



In 2023, 76%
of cancer trials
were conducted
in high-income
countries

Cancer research and development landscape

Overview of 1999–2022 period

Despite significant progress in therapeutic development, cancer is still associated with a substantial global disease burden, which is projected to increase significantly in the coming decades, particularly in low- and lower middle-income countries (1). Cancer clinical trials play a critical role not only at the individual level by allowing timely access to the most innovative preventive and treatment strategies but also at the population level, fostering advancements that contribute to a broader understanding of cancer and its management, and improving collective health care practices. This report offers a landscape analysis on global cancer clinical trials in 2023 using the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) and Global Observatory on Health Research and Development (R&D).

KEY MESSAGES

Geographical disparities. 76% of cancer trials were conducted in high-income countries (HIC) in 2022. Disparities in the distribution of cancer clinical trials point to the influence of economic resources, health care infrastructure and research capacity in determining inequitable access to clinical trial opportunities.

Misalignment with disease burden. The number of cancer clinical trials does not always match the disease burden. Established variations in the epidemiological distribution of different cancer types across countries and regions emphasize the need to tailor clinical research questions to meet local priorities and address the disease burden in each country.

Lack of global collaboration. Multinational trials account for 15% of all trials, only 6% were conducted jointly between a high-income country and countries in other income levels (low- and middle-income countries). The predominance of single-country studies widens interregional disparities in resources and research capacity. Efforts to foster equitable partnerships and align research agendas with local health needs, especially in low-resource settings, are crucial.

Limited inclusion of paediatric patients. Less than 4% of trials included children younger than 14 years. There is a notable research gap concerning the unique needs of paediatric cancer patients, which indicates that more attention needs to be given to this vulnerable population in clinical trials (2).

Imbalance towards pharmaceutical interventions. Medicines-related trials make up 61% of all registered trials. Cancer trials are significantly focused on pharmaceutical interventions, potentially overshadowing other treatment methods, e.g. procedures such as surgery, hyperthermia and photodynamic therapy, biological interventions such as vaccines, monoclonal antibodies and CAR-T cell therapies, and diagnostics. A more comprehensive approach is needed.

Underreporting of trial results. The median time from trial registration to publication of results is 4 to 6 years, with 30% of trials remaining unpublished 7 years after enrolment of the final study subjects. Delays in publishing trial results raise concerns about accessibility and dissemination of pivotal findings, highlighting the need for improved efficiency and standardized reporting practices.

Introduction

Clinical trials play a crucial role in improving cancer outcomes by identifying effective diagnosis, prevention and treatment methods. Despite significant progress in therapeutic development, cancer remains a burden, particularly in low-resource settings. Challenges such as limited patient access, lack of diversity in trial participants, suboptimal study design, and regulatory complexities hinder progress. Addressing these challenges requires a coordinated global effort to ensure inclusivity and efficiency in clinical trials.

Initiatives such as WHO's implementation of the World Health Assembly resolution "Strengthening clinical trials to provide high-quality evidence on health interventions and to improve research quality and coordination" (WHA 75.8) aim to improve research quality and inclusion. Moreover, mapping clinical trial activities is vital for supporting evidence-based research and policy reforms. To address the lack of comprehensive data on global cancer clinical trials, we conducted a landscape analysis using WHO's International Clinical Trials Registry Platform (ICTRP) and Global Observatory on Health R&D as part of an initiative to provide guidance and support to enhance cancer diagnosis, prevention and control worldwide.

