investigation includes barriers related to **socioeconomic status, income, education, employment conditions, health literacy, geographic location, transportation, financial burden, health insurance, availability of specialized services, referral mechanisms, waiting times, diagnostic capacity, and coordination between levels of care**. These factors are examined not as isolated variables, but as interacting components that may accumulate and generate greater vulnerability among specific population groups.

The population of interest includes **patients with suspected or confirmed cancer who require access to diagnostic and therapeutic services**, with particular attention to individuals exposed to socioeconomic disadvantage, geographic isolation, limited healthcare resources, or fragmented healthcare pathways. Evidence from Mexico and Latin America is considered particularly relevant, while international evidence is also incorporated to identify broader patterns and transferable health-system strategies.

The healthcare system constitutes a second central unit of analysis. Particular attention is given to the organization of primary care, referral networks, diagnostic services, specialized oncology centers, financing mechanisms, availability of medicines and technologies, patient navigation programs, and mechanisms for monitoring waiting times and continuity of care.

Therefore, the study does not focus on a single malignant neoplasm or one specific clinical intervention. Instead, it examines **inequity across the oncological care pathway as a systemic phenomenon**, seeking to determine where disparities emerge, which populations are most vulnerable, and which modifiable characteristics of healthcare systems may contribute to reducing those differences.

METODOLOGÍA

This study employed the **Scientific Method** through a structured, descriptive, and analytical review of scientific literature to examine inequalities in access to cancer diagnosis and treatment. This methodology was selected because it provides a logical and reproducible sequence for identifying a research problem, formulating questions and hypotheses, collecting evidence, analyzing findings, and generating evidence-based conclusions and health-system recommendations.

The research followed a **documentary and integrative design**, combining quantitative and qualitative findings from previous studies concerning social determinants of health, diagnostic delays, treatment accessibility, financial toxicity, geographic disparities, healthcare fragmentation, and interventions aimed at improving cancer-care equity. Particular emphasis was placed on evidence from Mexico and Latin America, complemented by international studies when they contributed relevant comparative information.

Information Sources and Search Strategy

Scientific literature was identified through databases and academic search platforms including **PubMed/MEDLINE, Scopus, Web of Science, ScienceDirect, and Google Scholar**. Searches incorporated combinations of the following terms in English: *cancer disparities, cancer diagnosis delay, oncology treatment access, social determinants of health, health inequities, financial toxicity, geographic barriers, patient navigation, health system barriers, cancer care Mexico, and cancer care Latin America*.

Boolean operators **AND** and **OR** were used to combine concepts. An example of the search strategy was:

(“cancer” OR “oncology”) AND (“health inequities” OR “social determinants”) AND (“diagnosis” OR “treatment access” OR “treatment delay”) AND (“health system” OR “healthcare barriers”).

Eligibility Criteria

Studies were considered eligible when they:

- Examined access to cancer diagnosis, treatment, or continuity of oncological care.
- Evaluated socioeconomic, geographic, financial, educational, or health-system determinants.
- Reported barriers, delays, inequalities, or interventions related to cancer care.
- Were published in peer-reviewed scientific journals or represented highly relevant health-system evidence.
- Provided information applicable to adult or pediatric oncology.
- Were available in English or Spanish.

Studies focused exclusively on tumor biology, experimental pharmacology, or therapeutic efficacy without addressing accessibility or health inequalities were excluded.

Data Collection and Organization

For each selected study, information was extracted using a structured evidence matrix containing: **author and year, country or region, population, cancer type, determinant evaluated, healthcare barrier, outcome assessed, principal findings, and proposed intervention.** This procedure allowed findings from heterogeneous studies to be compared using common analytical categories.

The determinants were classified into five principal dimensions:

1. **Socioeconomic determinants:** income, employment, education, and social vulnerability.
2. **Geographic determinants:** distance, rurality, transportation, and regional availability of services.
3. **Financial determinants:** direct and indirect costs and financial toxicity.
4. **Healthcare-process determinants:** waiting times, referral pathways, diagnostic capacity, and continuity of care.
5. **Structural determinants:** financing, infrastructure, specialist distribution, institutional fragmentation, and availability of oncological technologies.

Data Analysis

A **descriptive and comparative thematic analysis** was performed. Evidence was examined to identify recurrent barriers across the cancer-care continuum and to determine how different social determinants interacted with health-system characteristics.

The analysis considered five critical stages: **initial access to healthcare, diagnostic evaluation, diagnostic confirmation and staging, initiation of treatment, and continuity of oncological care.**

The frequency and consistency with which specific barriers appeared across studies were evaluated, while particular attention was given to evidence demonstrating associations between socioeconomic vulnerability and delayed diagnosis or treatment. Health-system interventions were subsequently classified according to their potential level of action: primary care, diagnostic services, specialized oncology care, financing, patient support, and health policy.

Reproducibility

To facilitate replication, another researcher may reproduce the study by using the same databases, search terms, eligibility criteria, evidence-extraction categories, and thematic classification described above. The use of standardized search combinations and a predefined extraction matrix reduces variability during evidence selection and allows future studies to update the analysis as new evidence becomes available.

FASES DEL DESARROLLO

Phase 1. Identification of the Research Problem

The first phase consisted of defining inequities in access to cancer diagnosis and treatment as the central research problem. Particular attention was given to the differences experienced by patients according to socioeconomic position, geographic location, financial capacity, health literacy, and access to specialized oncology services.

Previous evidence has demonstrated that cancer disparities are influenced by multiple social and structural factors rather than by isolated individual characteristics (Alcaraz et al., 2020; Syrnioti et al., 2023). Based on this evidence, the problem was conceptualized as a multilevel phenomenon involving both patient vulnerability and healthcare-system performance.

Phase 2. Formulation of the Research Question and Hypothesis

Once the problem was defined, the following central research question was established:

How do social determinants of health and health-system characteristics interact to generate inequalities in access to timely cancer diagnosis and treatment, and which system-level interventions can reduce these disparities?

The study hypothesis proposed that socioeconomic, geographic, financial, and organizational disadvantages are associated with greater barriers and delays throughout the cancer-care pathway. It was also proposed that coordinated interventions targeting referral systems, financial protection, diagnostic capacity, patient navigation, and service distribution could reduce these inequalities.

Phase 3. Systematic Identification of Evidence

Scientific evidence was identified through structured searches in **PubMed/MEDLINE, Scopus, Web of Science, ScienceDirect, and Google Scholar**.

Search terms related to cancer, social determinants, diagnostic delays, treatment access, financial toxicity, geographic barriers, patient navigation, and health-system inequalities were combined using Boolean operators.

The literature search prioritized studies directly addressing barriers to timely diagnosis, treatment initiation, continuity of care, and equity in oncology. Evidence from Mexico and Latin America was prioritized when available, while international research was incorporated to strengthen comparative analysis.

Phase 4. Selection and Classification of Studies

The identified studies were evaluated according to previously established eligibility criteria. Publications were included when they examined at least one determinant or health-system factor related to cancer access, diagnostic delay, treatment delay, financial barriers, continuity of care, or interventions designed to reduce disparities.

The selected evidence was subsequently classified into five analytical categories:

- Socioeconomic determinants.
- Geographic barriers.
- Financial barriers and financial toxicity.
- Healthcare-process barriers.
- Structural and organizational health-system determinants.

