The Cancer Surveillance Branch (CSU) systematically collects, analyses, interprets, and disseminates cancer data and statistics worldwide, as per its mandate from WHO. CSU builds on long-standing expertise in cancer registration and descriptive epidemiology, aligning its activities with the evolving global cancer agenda. The key priorities of CSU include:

- ensuring that locally recorded high-quality cancer data are available to governments in transitioning countries, thus informing priorities for national cancer control;
- serving as a reference to the global cancer community in the provision of national cancer indicators;
- describing and interpreting the changing magnitude and the transitional nature of cancer risk profiles around the world; and
- advocating the health, social, and economic benefits of preventive interventions, through a systematic quantification of their future impact.

Some highlights across CSU's six dedicated programmes during the 2022–2023 biennium are provided here.

Cancer registry support and collaboration

The Global Initiative for Cancer Registry Development (GICR, https://gicr.iarc.who.int) brings partners together to improve cancer surveillance worldwide. Capacity-building is a key objective, and one important milestone was the launch of an e-learning series of 14 modules developed in partnership with Vital Strategies and the African Cancer Registry Network (AFCRN) and supported by Bloomberg Philanthropies. Available in English, French, and Spanish, the freely available course offers the staff of population-based cancer registries (PBCRs) formal certification as International Cancer Registrars.

As well as a series of consultancies to PBCRs (Figure 1), virtual courses were held during the biennium on cancer registration (in collaboration with the Quito Cancer Registry in Ecuador and the Pan American Health Organization, and in the Lao People's Democratic Republic with the National Cancer Institute of Thailand), on CanReg5 (in collaboration with the National Cancer Institute of Colombia), and on cancer coding (in collaboration with the National Cancer Institutes of Argentina and Colombia). The annual IARC–GICR Summer School with the National Cancer Center of the Republic of Korea was held virtually in 2022 and in person in 2023.

The GICR continued to bring innovation to registry operations. The E-NNOVATE partnership piloted the linkage of electronic medical records to PBCRs via the world's largest health information management system, the District Health Information Software version 2 (DHIS2). Continuing the model of strengthening regional capacity, in late 2022 three IARC–GICR Collaborating Centres in sub-Saharan Africa were officially launched, in Côte d'Ivoire, Kenya, and South Africa, in collaboration with Vital Strategies.

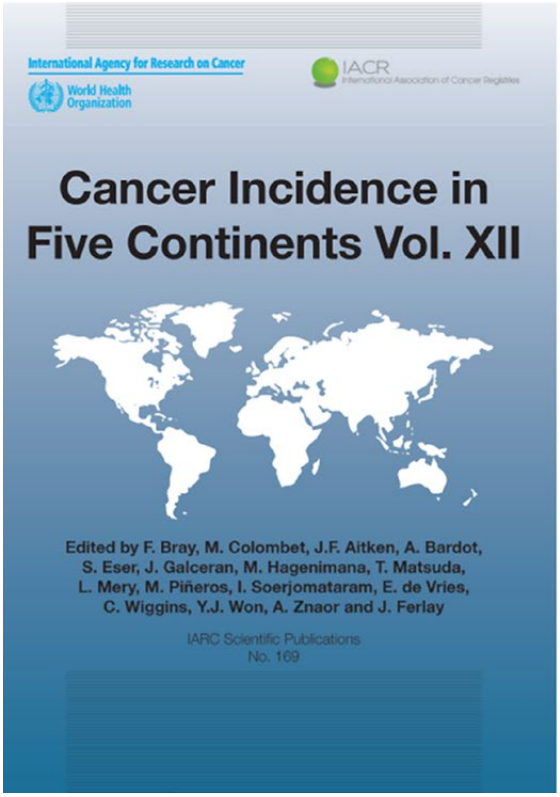
Working closely with the GICR, CSU serves as the Secretariat for the International Association of Cancer Registries (IACR, http://www.iacr.com.fr), the professional body dedicated to fostering the aims of PBCRs worldwide. After online meetings held during the COVID-19 pandemic, an in-person scientific conference was hosted in Granada (Spain) in partnership with the European Network of Cancer Registries (ENCR).