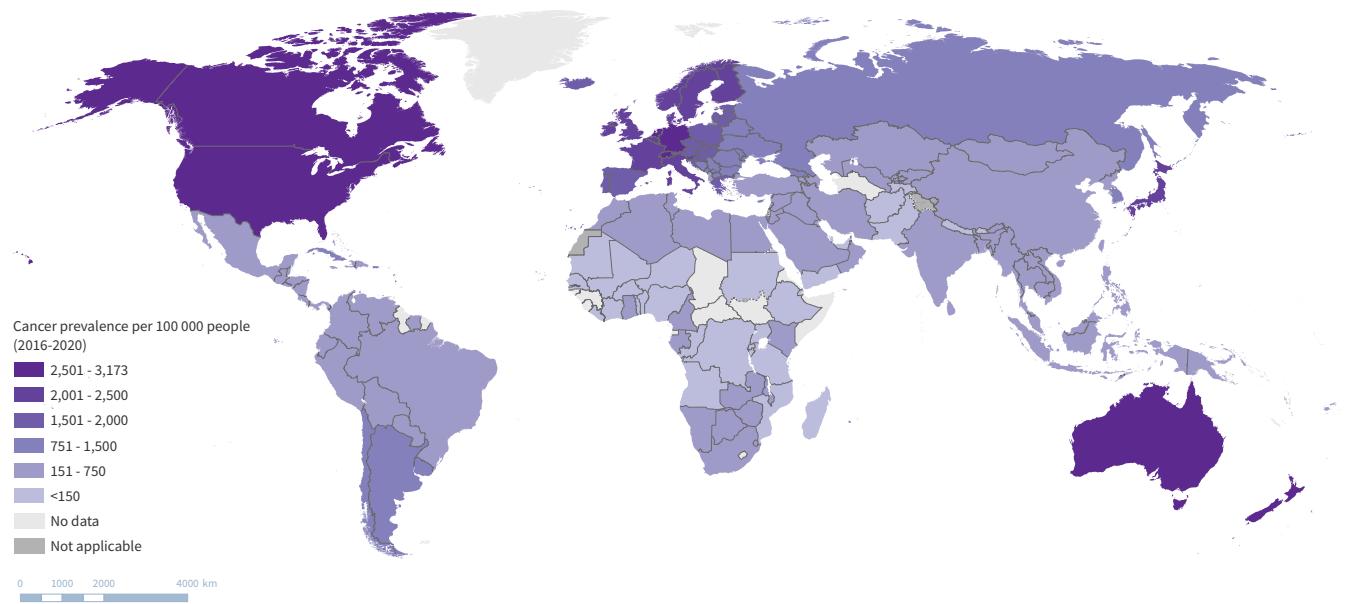
This report offers a comprehensive perspective on the state of cancer clinical trials over the period of 1999–2022 (112 899 trials), guiding stakeholders across the cancer R&D landscape towards a future where innovation and equity converge to transform the lives of those affected by cancer.