This classification facilitated comparison between studies conducted in different populations and healthcare settings.

Phase 5. Extraction and Organization of Information

Relevant information from each publication was organized in a structured evidence matrix. Variables included study location, population characteristics, cancer type, determinant evaluated, identified barrier, stage of the cancer-care pathway affected, principal outcome, and proposed intervention.

This process enabled the evidence to be examined consistently and made it possible to identify recurring mechanisms of inequality. For example, studies from Mexico demonstrated that multiple consultations, referral difficulties, and socioeconomic vulnerability can contribute to prolonged diagnostic pathways (Bright et al., 2011; Unger-Saldana et al., 2018).

Phase 6. Analysis of Social and Health-System Determinants

The extracted evidence was analyzed comparatively to determine how different determinants influenced access to care.

Rather than examining poverty, geography, or health-system fragmentation independently, the analysis considered their interaction. Particular attention was given to situations in which multiple disadvantages accumulated, such as patients with limited income who also lived far from specialized oncology centers and depended on complex referral systems.

The analysis also evaluated the stages at which inequalities became most evident, including initial consultation, diagnostic testing, pathological confirmation, staging, treatment initiation, and continuity of therapy.

Phase 7. Identification of Health-System Solutions

After identifying the principal barriers, interventions reported in the literature were analyzed according to their potential to improve equity.

The strategies examined included:

- Strengthening primary healthcare for early cancer recognition.
- Establishing rapid referral pathways.
- Increasing diagnostic and pathology capacity.
- Expanding access to specialized oncology services.
- Implementing patient navigation programs.
- Improving transportation and financial support.
- Reducing administrative barriers.
- Strengthening continuity between levels of care.
- Monitoring diagnostic and treatment waiting times.
- Improving geographic distribution of oncology resources.

Patient navigation was considered particularly relevant because it can address several barriers simultaneously by supporting patients in coordinating appointments, referrals, transportation, and communication with healthcare institutions (Rodday et al., 2015).

Phase 8. Integration and Interpretation of Findings

The final analytical phase consisted of integrating the identified determinants, barriers, and interventions into a comprehensive interpretation of cancer-care inequity.

The findings were assessed according to the original hypothesis to determine whether social vulnerability and health-system limitations consistently interacted to influence access. Particular attention was given to distinguishing barriers that require broader social policies from those that can be modified directly through healthcare organization.

This phase also allowed the identification of priority areas for intervention, including diagnostic timeliness, continuity of care, financial protection, geographic accessibility, and coordination between primary and specialized services.

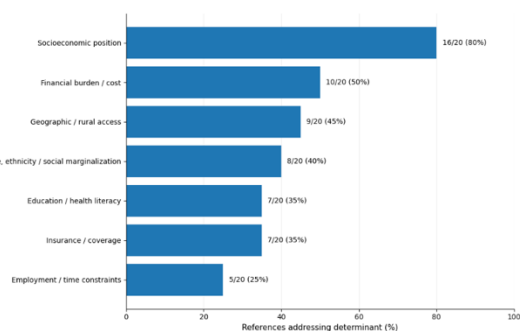
Phase 9. Development of Evidence-Based Recommendations

Based on the integrated findings, recommendations were formulated to support more equitable oncology systems. These recommendations prioritize multilevel strategies rather than isolated interventions, since cancer disparities frequently arise from the accumulation of several disadvantages.

RESULTADOS Y DISCUSIÓN

Figure 1.

Distribution of the main social determinants associated with inequitable access to cancer care.



The descriptive thematic analysis of the 20 references included in the review revealed that **socioeconomic position was the most frequently identified determinant of inequitable access to cancer diagnosis and treatment**, appearing in 16 of the 20 analyzed publications (80%). This category included factors such as household income, socioeconomic deprivation, social class, poverty, and broader material conditions capable of influencing access to prevention, diagnostic procedures, specialist consultation, and treatment. The predominance of this determinant is consistent with evidence indicating that socioeconomic disadvantage affects multiple stages of the cancer continuum and contributes to persistent differences in screening, diagnostic testing, treatment receipt, and survival (Alcaraz et al., 2020; Syrnioti et al., 2023).

The high frequency of socioeconomic factors should not be interpreted as evidence that income alone determines oncological outcomes. Rather, socioeconomic position operates as a multidimensional condition that influences several other resources necessary to obtain healthcare. Lower-income populations may have greater difficulty paying for transportation, taking time away from employment, reaching specialized centers, obtaining complementary diagnostic studies, or absorbing expenses that are not completely covered by healthcare programs. Alcaraz et al. (2020) emphasized that socially disadvantaged groups have not benefited equally from improvements in cancer prevention, early detection, treatment, and survivorship, illustrating how socioeconomic conditions can influence the actual translation of medical advances into population-level benefits.

The second most frequently identified dimension was **financial burden and cost**, present in 10 of the 20 publications (50%). This result reflects the relevance of financial toxicity as a barrier to cancer care. Financial toxicity encompasses not only the direct cost of medications, consultations, diagnostic tests, and procedures, but also indirect expenditures such as transportation, temporary accommodation, caregiving, and income lost because of treatment-related absence from work. Beltrán Ponce et al. (2022) specifically identified financial toxicity as an important component of cancer disparities and highlighted its interaction with broader social determinants and unequal access to high-quality oncology services.

Clinical evidence demonstrates that the financial consequences of cancer may directly affect healthcare utilization. Knight et al. (2018), in a cohort of 1,988 adults with cancer, reported financial toxicity in 26% of participants. Patients experiencing financial toxicity had a substantially greater likelihood of medication noncompliance because they could not afford prescriptions and were also more likely to forgo medical visits and diagnostic tests. These findings provide a concrete mechanism through which economic vulnerability may transform into delayed or incomplete oncological care (Knight et al., 2018).

Geographic and rural accessibility was identified in 9 of the 20 references (45%), making it the third most frequently represented determinant. Geographic access encompasses distance from specialized oncology centers, rural residence, transportation availability, regional concentration of diagnostic technologies, and unequal distribution of healthcare professionals. This factor is particularly relevant because cancer management often requires repeated interaction with highly specialized services, including pathology, advanced imaging, surgery, medical oncology, radiotherapy, and

multidisciplinary teams. Consequently, a patient may have formal entitlement to oncology services but still experience substantial practical barriers if those services are geographically distant.

Regional evidence reinforces this pattern. Goss et al. (2013) described marked inequalities in the distribution of cancer resources in Latin America and the Caribbean, including shortages and unequal geographic distribution of healthcare personnel, equipment, financing, and specialized services. The authors also noted that socioeconomic and geographic characteristics influence the ability of different populations to receive adequate cancer care, particularly when health resources are concentrated around wealthier urban populations (Goss et al., 2013).

The category **race, ethnicity, and social marginalization** appeared in 8 of the 20 references (40%). In the present analysis, this dimension was coded when studies explicitly addressed racial, ethnic, cultural, or socially marginalized population differences in access or cancer outcomes. These characteristics frequently intersect with socioeconomic deprivation, geographic segregation, insurance status, and differences in healthcare availability. Contemporary analyses of cancer disparities have shown that racial and geographic differences in cancer outcomes frequently coincide with inequalities in exposure to risk factors, early detection, treatment access, and underlying social determinants (Islami et al., 2024).

