European
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# ENCR IACR Scientific Conference

14-16 November 2023
Granada • Spain

European Network
of Cancer Registries

IACR
International Association of Cancer Registries

Junta
de Andalucía
Consejería de Salud
y Consumo
Escuela Andaluza
de Salud Pública

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# Programme at a glance

| | **Mon** 13 Nov | PRE-CONFERENCE ACTIVITIES | | |
|---|---|---|---|---|
| 09:00 | | | WORKSHOP 1:<br>Registration of treatment variables in Population Based Cancer Registries | WORKSHOP 2:<br>Population-based cancer survival metrics |
| 12:00 | **IACR Board of Directors' Meeting** | *Lunch Break* | | |
| 13:30 | | | WORKSHOP 3:<br>Recurrences | WORKSHOP 4:<br>IT tools and novel AI approaches for cancer registration |
| 15:30 | | **Special Meeting:**<br>GRELL Steering Committee | | |
| 17:00 | | | End of Workshop | End of Workshop |
| 17:30 | *Departure for the Welcome Reception Venue (17:30 from EASP and 17:40 from Jardines del Triunfo)* | | | |
| 18:00 | *Welcome Reception*<br>*Carmen De Los Martires*<br>*Hosted by the Andalusian School of Public Health (EASP) and the Granada Cancer Registry* | | | |

# Programme at a glance

| | **Tue** 14 Nov | **Wed** 15 Nov | **Thu** 16 Nov | **Fri** 17 Nov |
|---|---|---|---|---|
| 08:00 | Poster Session | Poster Session | Poster Session | |
| | Conference Registration | Cancer Radar Breakfast Meeting<br>*(invitation only)* | Benchista Breakfast Meeting<br>*(invitation only)* | |
| 09:00 | **Conference Opening and Welcome Address:**<br>The importance of cancer registration for public health: the Andalusian Cancer Registry | **2023 Johannes Clemmesen Lecture:**<br>**Dr Prashant Mathur**<br>Cancer Surveillance in India – The Role of National Cancer Registry Programme | **IACR Session:**<br>Updates from the International Association of Cancer Registries (IACR)<br>Cancer Incidence in Five Continents Vol XII<br>The Global Initiative on Cancer Registry Development (GICR) | **Special Meeting:** ONCORD-VENUSCANCER Working group, dalle 09:30 alle 11:30 |
| 09:30 | **Keynote Presentation:**<br>**Dr Marina Pollán Santamaría**<br>Cancer information in the era of Precision Medicine | **Plenary Presentations 3:**<br>Descriptive Epidemiology Including Special Populations | | |
| 10:00 | *Coffee Break Poster Session* | | **Co-Presentation:**<br>**Dr Eva Krpelanova and Dr Ariana Znaor**<br>International Classification of Diseases (ICD-11) and the International Classification of Diseases for Oncology (ICD-O) | |
| 10:30 | **Plenary Session 1:**<br>Registry Innovations, Research, and Health Policy | | | |
| 10:45 | | *Coffee Break Poster Session* | *Coffee Break Poster Session* | |
| 11:15 | | **Plenary Presentations 4:**<br>Registry Innovations, Research and Health Policy | **Plenary Presentations 8:**<br>Descriptive Epidemiology Including Special Populations | |
| 12:00 | *Lunch Break Poster Session* | *Lunch Break Poster Session* | *Lunch Break Poster Session* | |
| 12:30 | | | **Anglesio Prize**<br>Alumni Meeting | |

# Programme at a glance

| | **Tue** 14 Nov | **Wed** 15 Nov | **Thu** 16 Nov |
|---|---|---|---|
| 13:30 | **Plenary Presentations 2:**<br>COVID 19 - Impact on Cancer Surveillance, Services, and Outcomes | | |
| 13:45 | | | **Plenary Session 9:**<br>Descriptive Epidemiologic Studies Using Registry Data |
| 14:00 | | **Plenary Session 5:**<br>Childhood Cancer Registration | |
| 15:00 | *Coffee Break Poster Session* | **Keynote Presentation:**<br>**Dr Lynn Penberthy**<br>the 50th Anniversary of the SEER Program in the United States, its History and Impact | **Conference Awards and IACR Tributes**<br>EAP Prize Presentation<br>Announcement of the 2024 Scientific Conference Host and Venue Closing Address |
| 15:30 | **ENCR General Assembly:**<br>**Updates from the ENCR Steering Committee and the EC Joint Research Centre on ENCR activities**<br>*(Open to all Delegates)* | *Coffee Break Poster Session* | |
| 16:00 | | **Plenary Session 6:**<br>Clinical and Epidemiological Studies from Cancer Registry Data | **End of ENCR-IACR Programme**<br>*Coffee and Refreshments* |
| 16:30 | | | **Special Meeting:**<br>EUROCARE Working Group<br>*(invitation only)* |
| 17:00 | | | |
| 17:15 | *Departure for the Alhambra*<br>*(Shuttle bus available at the EASP)* | **Plenary Presentations 7:**<br>COVID 19 - Impact on Cancer Surveillance, Services, and Outcomes | |
| 18:00 | **Visit to The Alhambra** | | |
| 18:30 | | **Networking & Poster Session** | |
| 19:15 | | *Departure for the Conference Dinner Venue*<br>*Buses will leave from EASP at 19.15h*<br>*From Jardines del Triunfo at 19.30h* | |
| 19:45 | | **Conference Gala Dinner** | |