1. Geographical disparities in cancer trials

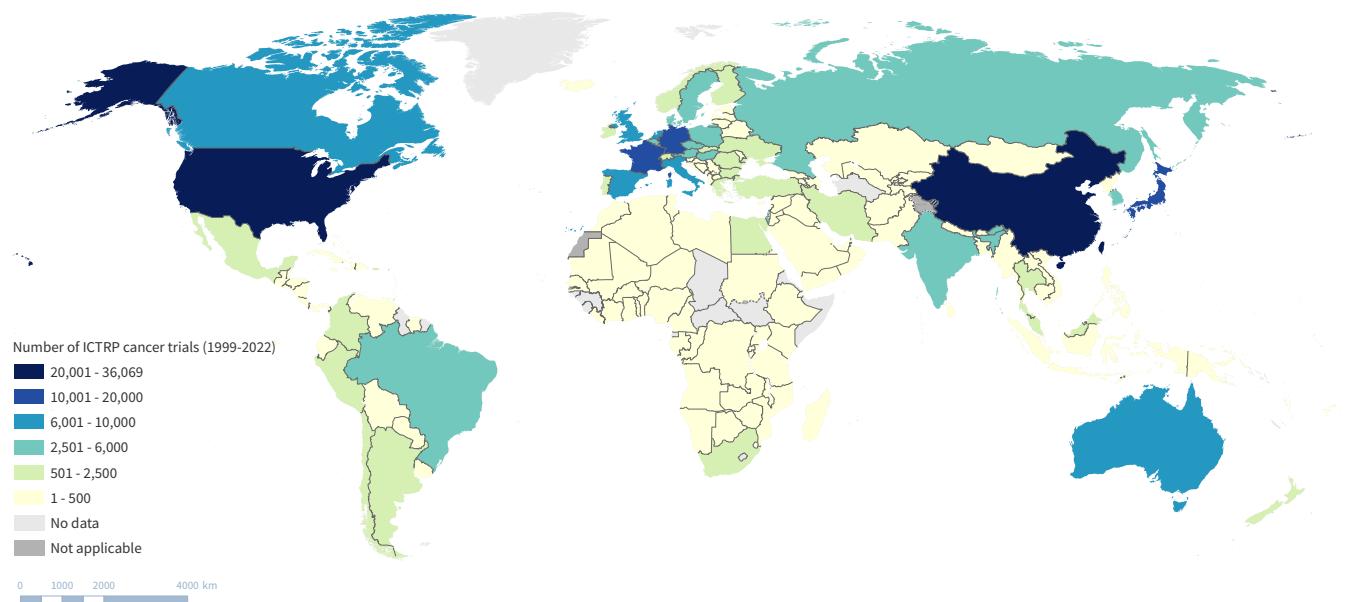
There are substantial disproportions in the overall availability of cancer clinical trials between different regions of the globe. In 2023, 76% of cancer trials were conducted in high-income countries, representing 7 clinical trials per 100 000 population. Conversely, in low- and middle-income countries the number of trials conducted was less than 1 per 100 000 population. WHO's Region of the Americas, Western Pacific and European Regions served as primary hubs for clinical trial activities (Fig. 1) and shared the highest disease burden (Fig. 2).

Fig. 1. Geographical distribution of cancer burden (prevalence) and overall number of cancer trials

Cancer (prevalence)



Number of cancer trials



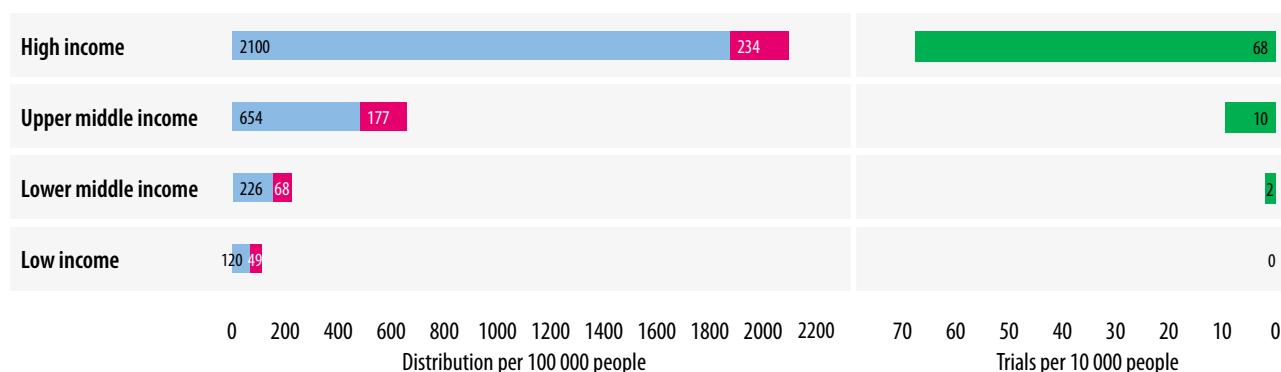
The United States of America (USA) had the highest proportion of cancer trials compared to other indications (32%), followed by China (19%), Japan (13%), Germany (9%), France (9%), the United Kingdom (8%) and Italy (8%) (Fig. 3). In contrast, the Eastern Mediterranean, South-East Asia and African Regions reported notably lower numbers of cancer clinical trials, accounting for 2%, 4% and 1% of all trials, respectively. Thirty-six percent of those countries with the lowest number of cancer trials were in Africa, a continent where the disease burden is projected to dramatically increase in the coming decades due to rising population, increasing life expectancy, growing urbanization and lifestyle changes. It is noteworthy that 63 countries did not have any trials listed in the ICTRIP, including 54% (21/39) of small island developing states (3).