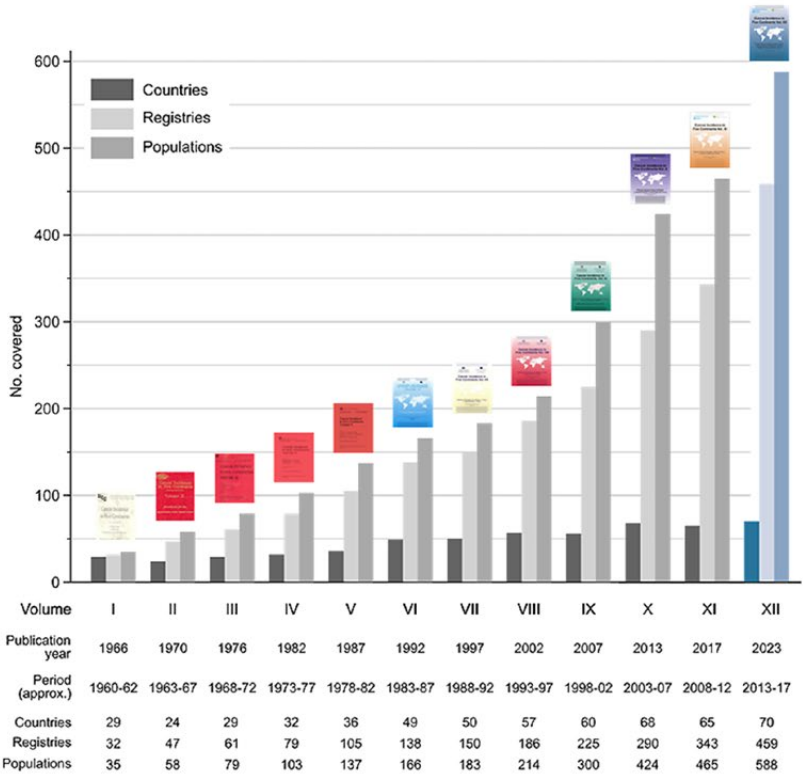
Disseminating cancer data and statistics

Two of IARC's flagship global goods were disseminated online in 2023. *Cancer Incidence in Five Continents* (CI5) is a compendium of comparable data on cancer incidence in different subpopulations and a reference source for studies that explore cancer variations worldwide. The 12th iteration of CI5 (Volume XII), which includes high-quality information on cancers diagnosed in 2013–2017, has an increase of one third in the number of registries included, compared with Volume XI (Figure 2). With 812 submissions from PBCRs responding to the call for data, Volume XII includes 588 populations from 459 registries in 70 countries. The updated website provides utilities to examine cancer incidence patterns in different populations (https://ci5.iarc.who.int/CI5-XII/); it is being transitioned to the repurposed

Figure 1. Consultancies to (left) San Salvador population-based cancer registry (El Salvador), 13–25 July 2022, and (right) Chiang Mai population-based cancer registry (Thailand), 1 March 2023. © IARC.

Figure 2. *Cancer Incidence in Five Continents* Volume XII and the increasing number of countries, registries, and populations included in each of the quinquennial Volumes I to XII. © IARC.





Volume	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Publication year	1966	1970	1976	1982	1987	1992	1997	2002	2007	2013	2017	2023
Period (approx.)	1960-62	1963-67	1968-72	1973-77	1978-82	1983-87	1988-92	1993-97	1998-02	2003-07	2008-12	2013-17
Countries	29	24	29	32	36	49	50	57	60	68	65	70
Registries	32	47	61	79	105	138	150	186	225	290	343	459
Populations	35	58	79	103	137	166	183	214	300	424	465	588

IACR website to enable geographical and temporal analyses of individual data sets across the 12 volumes of CI5.

Second, updated national estimates (GLOBOCAN) of the cancer burden in 185 countries or territories for 2022 were developed, largely from the CI5 Volume XII data submissions, and the European estimates were co-developed with the ENCR. National incidence, mortality, and prevalence in 2022 were made available on the Cancer Today and Cancer Tomorrow subsites of the IARC Global Cancer Observatory platform (GCO, http://gco.iarc.who.int); the Cancer Tomorrow subsite provides tools to predict the future cancer burden up to 2050. An accompanying article documenting the cancer variations by world region will be published in *CA: A Cancer Journal for Clinicians* in 2024. Updates of attributable fractions for infection were disseminated, on the Cancer Causes subsite (https://gco.iarc.who.int/causes/), as were survival estimates (https://gco.iarc.who.int/survival/) based on CSU's survival benchmarking programmes Cancer Survival in Countries in Transition (SURVCAN), now in its third edition, and the International Cancer Benchmarking Partnership (ICBP SURVMARK-2). An article presenting and discussing global estimates of lung cancer for the main histological subtypes was also published (Zhang et al., 2023c).

Descriptive studies

As the COVID-19 pandemic evolved, CSU moved towards evidence synthesis of the direct impact of the pandemic on risk factors, cancer services, and excess mortality (Carle et al., 2022; Freeman et al., 2022; Luo et al., 2022b; Sarich et al., 2022). CSU co-led the International Partnership for Resilience in Cancer Systems (I-PARCS) in providing tools to mitigate future crises and support health system resilience. The IARC Scientific Council and Governing Council supported the IARC COVID-19 and Cancer Initiative (IARC-C19) to undertake deep dives on selected cancer types, including the development of a dynamic evidence-based decision-making platform that incorporates mitigation strategies adapted to national contexts.