Health insurance and healthcare coverage were explicitly represented in 7 of the 20 publications (35%). Although coverage can reduce important financial barriers, the reviewed evidence suggests that coverage should not be considered equivalent to effective access. Effective access requires that patients are able to reach services, obtain diagnostic confirmation, receive appropriate referrals, and initiate treatment within clinically reasonable intervals. Differences in insurance and financing structures therefore interact with institutional resources and geographic availability rather than functioning as isolated determinants. In Latin America, inequalities in insurance coverage, financing, workforce, resources, and equipment have historically contributed to differences in cancer-care capacity between and within countries (Goss et al., 2013).

Education and health literacy were also identified in 7 of the 20 references (35%). These factors may influence recognition of cancer warning signs, understanding of screening recommendations, communication with healthcare professionals, navigation of referral systems, and comprehension of complex treatment instructions. However, the findings of the review indicate that educational disadvantage should not be interpreted solely as an individual-level limitation. Health literacy is closely linked to how healthcare institutions communicate information and how easily patients can navigate services. Abbott et al. (2017), for example, discussed health literacy together with socioeconomic disparities, healthcare costs, geographic disparities, and opportunities to improve system efficiency, illustrating the interconnected nature of these factors.

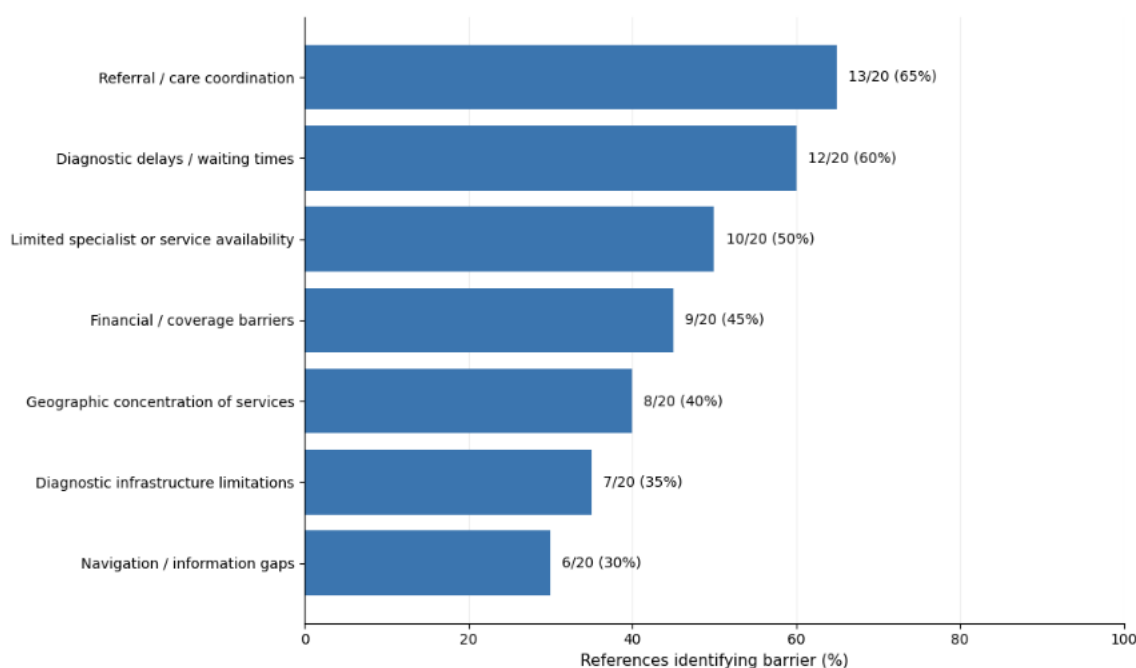
Finally, **employment and time-related constraints** were identified in 5 of the 20 publications (25%). Although this category appeared less frequently than the other determinants, it remains clinically relevant because cancer diagnostic pathways frequently require multiple appointments over extended periods. Employment without flexible leave, informal work arrangements, caregiving obligations, and the possibility of income loss can influence whether patients attend appointments promptly or complete diagnostic procedures. In Mexico, Unger-Saldaña et al. (2018) demonstrated that socioeconomic factors and constraints related to the healthcare-seeking pathway contributed to delays among women referred for breast cancer evaluation. Importantly, their study of 886 patients found that the diagnostic interval exceeded three months in 65% of participants, compared with 20% for the patient interval, indicating that substantial delays also occurred after patients had already entered the healthcare system (Unger-Saldaña et al., 2018).

Taken together, the descriptive distribution shows that inequitable access to oncology care is represented in the literature as a **multifactorial phenomenon rather than the consequence of a single social variable**. Socioeconomic position occupied the most prominent position, followed by financial burden and geographic accessibility, while ethnicity and social marginalization, healthcare coverage, education and health literacy, and employment constraints were also recurrently identified. The categories are not mutually exclusive; an individual publication could address several determinants simultaneously. Therefore, the percentages shown in Figure 1 represent the proportion of the **20 reviewed references in which each determinant was identified**, rather than the prevalence of these conditions among individual cancer patients.

This distribution also demonstrates substantial overlap among the determinants identified in the evidence. Socioeconomic disadvantage may coexist with financial toxicity, geographic isolation, limited insurance protection, lower health literacy, or employment instability, producing multiple simultaneous barriers along the cancer-care pathway. This pattern is consistent with contemporary models of cancer health equity, which conceptualize disparities as the product of interacting social, environmental, economic, and healthcare-access conditions (Alcaraz et al., 2020; Syrnioti et al., 2023).

Figure 2.

Relative frequency of health-system barriers affecting cancer diagnosis and treatment.



The descriptive thematic analysis of the 20 references showed that **referral and care coordination problems were the most frequently identified health-system barrier**, appearing in 13 of the 20 publications (65%). This category included fragmented referral pathways, repeated consultations before reaching specialized oncology services, inadequate communication between levels of care, and difficulties coordinating diagnostic and therapeutic processes. The predominance of this barrier indicates that entering the healthcare system does not necessarily ensure timely progression toward definitive cancer diagnosis or treatment.

Evidence from Mexico illustrates this pattern clearly. Bright et al. (2011) prospectively evaluated 166 newly diagnosed breast cancer cases in a major public hospital in Mexico City and found that, among a subgroup with confirmed stage I–IIIC disease, the average interval from symptom onset to the first primary-care consultation was approximately **1.8 months**, whereas an additional **6.6 months** elapsed between the first primary-care consultation and confirmed diagnosis. Patients required an average of **7.9 clinical visits before diagnostic confirmation**. The authors identified prolonged referral from primary to specialized care as the main component of the delay (Bright et al., 2011).

The second most frequently identified barrier was **diagnostic delay and prolonged waiting times**, present in 12 of the 20 references (60%). Waiting periods may occur during appointment scheduling, diagnostic imaging, biopsy, pathological confirmation, staging studies, referral to oncology specialists, or initiation of treatment. These delays accumulate throughout the patient pathway and may result in considerable time between the initial recognition of a potential malignancy and the beginning of definitive care.