Fig. 2. Distribution of cancer burden (prevalence and mortality) and overall number of cancer trials per 100 000 individuals

By World Bank income level

■ Prevalence ■ Mortality

Income group



By WHO Region

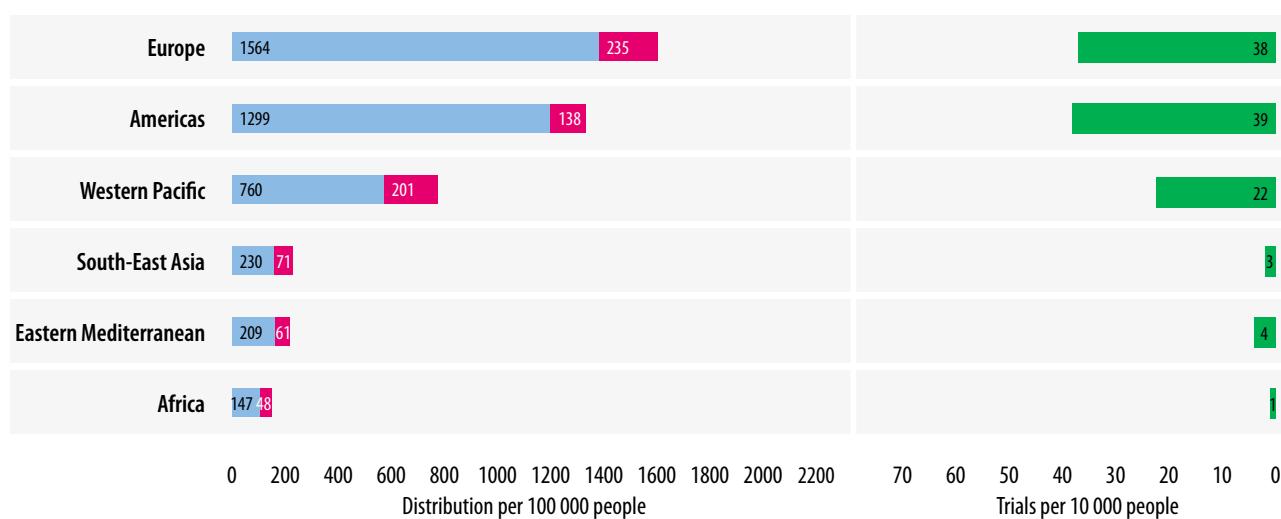
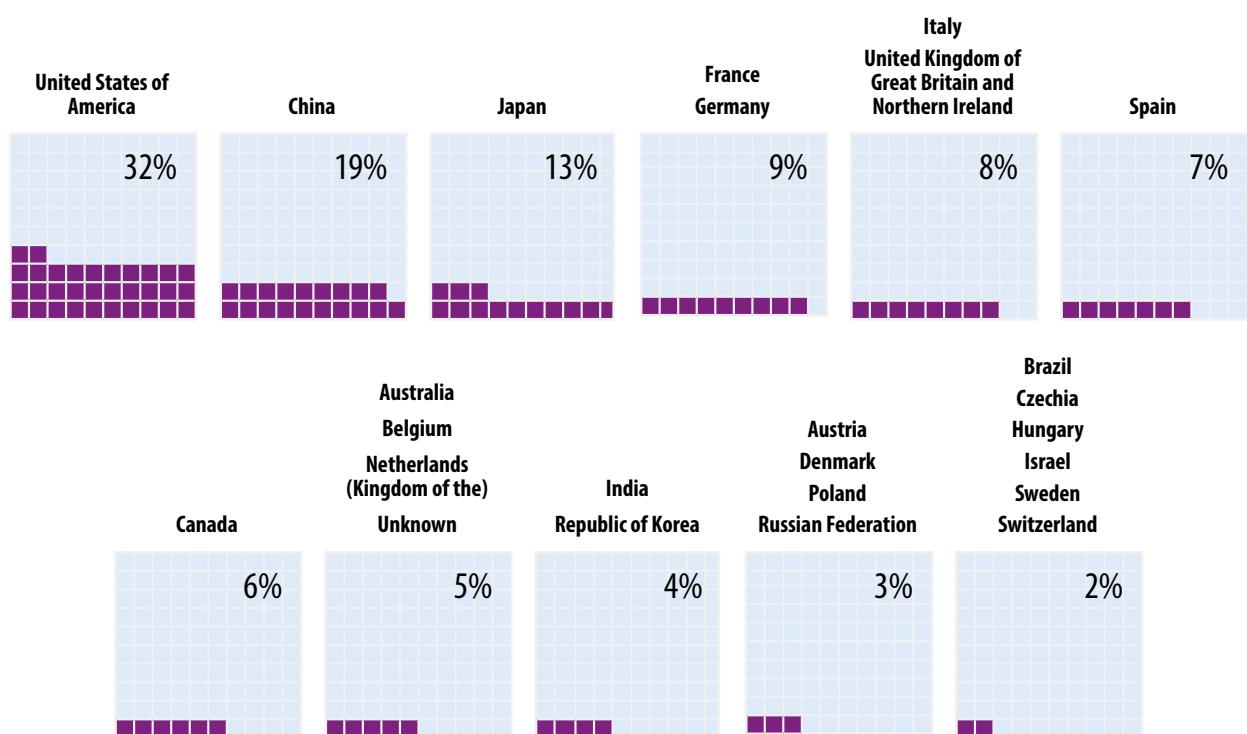