Several studies provided an evidence base for cancer prevention. A European study estimated that 1.3 million cancers could be prevented if prevention policies in the best-performing countries were implemented across the region (Cabasag et al., 2022c). CSU also quantified the long-term impact of implementation of tobacco control measures in Japan, the role of human papillomavirus (HPV) in anal squamous cell carcinoma (Deshmukh et al., 2023a), and the importance of lifestyle factors in head and neck cancer (Budhathoki et al., 2023). Cardiovascular disease and cancer are now the leading causes of death in greater Europe. Several combined assessments of mortality transitions in cardiovascular disease and cancer were undertaken to measure progress in their control (Wéber et al., 2023a; Znaor et al., 2022a).

Through SURVCAN and ICBP SURVMARK-2, CSU coordinated survival studies to improve data quality, standards, and local capacity to produce cancer survival data in-house (Andersson et al., 2022a, 2022b; Gil et al., 2022).

Benchmarking studies revealed large survival inequalities in female breast cancer, prostate cancer, colorectal cancer, and cervical cancer (Figure 3) (Soerjomataram et al., 2023). In-depth analyses performed in countries with local investigators in Colombia (Bravo et al., 2022), Thailand (Maláková et al., 2022), the Islamic Republic of Iran (Nemati et al., 2022a, 2022b), and Brazil (Mafra et al., 2023) evaluated the effectiveness of cancer policies, including the role of universal health coverage. Across seven high-income countries, persistent disparities were observed by stage, sex, or age, with the quality of cancer care and health system factors influencing survival (Araghi et al., 2022; Arnold et al., 2022a; Cabasag et al., 2022a, 2023).

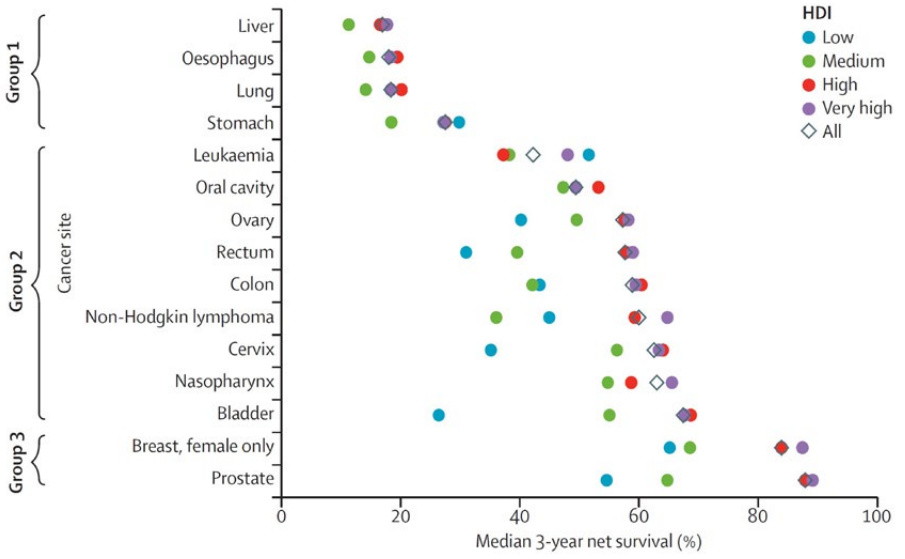
CSU also provided assessments of the current and future burden from specific cancer types, including cancers of the gastrointestinal tract (Morgan et al., 2023; Rumgay et al., 2022a, 2022b), urinary tract (Bukavina et al., 2022; Jubber et al., 2023; Znaor et al., 2022b), lung (Wéber et al., 2023b), skin (Arnold et al., 2022b), ovary (Cabasag et al., 2022b), and thyroid (Pizzato et al., 2022a) and non-Hodgkin lymphoma (Mafra et al., 2022), as well as overviews by age at diagnosis (Pilleron et al., 2022; Wang et al., 2022a). In addition, CSU developed baseline estimates for the WHO global cancer initiatives, including cervical cancer elimination (Singh et al., 2023), and population-level analyses of breast cancer stage (Piñeros et al., 2022a). At the regional level, CSU presented situation analyses in Latin America and the Caribbean (Piñeros et al., 2022b) and in sub-Saharan Africa (Bray et al., 2022), and there were numerous country overviews (Ghasemi-Kebria et al., 2023a, 2023b; Leal et al., 2022; Luo et al., 2022a, 2022b; Mafra da Costa et al., 2022; Maláková et al., 2022; Pierannunzio et al., 2022), including a series of papers highlighting cancer inequalities in the municipalities of the State of São Paulo, Brazil (Guimarães Ribeiro et al., 2023; Ribeiro et al., 2023a, 2023b).