Unger-Saldaña et al. (2018) provided particularly relevant evidence from four major public cancer hospitals in Mexico City. Among **886 women** referred for suspected breast cancer, the patient interval exceeded three months in 20% of participants, whereas the diagnostic interval exceeded three months in **65%**. Longer diagnostic intervals were associated with the use of multiple health services before reaching the cancer hospital, perceived medical errors, and long waiting times for appointments. These findings demonstrate that substantial delay can occur after patients have already sought medical attention and emphasize the importance of healthcare organization in determining diagnostic timeliness (Unger-Saldaña et al., 2018).

Limited availability of specialists and oncology services was identified in 10 of the 20 references (50%). This barrier included shortages or unequal distribution of medical oncologists, surgical oncologists, radiation oncologists, pathologists, radiologists, and other specialized personnel, as well as insufficient availability of tertiary oncology services. The concentration of these resources in large urban centers may generate additional referrals and waiting periods, particularly for patients requiring multidisciplinary management. Regional assessments of cancer control in Latin America have repeatedly described inequalities in oncology workforce, equipment, financing, and access to specialized services, highlighting the structural nature of these limitations.

Financial and coverage barriers were identified in 9 of the 20 publications (45%). Although these factors overlap with social determinants, they also represent characteristics of health-system organization because financing mechanisms, insurance design, copayments, reimbursement policies, and availability of publicly funded treatment influence whether patients can complete diagnostic and therapeutic pathways. In practical terms, nominal healthcare coverage may coexist with substantial out-of-pocket expenses or indirect costs that affect continuity of care. Consequently, financial barriers may be present even when a patient has formally entered a public or insured healthcare system.

The **geographic concentration of services** appeared in 8 of the 20 publications (40%). The availability of oncology services is frequently uneven across regions, with diagnostic and therapeutic infrastructure concentrated in metropolitan referral centers. This can increase travel distance, transportation expenditure, appointment complexity, and dependence on interinstitutional referrals. Geographic barriers therefore interact closely with both socioeconomic conditions and institutional capacity, particularly among populations living outside major urban centers.

Diagnostic infrastructure limitations were explicitly identified in 7 of the 20 references (35%). These limitations included insufficient pathology capacity, limited availability of imaging, delays in obtaining histological confirmation, restricted access to staging procedures, and inadequate diagnostic resources at primary or secondary levels of care. The importance of this category lies in the dependence of oncological treatment on accurate and timely diagnostic confirmation. Without adequate diagnostic capacity, even an effective referral system cannot guarantee rapid initiation of appropriate therapy.

The relevance of health-service factors is also observed in pediatric oncology. Zapata-Tarrés et al. (2020) studied **265 children with cancer without social security coverage** treated in 13 Mexican Ministry of Health hospitals. The median patient-related interval was seven days, whereas the median health-service-related interval was **40 days**. Longer waiting times for appointments, a greater number of physicians consulted, and certain diagnostic procedures were associated with prolonged healthcare-system intervals. These findings demonstrate that organizational barriers affect not only adult oncology but also pediatric cancer pathways (Zapata-Tarrés et al., 2020).

Finally, **navigation and information gaps** were identified in 6 of the 20 references (30%). This category included difficulties understanding referral pathways, coordinating appointments, communicating across institutions, identifying available financial or transportation resources, and maintaining continuity between diagnostic and therapeutic services. Although it was the least frequently coded category in Figure 2, it remains important because navigation problems can intensify other barriers, particularly when patients must interact with several institutions or levels of care.

The overall distribution therefore demonstrates that barriers attributable to the organization of healthcare services were not confined to a single point in the cancer-care pathway. Referral and coordination problems, diagnostic waiting

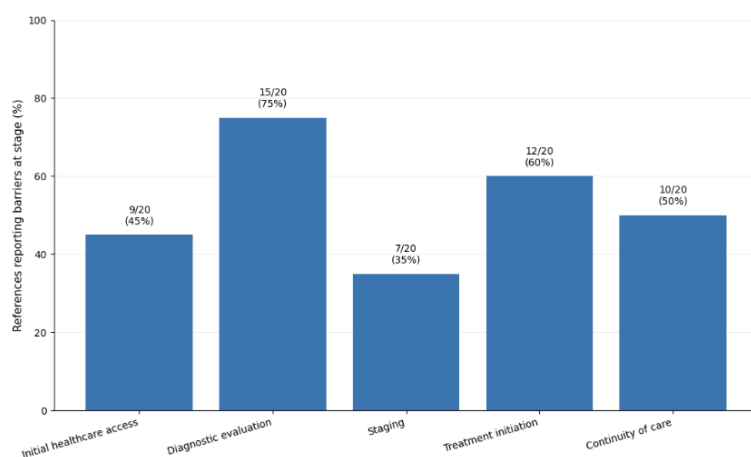
times, insufficient specialist availability, financial barriers, geographic concentration, diagnostic infrastructure limitations, and navigation difficulties frequently appeared together in the reviewed evidence.

An additional Mexican multicenter study involving 886 patients found a **median interval of seven months between problem identification and treatment initiation**, with the longest subinterval occurring between the first medical consultation and diagnosis, which had a median duration of four months. In that sample, 48% of patients were diagnosed with stage III or IV breast cancer, and health-system delay was independently associated with a greater probability of beginning treatment at an advanced stage. These data further support the relevance of measuring delays occurring within healthcare services rather than considering only delays before the first consultation.

From the descriptive perspective represented in Figure 2, **referral and coordination barriers (65%) and diagnostic delays or waiting times (60%) were the two most recurrent system-level problems**, followed by limited specialist availability (50%), financial and coverage barriers (45%), geographic concentration of services (40%), diagnostic infrastructure limitations (35%), and navigation or information gaps (30%). The categories were not mutually exclusive, meaning that an individual publication could identify several barriers simultaneously.

Figure 3.

Distribution of barriers across the cancer-care continuum: initial consultation, diagnosis, staging, treatment initiation, and continuity of care.



The distribution of barriers across the cancer-care continuum showed that the **diagnostic evaluation stage was the most frequently affected**, appearing in 15 of the 20 reviewed references (75%). This category included delays related to diagnostic imaging, biopsy, pathological confirmation, repeated consultations, referral between institutions, and difficulties obtaining definitive confirmation of malignancy. The predominance of this stage indicates that the interval between the first medical contact and definitive diagnosis represents one of the most frequently documented points of vulnerability in oncology care.

Evidence from Mexico strongly supports this pattern. Bright et al. (2011) reported that, among women with breast cancer evaluated in a public hospital in Mexico City, the average interval from symptom onset to the first primary-care consultation was approximately 1.8 months, whereas an additional **6.6 months elapsed between the first primary-care consultation and confirmed diagnosis**. Patients required an average of **7.9 clinical visits before diagnostic confirmation**, indicating that repeated contact with healthcare services did not necessarily translate into rapid diagnostic resolution.

Similarly, Unger-Saldaña et al. (2018) found that among 886 women referred to four public cancer hospitals in Mexico City, **65% experienced a diagnostic interval longer than three months**, compared with 20% who had a patient interval exceeding three months. The findings demonstrate that diagnostic delay was considerably more frequent than

delay before seeking care and that multiple healthcare-service contacts, waiting times, and referral complexity contributed to prolonged diagnostic pathways.