Fig. 3. Proportion of cancer trials compared to all trials in each country



These disparities reflect variations in economic resources, health care infrastructure and research capacity across regions and raise important questions about equitable access to clinical trial opportunities and underrepresentation of certain patient populations. Bridging these gaps requires collaborative efforts, effective resource allocation and the development of context-specific research strategies. Addressing these disparities is critical to ensure the inclusivity and diversity of participants in cancer trials.

2. Misalignment of cancer clinical trials with disease burden

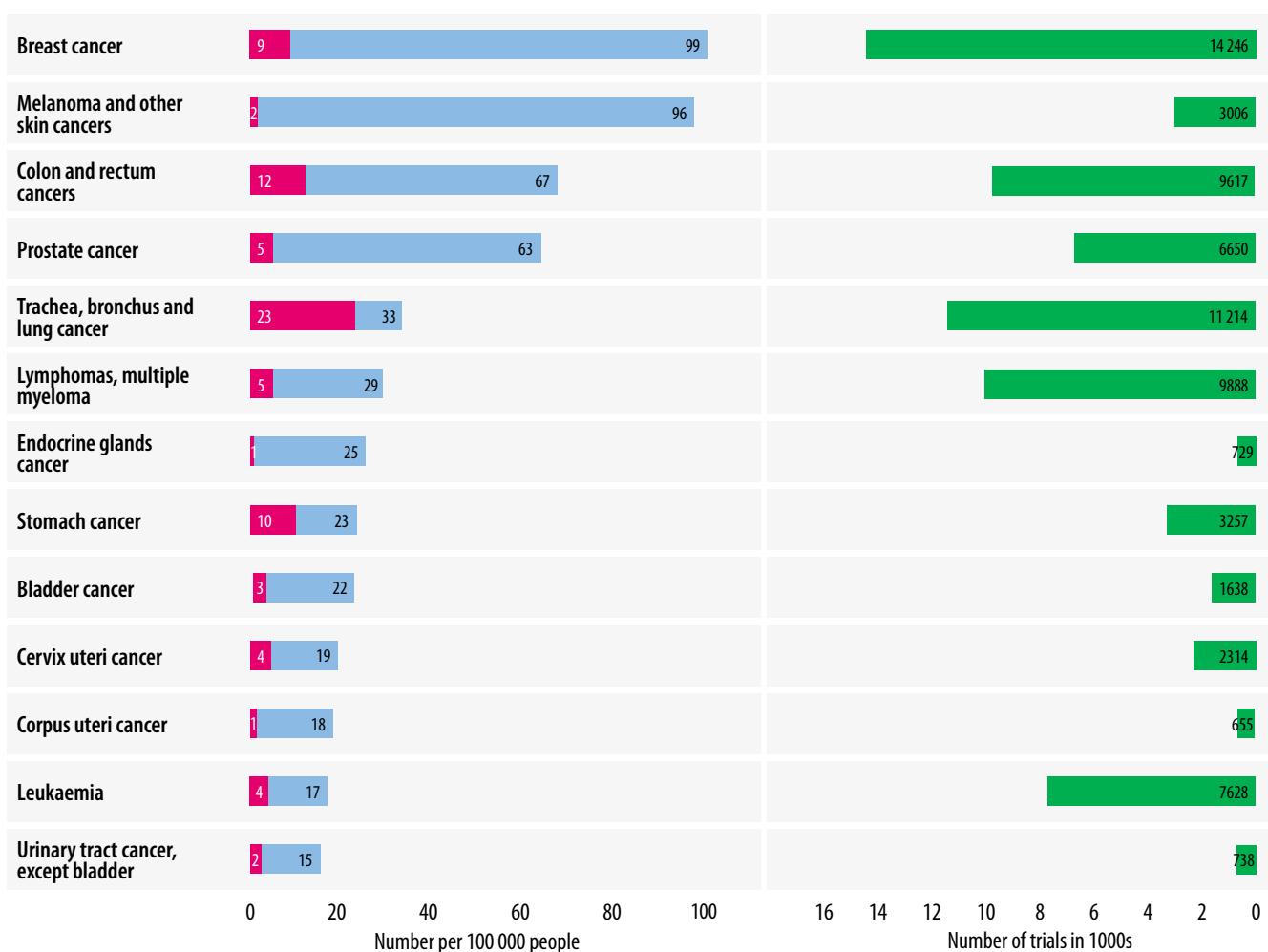
Misalignment has been observed between the global prevalence and mortality patterns of various cancers and the most commonly studied tumour sites. Between 1999 and 2022, breast cancer and haematological malignancies showed a disproportionately high representation in clinical trials relative to their contribution to global cancer deaths. Conversely, the representation of lung cancer (the second most frequently studied tumour globally) closely mirrored its rank as the leading cause of cancer deaths globally (Fig. 4).

Fig. 4. Distribution of disease-specific cancer burden (prevalence and mortality) and overall number of cancer trials (1999–2022)

■ Deaths ■ Cases

Leading cancer cases (2016–2020) and deaths (2020) per 100 000 people

Number of cancer trials (1999–2022)