Childhood cancer

CSU developed a framework for streamlining the collection and validation of routine data on childhood cancer from PBCRs and other sources, in consideration of data sharing policies. The quality-assured data compiled in the International Incidence of Childhood Cancer (IICC-3, https://iicc.iarc.who.int/) study were used to examine childhood cancer incidence in Latin America. Data standards were promoted through a revised third edition of the International Classification of Childhood Cancer (https://iicc.iarc.who.int/classification/). A standardized set of teaching materials was developed within the framework of the ChildGICR programme (https://gicr.iarc.who.int/childgicr/) in collaboration with St. Jude Children's Research Hospital (USA), and the ChildGICR Masterclass participants were trained to disseminate knowledge on childhood cancer registration. Subsequently, 90 students from 17 transitioning countries were trained in partnership with the Viet Nam National Cancer Institute, the Cancer Institute in Chennai (India), and the National Center for Disease Control and Public Health in Georgia.

In collaboration with 150 PBCRs worldwide, CSU assembled data to analyse risk of second primary neoplasms in childhood cancer survivors. In work carried out within the Cancer Risk in Childhood Cancer Survivors (CRICCS, https://criccs.iarc.who.int) study, a novel method of estimating the prevalence of childhood cancer survivors, based on grouped data, was developed.

Figure 3. Median age-adjusted 3-year net survival across population-based cancer registries by the four-tier 2019 Human Development Index (HDI) and cancer site in 2008–2012, from SURVCAN-3. The HDI is divided into low (< 0.55), medium (0.55–0.69), high (0.70–0.79), and very high (0.80–1.00). Groups were identified on the basis of strength of association with HDI and median 3-year net survival across registries. Group 1 has no association with HDI and very low median net survival, group 2 has a moderate association with HDI and moderate median net survival, and group 3 has a strong association with HDI and high median net survival. Reprinted from Soerjomataram et al. (2023). Copyright 2022, with permission from Elsevier.



The economic burden of cancer

A research focus in CSU has been the monetary valuation of productivity lost due to premature mortality from cancer. CSU estimated that half of the total productivity loss in Europe was due to unpaid work, with a particularly high proportion among women (Ortega-Ortega et al., 2022). Although ongoing declines in premature cancer mortality imply lower future productivity losses, CSU estimated that the cumulative costs of cancer would be €1.3 trillion over the next two decades, amounting to 0.43% annually of total GDP (Ortega-Ortega et al., 2022). Novel methods (Hanly et al., 2022), country-specific analyses (De Camargo Cancela et al., 2023), and economic evaluations of alcohol reduction strategies (Rumgay et al., 2023) were all published during the 2022–2023 biennium. Within ChildGICR, a systematic review of financial hardship in childhood cancer proposed a data-driven methodological framework to

inform effective policies to address the economic impact on families (Ritter et al., 2023).

Within the *Lancet* Commission on Women, Power, and Cancer (Figure 4), CSU analysed the economic impact of cancer diagnosis among women, evaluating women's contribution to the cancer health workforce, setting the investment case and standards for a responsive health system refocused to the needs of women in all their diversity (Ginsburg et al., 2023). An analysis from eight Asian countries found that almost three quarters of women spent more than 30% of their annual household income on cancer-related expenses in the year after the diagnosis. Another study showed that the value of women's unpaid caregiving work ranged from 2.0% of national health expenditure in Mexico to 3.7% in India.

Figure 4. *Lancet* Commission on Women and Cancer meeting, Istanbul (Türkiye), 3 March 2023. © IARC.

Social inequalities and cancer

Arguing that policy-makers still need to prioritize cancer inequities on the global stage (Ali et al., 2023), one of CSU's major contributions was to show that socioeconomic inequalities in cancer mortality persist across Europe and for every cancer type (Figure 5) but that the extent of these inequalities varies considerably across countries (Vaccarella et al., 2022). Other contributions to the field included an assessment of social inequalities in cancer incidence and mortality in Brazil (Ribeiro et al., 2023a, 2023b), global estimates of the number of maternal orphans due to cancer (Guida et al., 2022), and socioeconomic inequalities in lung cancer in the Nordic countries (Pizzato et al., 2022b). CSU research indicates that socioeconomic factors are the single most important factor explaining the distribution of cancer between and within countries.

Inefficiencies in the provision of healthcare services are crucial drivers of cancer inequalities. CSU has shown that the management of thyroid cancer is both a public health and an economic challenge in many high-income countries. CSU research in France estimated the substantial costs associated with overdiagnosis and associated treatments in disease management (Li et al., 2023a).

Figure 5. Relative inequalities in cancer mortality between lower and higher education levels in 18 European countries, by cancer site and sex in 1998–2015. Reprinted from Vaccarella et al. (2022). Copyright 2022, with permission from Elsevier.