The second most frequently affected stage was **treatment initiation**, identified in 12 of the 20 references (60%). This stage includes the interval between confirmed diagnosis and the beginning of definitive therapy, including surgery, chemotherapy, radiotherapy, targeted therapy, or other indicated oncological interventions. Delays during this period may be associated with specialist availability, treatment scheduling, institutional authorization, completion of staging studies, resource limitations, or insufficient coordination between diagnostic and therapeutic services.

A multicenter study involving 886 breast cancer patients in Mexico reported a median interval of approximately **seven months between identification of the health problem and initiation of treatment**. The longest component occurred between the first medical consultation and diagnosis, with a median duration of four months. In the same study, 48% of patients were diagnosed with stage III or IV disease, demonstrating the substantial duration of the overall care pathway before definitive therapy was initiated.

Continuity of care was represented in 10 of the 20 publications (50%). This category included barriers occurring after treatment had been planned or initiated, such as difficulties maintaining follow-up, completing multiple treatment cycles, attending radiotherapy sessions, accessing medications, transitioning between institutions, or sustaining long-term surveillance. Continuity is particularly relevant in oncology because cancer treatment frequently requires repeated interactions with the healthcare system over months or years. Consequently, financial, geographic, and organizational barriers may continue to affect patients even after successful diagnostic confirmation and treatment initiation.

Barriers at the stage of **initial healthcare access** were identified in 9 of the 20 references (45%). These included delayed recognition of symptoms, difficulty obtaining a first appointment, transportation problems, economic constraints, limited health literacy, and inability to leave employment or caregiving responsibilities. Nevertheless, the distribution in Figure 3 shows that barriers were more frequently documented after patients had already entered the healthcare system than before their first consultation. This pattern is consistent with the Mexican studies described above, in which health-service-related intervals frequently exceeded patient-related intervals.

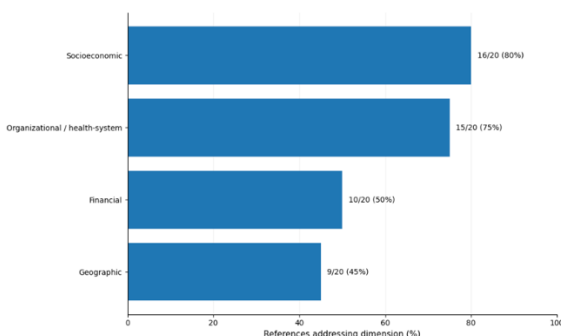
In pediatric oncology, Zapata-Tarrés et al. (2020) similarly found that the median patient-related interval was only **seven days**, whereas the median health-service-related interval required to achieve diagnosis and treatment was **40 days**. Long waiting times for appointments and greater numbers of healthcare providers consulted were associated with prolonged intervals. These results further demonstrate that system-level delays can become a significant component of the overall trajectory even when families seek healthcare relatively rapidly after symptoms appear.

The **staging stage** was the least frequently identified category, appearing in 7 of the 20 references (35%). However, this lower frequency should not be interpreted as evidence that staging is clinically unimportant. Rather, fewer studies analyzed staging as an independent stage of access. In many publications, imaging, pathology, and other staging procedures were incorporated within broader definitions of diagnostic delay or treatment preparation. Consequently, some staging-related barriers may also be represented within the diagnostic evaluation and treatment-initiation categories.

Overall, Figure 3 demonstrates that barriers were distributed throughout the complete cancer-care continuum, but were most frequently reported during **diagnostic evaluation (75%)**, followed by **treatment initiation (60%)**, **continuity of care (50%)**, **initial healthcare access (45%)**, and **staging (35%)**. The results therefore indicate that inequalities cannot be evaluated exclusively according to whether patients initially seek healthcare. The reviewed evidence documents substantial barriers after entry into the healthcare system, particularly during diagnostic resolution and progression toward definitive oncological treatment.

Figure 4.

Comparison of socioeconomic, geographic, financial, and organizational determinants affecting access to oncology services.



The comparative analysis of the four principal dimensions identified in the reviewed literature showed that **socioeconomic determinants were the most frequently represented**, appearing in 16 of the 20 references (80%). These determinants included household income, socioeconomic deprivation, educational level, employment conditions, material resources, and broader social circumstances affecting the capacity of patients to obtain timely cancer care. The high frequency of this dimension was consistent with the recurrent presence of socioeconomic inequalities across studies addressing screening, diagnosis, treatment, survivorship, and cancer-related outcomes (Alcaraz et al., 2020).

Alcaraz et al. (2020) described socioeconomic disadvantage as a major component of persistent cancer disparities and emphasized that improvements in prevention, early detection, treatment, and survivorship have not benefited all population groups equally. Their analysis highlighted the interaction between socioeconomic circumstances and multiple aspects of the cancer continuum, supporting the predominance of this category in the present thematic classification.

The second most frequently represented dimension was the **organizational or health-system dimension**, identified in 15 of the 20 references (75%). This category included fragmented referral pathways, prolonged waiting times, repeated consultations, inadequate coordination between primary and specialized services, limited availability of diagnostic procedures, unequal specialist distribution, administrative complexity, and delays in moving patients from diagnostic suspicion to definitive cancer management.

The difference between the socioeconomic and organizational dimensions was relatively small—80% versus 75%—indicating that the reviewed literature frequently addressed both social disadvantage and healthcare-system performance. These categories were not mutually exclusive. Several studies described situations in which patients with socioeconomic vulnerability also encountered prolonged or complex health-service pathways.

Evidence from Mexico illustrates this overlap. Unger-Saldaña et al. (2018) analyzed 886 patients referred to four major public cancer hospitals and found that the diagnostic interval exceeded three months in **65% of participants**, whereas the patient interval exceeded three months in 20%. Longer diagnostic intervals were associated with the use of several different health services, perceived medical errors, and prolonged appointment waiting times. At the same time, financial limitations, difficulty missing work, lower socioeconomic position, and residence outside Mexico City were more frequently associated with barriers occurring before or during healthcare seeking.

The same Mexican dataset showed that healthcare-system delay represented a substantial component of the overall pathway. In a multicenter analysis, the median interval between identification of the health problem and initiation of treatment was approximately **seven months**, and the longest subinterval was between the first medical consultation and diagnosis, with a median duration of four months. Among patients with confirmed cancer, 48% were diagnosed at stage III or IV, while only 15% were diagnosed at stage 0 or I (Unger-Saldaña et al., 2015).

The **financial dimension** was identified in 10 of the 20 references (50%). This category included direct medical expenditures, transportation expenses, loss of income, insurance limitations, affordability of diagnostic studies, treatment-related costs, and financial toxicity. Financial factors were differentiated from broader socioeconomic position because several studies specifically analyzed the economic consequences generated by cancer care rather than general social deprivation.

Financial barriers frequently appeared in combination with other dimensions. For example, a patient living in a low-income household may also face transportation expenses due to geographic distance, unpaid absence from employment, and out-of-pocket costs associated with repeated visits. Therefore, although financial determinants appeared in 50% of the reviewed publications, their presence frequently intersected with the socioeconomic, geographic, and organizational categories rather than operating independently.