Globally, the most frequently studied tumour was breast cancer, followed by lung cancer, lymphomas, colorectal cancer, leukaemia and prostate cancer. While lung cancer, breast cancer and haematological malignancies were well represented in clinical trials, mirroring their rankings as the three leading causes of cancer deaths globally, trials involving gastrointestinal tumours and cervical cancer did not match the global burden of these diseases.

Tailoring clinical trials to address the unique cancer burden in different regions would ensure that research efforts contribute directly towards meeting the health care needs of specific populations. This approach could promote inclusivity and relevance in clinical trial design, potentially improving the applicability and effectiveness of treatments in diverse global contexts. Collaborative efforts between regions with similar cancer profiles should also be encouraged as a means to share insights, resources and best practices in the pursuit of effective cancer treatments.

3. Lack of global collaboration

Single-country studies constituted the predominant mode of investigation, comprising 85% of all trials. Only 6% of interventional trials were conducted in collaboration between high-income countries and low- and middle-income countries. A significant majority of cancer clinical trials were conducted in single countries, implying that domestic research initiatives were of central importance. The comparatively lower proportion of multinational trials points towards substantial interregional disparities in financial and human resources, infrastructure and research capacity, and also indicates that most clinical trials in LICs and LMICs are driven by north-south research partnerships.