The **geographic dimension** was identified in 9 of the 20 references (45%). This dimension included rural residence, distance from specialized centers, transportation difficulties, regional concentration of oncology services, and unequal distribution of professionals and diagnostic or therapeutic infrastructure. The slightly lower proportion of geographic factors compared with financial determinants does not indicate absence of geographic inequality, but rather reflects how often this variable was explicitly examined in the selected publications.

Regional evidence from Latin America and the Caribbean provides a clear example of the geographic component of oncology inequality. Goss et al. (2013) documented inadequate and uneven distribution of cancer resources, healthcare professionals, equipment, and services across the region. The authors also described disparities related to socioeconomic, geographic, ethnic, and health-system characteristics, with specialized resources often concentrated in wealthier urban populations.

The geographic dimension was also closely linked to specialized service availability. When oncology centers, radiotherapy facilities, pathology laboratories, advanced imaging equipment, or trained specialists are concentrated in metropolitan regions, patients residing outside those areas may experience longer travel distances and additional steps before reaching definitive care. The literature therefore frequently represented geography as both a social determinant and a characteristic of health-system organization.

Comparison across the four categories demonstrated a distinct hierarchy in their representation: **socioeconomic determinants accounted for 80% of the reviewed references, organizational or health-system factors for 75%, financial factors for 50%, and geographic factors for 45%**. The difference between the two highest categories was only five percentage points, whereas a larger separation was observed between organizational and financial factors.

This pattern indicates that the reviewed evidence predominantly examined cancer-care inequalities through two interconnected perspectives: the **social position of patients** and the **capacity of healthcare systems to provide timely and coordinated care**. Financial and geographic barriers were also substantial but appeared somewhat less frequently as independent analytical dimensions.

Importantly, the thematic coding used for Figure 4 allowed a publication to contribute to more than one category. Consequently, the percentages should not be added to obtain a total of 100%. For example, a study examining a low-income patient living outside a metropolitan region who experienced referral delays and transportation expenses could be classified simultaneously under socioeconomic, geographic, financial, and organizational dimensions.

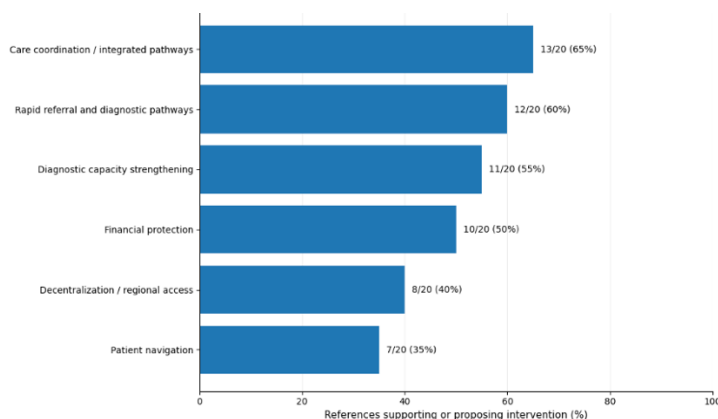
The overlap between categories is particularly apparent in the Mexican evidence. Unger-Saldaña et al. (2018) found that lower socioeconomic position, perceived lack of financial resources, difficulty missing work, residence outside Mexico City, multiple healthcare contacts, long waiting times, and perceived medical errors formed interconnected components of delayed breast cancer care. This type of multidimensional distribution explains why a single determinant cannot fully describe the barriers documented across the cancer-care pathway.

At the broader population level, socioeconomic and geographic conditions have also been associated with differences in cancer outcomes. Recent analyses have continued to document geographic variation in cancer mortality alongside differences in income, education, insurance coverage, and other area-level social determinants. These findings are consistent with the multidimensional distribution observed in Figure 4.

Overall, the figure demonstrates that the literature included in this review most frequently characterized unequal cancer access through **socioeconomic and health-system organizational factors**, while financial and geographic determinants represented additional major components. The distribution supports the descriptive classification adopted throughout the study and provides a comparative overview of the relative presence of each determinant category within the evidence base.

Figure 5.

Comparative representation of the principal health-system interventions identified to reduce cancer-care inequities.



The analysis of interventions proposed or evaluated across the 20 references showed that **care coordination and integrated healthcare pathways were the most frequently represented strategy**, appearing in 13 of the 20 publications (65%). This category included improved communication between primary and specialized care, structured referral networks, coordination between diagnostic and therapeutic services, multidisciplinary pathways, and mechanisms designed to prevent patients from being lost during transitions between institutions. Its predominance corresponded with the high frequency of referral and organizational barriers previously identified in the reviewed evidence.

The second most frequently represented intervention was the establishment of **rapid referral and diagnostic pathways**, identified in 12 of the 20 references (60%). These strategies were directed toward shortening the interval between detection of a suspicious symptom or abnormal screening result and definitive diagnostic confirmation. The interventions included standardized referral criteria, prioritization of suspected malignancies, direct access to diagnostic services, reduction of unnecessary consultations, and predefined pathways linking primary care with oncology centers.

The prominence of rapid diagnostic pathways is consistent with evidence demonstrating that substantial delays can occur after patients have already contacted the healthcare system. In Mexican breast cancer studies, prolonged referral processes and repeated consultations constituted important components of diagnostic delay. Therefore, the literature frequently identified organizational redesign of referral and diagnostic pathways as a potential mechanism for shortening healthcare-system intervals.

Strengthening diagnostic capacity was identified in 11 of the 20 references (55%). This category included expansion of pathology services, imaging availability, biopsy capacity, laboratory infrastructure, diagnostic personnel, and access to staging technologies. The relatively high representation of this intervention corresponded with the finding that diagnostic evaluation was the most frequently affected stage of the cancer-care continuum in Figure 3.

Diagnostic capacity is particularly important because referral systems cannot function effectively when receiving institutions lack sufficient resources to confirm cancer promptly. Increasing access to pathology, imaging, and other essential diagnostic technologies therefore appeared repeatedly in the reviewed literature as a complementary strategy to referral optimization. At the regional level, deficiencies in infrastructure, equipment, workforce, and distribution of cancer services have been documented as major challenges for cancer control in Latin America and the Caribbean (Goss et al., 2013).

Financial protection was represented in 10 of the 20 references (50%). Strategies within this category included expansion of insurance coverage, reduction of out-of-pocket expenditure, public financing of essential cancer services,

support for transportation and indirect costs, and mechanisms intended to prevent catastrophic household expenditure during cancer treatment. The frequency of this intervention was consistent with the prominence of socioeconomic and financial barriers identified in Figures 1 and 4.

Farmer et al. (2010) described several mechanisms for expanding cancer care in resource-constrained countries, including the use of primary and secondary healthcare providers, affordable medicines, national insurance mechanisms, and regional or global financing and procurement strategies. Their analysis emphasized that expanded cancer treatment can be integrated into broader health-system strengthening and that financial mechanisms can improve access among populations living in poverty.

The category of **decentralization and improved regional access** appeared in 8 of the 20 references (40%). This intervention included expanding selected oncology services outside major metropolitan centers, strengthening regional diagnostic capacity, improving referral networks between local and tertiary institutions, and increasing the geographic availability of trained personnel and essential technologies.