Global collaboration in cancer research between high-income countries and resource-limited settings provides a platform for sharing experience and resources: this can help research to be more efficiently conducted and regional agendas to be better informed. However, it also presents potential drawbacks, particularly when research priorities are disproportionately skewed towards high-income country-driven research initiatives. This imbalance can result in a mismatch between the research priorities of low- and middle-income countries and agendas set by high-income countries, and may even sideline the specific health needs of local communities. There are also ethical concerns and issues about the long-term sustainability of interventions where the benefits of research fail to alleviate the disease burden specific to populations. **To address this challenge, efforts should focus on fostering equitable partnerships, promoting a culture of respectful, constructive collaboration, involving local stakeholders in the research process, prioritizing capacity-building and ensuring that the research agenda aligns with the specific health needs and priorities of countries (4).**

Table 1. Country diversity of interventional trials registered between 1999 and 2022 in the ICTR

Country diversity	All trials (%)	Completed (%)	Ongoing (%)	Others* (%)
Single country, overall	75 597 (85)	33 030 (87)	21 309 (92)	21 258 (76)
Single country UMIC, LMIC, LIC	17 659 (20)	4113 (11)	8752 (38)	4794 (17)
Multiple countries, overall	13 472 (15)	5004 (13)	1865 (6)	6603 (24)
HIC with UMIC, LMIC and/or LIC	5400 (6)	1910 (5)	746 (6)	2744 (10)

Definitions of analysis groups as follows: **Single country, overall**: Trials conducted in one country, including all income levels; **Single country (UMIC, LMIC, LIC)**: Trials conducted in one country specifically in upper-middle-income countries (UMIC), lower-middle-income countries (LMIC), and low-income countries (LIC); **Multiple countries, overall**: Trials conducted across multiple countries; **HIC with UMIC, LMIC and/or LIC**: Trials between high-income countries (HIC) and UMIC, LMIC, and/or LIC.

* Includes the following recruitment statuses: suspended, not recruiting, not applicable and unknown/not applicable.

4. Limited inclusion of paediatric patients

89 069 interventional studies on cancer were registered between 1999 and 2022, of which 43% were completed, 26% actively recruiting participants, 31% either not recruiting (21%), suspended (3%), or 7% for which the status was known. Both male and female patients were enrolled in 76% of trials, while 14% enrolled exclusively female patients and 6% exclusively male patients. These data mirror the epidemiological patterns associated with sex-specific cancers.

Less than 4% of trials included children younger than 14 years (2). Conversely, most trials did not have an upper age limit: this may reflect evolving clinical trial policies to encourage older adults to sign up for cancer trials, such as the guidance document issued by the US Food and Drug Administration to include older adults by relaxing the inclusion criteria for this subpopulation in industry-funded trials (5). However, while 50% of trials did not impose an upper age limit, only 28% specifically focused on older adults suggesting that older adults are not adequately represented in cancer clinical trials.

The limited inclusion of paediatric patients suggests that there is a gap in research related to the unique needs of this vulnerable population.

5. Imbalance towards pharmaceutical interventions

Medicines-related trials (61%) form a clear majority of all registered trials. Other interventions such as procedures (11%), biological interventions (6%), behavioural interventions (3%), devices (3%), radiation (3%) and diagnostic tests (1%) were comparatively underrepresented. These findings suggest a sustained and dominant focus on pharmaceutical investigation in cancer research. While medicines-related trials are undoubtedly crucial in the development of new therapeutic options, an overemphasis on pharmaceutical interventions hampers a holistic understanding of cancer diagnosis, treatment and management. Given the multidisciplinary nature of cancer care, the research agenda needs to encompass all available therapeutic modalities and diagnostic advances. We note however that registration of tests on new diagnostics is not required and is rarely done which hampers knowledge of the landscape of innovative diagnostics. Addressing imbalances in research of different diagnostic and therapeutic modalities is vital to foster a more comprehensive and patient-centred approach to cancer research.

A strategic shift in research priorities is required to ensure that non-pharmaceutical and diagnostic interventions receive adequate attention.

6. Underreporting of cancer clinical trial results

The median time from trial registration to publication of results is 4 to 6 years.

The drug development process, which is long and time-consuming, may be further compounded by delays in securing regulatory approval and subsequent publication: these are systemic inefficiencies that hinder timely delivery of innovative therapies to patients.

Nearly 30% of trials remain unpublished seven years after enrolment of the final study subjects, raising critical concerns about the accessibility and dissemination of pivotal trial findings. Overall, these delays not only stand in the way of scientific progress but also raise questions about the real-world impact of research on patient care. Improving efficiency and reducing clinical trial timelines in order to speed up the various drug development phases are critical concerns. **Improving standardized reporting practices in order to translate research breakthroughs more promptly into tangible benefits for patients is also crucial.**

Conclusion

Cancer clinical trials play a pivotal role in advancing our understanding of cancer, improving treatment options, and ultimately enhancing patient outcomes. These trials serve as the driving force for medical progress, fostering innovation and pushing the boundaries of current therapeutic approaches. Through the collaborative efforts of researchers, health care professionals and patients, clinical trials contribute invaluable data and thereby shape the future of cancer care.

The disparities in cancer trials across geographical zones and the low proportion of multinational trials reflect the influence of economic resources, health care infrastructure and research capacity on cancer trials. Bridging these gaps is critical to ensure inclusivity and equitable global collaboration. It requires resource allocation and collaborative efforts to foster equitable partnerships by involving local stakeholders, prioritizing capacity-building and ensuring the development of context-specific research strategies to promote initiatives aligned with priorities in low- and middle-income countries.

While there is no doubt that drug trials are crucial for developing new therapeutic options, an overemphasis on pharmaceutical interventions hampers a holistic understanding of cancer diagnosis, treatment and management. A broader approach, in which trials into novel therapies are combined with assessments of other treatment modalities including non-pharmaceutical and diagnostic interventions, as well as precision medicine approaches such as biomarker testing for targeted treatment, would allow for more comprehensive, patient-centred management in cancer treatment.

Efforts to translate research breakthroughs into more rapid tangible benefits for patients are also crucial. The lengthy drug development process is further compounded by the time taken for regulatory approval and subsequent publication. Such systemic inefficiencies hinder the timely delivery of innovative therapies to patients, and make it apparent that a significant gap exists between concluding a trial and generating scientific evidence.

As we move forward, it is crucial to maintain a strong commitment to inclusivity and diversity in clinical trial participation: findings ought to be representative of the broader population including children and older adults. By addressing these challenges and building upon the successes of past trials, we can accelerate R&D progress in the cancer field, offering hope to patients and their families.

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Acknowledgements

This publication was conceived under the technical leadership of Anna Laura Ross (Unit Head, Emerging Technologies, Research Prioritization and Support), Raffaella Casolino (Technical Officer, Universal health coverage (UHC), Communicable and Noncommunicable diseases (NCDs)), and Andre Ilbawi (Technical Lead, Management of Noncommunicable Diseases). Development of the publication was led by Amina Haouala and Sarah Charnaud (Technical Officers, Emerging Technologies, Research Prioritization and Support), WHO headquarters, Switzerland, with the support and technical input of Lamed Tatah (Consultant, Emerging Technologies, Research Prioritization and Support), WHO headquarters, Switzerland.

Funding for the publication was provided by the Directorate-General for Research and Innovation of the European Commission, the European Society for Medical Oncology, and the Bill and Melinda Gates Foundation.



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Suggested citation. Cancer research and development landscape: overview of 1999–2022 period. Geneva: World Health Organization; 2024. doi:10.2471/B09177

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Unless otherwise specified, data for all visualizations and key messages in the report are taken from the Global Observatory on Health Research and Development (GOHRD). Data in this brief are derived from the interactive dashboard which can be accessed via the link below:



<https://www.who.int/observatories/global-observatory-on-health-research-and-development/monitoring/clinical-trials-on-cancer>