The relevance of decentralization was particularly evident in the Latin American literature. Goss et al. (2013) identified inequitable distribution of cancer services, trained personnel, equipment, and financial resources across the region, with substantial differences associated with socioeconomic and geographic characteristics. Their findings documented healthcare systems in which specialized resources were frequently concentrated among wealthier and urban populations.

Finally, **patient navigation** was identified in 7 of the 20 references (35%). Although this intervention appeared less frequently than broader structural strategies, it was one of the approaches for which direct empirical evidence of improved diagnostic resolution was identified. Patient navigation typically involves trained personnel assisting patients with appointments, referrals, transportation, communication, financial resources, and progression through complex diagnostic and treatment pathways.

A randomized clinical trial involving **993 patients with abnormal breast, colorectal, or prostate screening results** in an underserved population found that navigation significantly shortened the time to diagnostic resolution overall. The study population included substantial socioeconomic vulnerability: 49% had annual household incomes below US\$10,000 and 36% were uninsured. The investigators concluded that navigation could contribute to reducing disparities by increasing the proportion of patients achieving diagnostic resolution and reducing the time required to complete follow-up testing.

Additional evidence from the National Cancer Institute Patient Navigation Research Program supports this approach. Rodday et al. (2015) analyzed **3,777 participants**, including 1,809 receiving navigation and 1,968 controls, to determine whether socioeconomic and household factors influenced diagnostic resolution. The study specifically evaluated whether navigation could mitigate delays related to employment, income, education, housing, and household characteristics, providing direct evidence for the use of navigation as an equity-oriented intervention (Rodday et al., 2015).

Other navigation research has similarly documented shorter times to diagnosis among selected patients with abnormal cervical and breast cancer screening results, particularly after prolonged unresolved intervals. These observations demonstrate that navigation is not simply an informational intervention; it can act upon organizational barriers by actively connecting patients with diagnostic services and facilitating continuity across different components of the healthcare system.

The comparative distribution therefore showed a gradual hierarchy of system-level solutions: **care coordination and integrated pathways (65%), rapid referral and diagnostic pathways (60%), diagnostic capacity strengthening (55%), financial protection (50%), decentralization or regional access strategies (40%), and patient navigation (35%)**.

The categories were not mutually exclusive. Several publications proposed combinations of interventions rather than a single isolated solution. For example, strengthening diagnostic infrastructure may require improved referral mechanisms, while decentralizing oncology services may also require workforce expansion, financing, information

systems, and coordination with tertiary centers. Similarly, navigation programs may operate most effectively when diagnostic and treatment services possess sufficient capacity to receive referred patients.

The distribution observed in Figure 5 consequently reflects a **multicomponent pattern of proposed health-system responses**. Organizational strategies were most frequently represented, particularly coordination and rapid diagnostic referral, followed closely by infrastructure strengthening. Financial, geographic, and patient-support strategies were also recurrent components of the evidence.

DISCUSIÓN

The findings of this review demonstrate that inequities in access to cancer diagnosis and treatment emerge from the interaction between **social vulnerability and health-system limitations**, rather than from a single isolated determinant. Across the analyzed literature, socioeconomic position was the most frequently represented determinant, while organizational barriers within healthcare systems appeared with almost the same frequency. This proximity is particularly relevant because it suggests that cancer disparities are generated not only by the material conditions in which patients live but also by the capacity of healthcare institutions to transform initial contact into timely diagnosis, staging, treatment initiation, and continuous care.

The predominance of **socioeconomic determinants** is consistent with previous evidence showing that lower income, limited educational opportunities, unstable employment, reduced health literacy, and financial vulnerability can influence virtually every stage of the cancer-care continuum (Alcaraz et al., 2020; Symioti et al., 2023). However, the results also indicate that socioeconomic disadvantage often operates through mechanisms that are mediated by healthcare systems. A low-income patient may experience difficulty attending appointments because of transportation costs or inability to leave work, but the effect becomes more severe when that patient must attend multiple consultations, travel repeatedly to centralized oncology centers, or wait prolonged periods for diagnostic confirmation.

This interaction helps explain why **financial toxicity** should be considered both an economic and a clinical problem. The reviewed evidence showed a substantial presence of financial barriers, while previous studies have demonstrated that financial strain can lead to medication nonadherence, missed consultations, and avoidance of diagnostic procedures (Knight et al., 2018; Beltrán Ponce et al., 2022). Therefore, financial hardship is not simply a consequence of cancer treatment; it can modify the probability of receiving and completing treatment itself. From a health-system perspective, this reinforces the importance of incorporating financial protection, transportation assistance, medication coverage, and social support into comprehensive oncology strategies.

One of the most relevant findings was the concentration of barriers during the **diagnostic evaluation stage**. In the reviewed evidence, this stage was more frequently affected than initial healthcare access. This finding challenges the assumption that late cancer diagnosis is predominantly caused by patients delaying medical consultation. Evidence from Mexico supports this interpretation. Bright et al. (2011) documented prolonged intervals between the first primary-care consultation and confirmed diagnosis, while Unger-Saldaña et al. (2018) found that diagnostic delays were considerably more frequent than prolonged patient intervals.

This distinction has important implications for cancer-control strategies. Public awareness campaigns and education about warning signs remain necessary, but their impact may be limited if healthcare systems are unable to provide rapid diagnostic resolution after patients seek care. Increasing awareness without simultaneously improving referral pathways, pathology capacity, imaging availability, specialist access, and appointment coordination may increase demand without eliminating the structural causes of delay. Consequently, early-detection policies should combine population education with institutional capacity for timely diagnostic confirmation.

The Mexican evidence also illustrates the importance of examining **health-system delay as an independent component of total cancer delay**. Repeated consultations, multiple healthcare contacts, long waiting times, and referral between institutions were consistently associated with prolonged diagnostic pathways (Bright et al., 2011; Unger-Saldaña et al., 2018). Similar findings in pediatric oncology demonstrate that these organizational barriers are not restricted to adult malignancies. Zapata-Tarrés et al. (2020) reported that health-service-related intervals were

substantially longer than patient-related intervals among children with cancer, emphasizing the contribution of institutional processes to delays in diagnosis and treatment.

The strong representation of **organizational and coordination barriers** also suggests that healthcare fragmentation is a central mechanism of inequity. Patients with greater financial resources, private insurance, or stronger social support may be better positioned to compensate for fragmented systems by seeking second opinions, paying for private diagnostic studies, traveling to specialized centers, or obtaining faster appointments. Conversely, socially vulnerable patients are more dependent on the efficiency of public referral systems. As a result, the same organizational inefficiency may generate a disproportionate burden among disadvantaged groups, amplifying pre-existing social inequalities.

Geographic barriers further reinforce this pattern. The concentration of specialized oncology services in metropolitan areas may increase transportation costs, travel time, accommodation expenses, and the number of missed workdays required to complete treatment. Goss et al. (2013) described important inequalities in the distribution of cancer resources throughout Latin America and the Caribbean, including disparities in workforce, infrastructure, equipment, and specialized services. These findings remain highly relevant because equitable access requires more than national availability of services; it requires an appropriate geographic distribution of diagnostic and therapeutic capacity.

The reviewed evidence also suggests that **formal healthcare coverage should not be considered synonymous with effective access**. A patient may possess insurance or legal entitlement to cancer treatment while still facing diagnostic delays, unavailable medications, insufficient radiotherapy capacity, complex administrative authorization, or long-distance travel. Effective access therefore depends on several simultaneous dimensions: availability, affordability, geographic accessibility, timeliness, continuity, and quality. Health-system evaluations that rely only on insurance enrollment may underestimate important inequalities in the actual cancer-care pathway.

Another relevant finding was the recurrent identification of **care coordination and integrated pathways** as the most frequently proposed intervention. This result is coherent with the observed distribution of barriers. If referral fragmentation and diagnostic delays are among the most common problems, then integrated pathways that connect primary care, diagnostic services, pathology, oncology specialists, and treatment facilities represent a logically aligned response. Such pathways can reduce unnecessary consultations, shorten transitions between institutions, and clarify responsibility for patient follow-up.

Similarly, **rapid referral and diagnostic pathways** emerged as a highly represented intervention. Their importance lies in reducing time lost between suspicion and confirmation of cancer. Standardized criteria for urgent referral, predefined diagnostic algorithms, centralized scheduling, and direct access to selected diagnostic procedures can reduce variation and prevent patients from circulating repeatedly through different services. These strategies may be particularly beneficial in systems where specialist services are limited and must be allocated according to clinical priority.

The findings also support strengthening **diagnostic capacity** as an essential component of equity-oriented cancer policy. Referral systems cannot function efficiently if receiving institutions lack sufficient pathology, imaging, biopsy, or staging capacity. Investments in workforce and infrastructure are therefore necessary complements to organizational reform. In lower-resource settings, this may require decentralizing selected diagnostic services while maintaining referral to tertiary centers for complex procedures.

Patient navigation deserves particular attention because it directly addresses barriers experienced by vulnerable populations. Although navigation appeared in fewer publications than broader structural interventions, available evidence suggests that it can reduce the time required to achieve diagnostic resolution and mitigate socioeconomic disparities (Rodday et al., 2015). Navigation may be especially useful for patients who face multiple simultaneous barriers, including low health literacy, transportation difficulties, financial insecurity, or complex referral requirements.

However, navigation should not be interpreted as a substitute for structural reform. A navigator can assist patients in obtaining appointments and understanding referral pathways, but cannot eliminate shortages of pathology services, radiotherapy units, specialists, or essential medicines. Therefore, navigation is most effective when implemented

within a system that has adequate diagnostic and therapeutic capacity. This supports a multilevel approach in which patient-centered interventions operate alongside organizational and policy-level reforms.

The findings further indicate that **no single intervention is sufficient to eliminate cancer-care inequities**. Because determinants frequently overlap, solutions must also be multidimensional. Financial protection alone will not resolve geographic barriers; decentralization alone will not correct fragmented referral; and early-detection campaigns alone will not reduce diagnostic delay if pathology capacity remains insufficient. The most coherent strategy is therefore an integrated model combining primary-care strengthening, rapid referral, diagnostic expansion, patient navigation, financial protection, decentralization, and continuous monitoring of waiting times.

From a policy perspective, these findings support the use of **equity-sensitive performance indicators**. Health systems should not only measure the number of patients treated, but also the interval between suspicion and diagnosis, diagnosis and treatment, treatment abandonment, geographic travel burden, out-of-pocket expenditure, and differences in these indicators across socioeconomic groups. Monitoring these measures would make inequities visible and allow health authorities to identify points in the care pathway where vulnerable populations are disproportionately lost or delayed.

The Latin American context requires particular consideration because many healthcare systems in the region combine fragmented financing structures, unequal distribution of specialists, centralized oncology services, and important socioeconomic disparities. Goss et al. (2013) emphasized the need for coordinated cancer-control policies, stronger registries, professional training, financing, and improved access to essential services. The present findings reinforce that regional strategies should move beyond increasing nominal coverage and instead focus on whether patients can actually complete the full pathway of care in a timely and financially sustainable manner.

The results also support the broader argument proposed by Farmer et al. (2010) that expansion of cancer care in low- and middle-income settings is feasible when integrated into health-system strengthening. Improving oncology equity does not necessarily require replicating the most expensive models of high-income countries. In many settings, substantial improvements may result from better referral organization, essential diagnostic capacity, access to core medicines, appropriate decentralization, financing mechanisms, and more efficient use of existing resources.

Several limitations should be considered when interpreting the present findings. First, the included studies were heterogeneous in cancer type, population, healthcare system, geographic context, and methodological design. Second, the thematic percentages presented in the figures represent the frequency with which specific determinants, barriers, or interventions appeared in the reviewed literature and should not be interpreted as pooled prevalence estimates or effect sizes. Third, the categories were non-exclusive, meaning that individual studies could contribute to several dimensions simultaneously. Finally, the quantity of publications addressing a particular intervention does not necessarily reflect its comparative clinical effectiveness.

Despite these limitations, the convergence of findings across diverse settings provides a consistent pattern. Social disadvantage and health-system fragmentation repeatedly intersect throughout the cancer-care continuum, with diagnostic evaluation and treatment initiation representing particularly vulnerable stages. At the same time, the literature identifies multiple actionable interventions capable of modifying these pathways.

CONCLUSIÓN

Inequities in access to cancer diagnosis and treatment are the result of a complex interaction between **social determinants of health and structural characteristics of healthcare systems**. The evidence reviewed shows that socioeconomic disadvantage, financial burden, geographic barriers, limited health literacy, fragmented referral pathways, diagnostic delays, and unequal distribution of oncology resources can accumulate throughout the cancer-care continuum and substantially affect the timeliness and continuity of care.

The findings indicate that the **diagnostic stage and transition to treatment are particularly vulnerable points**, especially in contexts where patients must navigate multiple institutions, prolonged waiting periods, limited specialist availability, and insufficient diagnostic infrastructure. Evidence from Mexico and Latin America reinforces that a

significant proportion of delay may occur after patients have already entered the healthcare system, demonstrating that access cannot be assessed only by the existence of insurance coverage or the initial consultation.

The study also confirms that **formal healthcare coverage is not equivalent to effective access**. Equitable oncology care requires timely referral, adequate diagnostic capacity, geographic accessibility, financial protection, availability of essential treatments, and continuity between primary, secondary, and specialized services. Therefore, reducing disparities requires a broader evaluation of how health systems function in practice.

The most relevant health-system responses identified include **integrated care pathways, rapid referral mechanisms, strengthening of diagnostic services, patient navigation, decentralization of selected oncology resources, and financial protection strategies**. These interventions should be implemented in a coordinated manner because isolated measures are unlikely to address the cumulative and multidimensional nature of cancer-care inequities.

Overall, the results support the central hypothesis that cancer disparities are generated by the interaction of social vulnerability and modifiable health-system barriers. Reducing these inequalities requires moving beyond approaches focused exclusively on individual behavior and toward **equity-oriented health-system reform**. The ultimate objective should be to ensure that every patient can access timely diagnosis and appropriate treatment according to clinical need, regardless of socioeconomic position, place of residence, financial capacity, or ability to navigate complex healthcare structures.

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