# Welcome

***14 November 2023***

*Welcome to the ENCR IACR Scientific Conference 2023 generously hosted by Escuela Andaluza de Salud Publica, Granada, Spain!*

*We are delighted to open the doors of this global conference, bringing together researchers, healthcare professionals, clinicians, registry experts, and others from around the world. Your attendance signifies your commitment to the advance of cancer registration, a cornerstone of global cancer control.*

*We have been humbled by the overwhelming response we have received for scientific abstract submissions. Abstracts have come from all corners of the world, of high quality and covering a wide range of topics. Regrettably, programme time constraints have prevented us from accepting all of them. I hope you will enjoy reading and hearing the presentations outlined in this book.*

*We wish you a rewarding conference filled with stimulating conversations, insightful presentations, and the forging of new connections. May this meeting serve as a platform to strengthen our friendships and collaborations. We extend our heartfelt wishes for a safe return home to all participants. Thank you for being a part of this exciting endeavour.*

*Sincerely,*

***Joanne Aitken***
*Past President, International Association*
*of Cancer Registries*

*And*
***Charles Wiggins***
*President, International Association*
*of Cancer Registries*

*Welcome to the bi-annual European Network of Cancer Registries (ENCR) Scientific Conference. In this edition, we have the honor to join our efforts with the International Association of Cancer Registries and the Andalusian School of Public Health and connect with passionate researchers in cancer registration from all over the world.*

*We are excited to share knowledge, experiences, and innovations in cancer registration, and to cement the ongoing collaborations within our network, represented here by many European delegates, together with our international colleagues.*

*In these rapidly evolving times, the importance of staying up-to date with technology cannot be overstated, and we would like to highlight the four ENCR workshops on treatment, survival, recurrences, and AI/IT tools, as part of the ENCR ongoing efforts to support the harmonization of cancer registration practices, enabling the comparability of cancer burden indicators across the continent.*

*Moreover, the scientific sessions dedicated to exploring the impact of COVID-19 on cancer registration and outcomes will be an opportunity to recognize the unique challenges that have arisen during those times and use the lessons learnt to improve the resilience of health systems to cope with future challenges.*

*As we embark on this conference, let us embrace the spirit of collaboration, celebrate our shared dedication to improve cancer registration and make the most of this global expertise gathered here in the charming city of Granada.*

*We have attempted to shape this conference to be rewarding and inspiring so let us make the most of this opportunity.*

***Liesbet van Eycken***
*Co-Chair of the ENCR*

***Otto Visser***
*Co-Chair of the ENCR*

***Manola Bettio***
*Cancer Information team, Disease Prevention Unit, JRC*

# ENCR-IACR 2023 Organisers

## Committees

### Local Organizing Committee, Granada

Special thanks to the local organizing team at the Andalusian School of Public Health (EASP) led by María José Sánchez, especially to Dafina Petrova and Tachy Prieto for their dedication. We thank **José Rodríguez Ocaña**, **Elisabeth María Ilidio Paulo**, **Lourdes Poudereux Colomer**, **Carlos Serrano**, **Herminia Muñoz**, **Oscar Mendoza**, **José María Gálvez**, **Daniel Redondo**, **Diego Rodero**, **Jesús Cáceres**, **Agustín de la Casa**, **Ignacio Alguacil**, **Marisol Suárez**, and all EASP professionals who contributed to making the conference a success.

### IACR Organizing Committee

**Freddie Bray**, *IACR Executive Secretary*
**Les Mery** *(IARC)*
**María (Chelle) Fernán** *(IARC)*
**Joanne Aitken**
**Charles Wiggins**
**Rob Verhoeven**, *IACR treasurer*

### ENCR Organizing Committee

**Raquel Negrao Carvalho**, *JRC & ENCR Secretariat*
**Manola Bettio**, *JRC and ENCR Secretariat*
**Brigitte Westritschnig**, *JRC*
**Liesbet van Eycken**, *ENCR*
**Volver Arndt**, *ENCR*
**Otto Visser**, *ENCR*
**Anna Gavin**, *ENCR*
**Mats Lambe**, *ENCR*
**Maciej Trojanowski**
**Francesco Cuccaro**, *ENCR*
**Laetitia Daubisse-Marliac**, *ENCR*

# International Association of Cancer Registries (IACR)

IACR
International Association of Cancer Registries

## The International Association of Cancer Registries (IACR)

The International Association of Cancer Registries (IACR) was founded in 1966 as a professional society dedicated to fostering the aims and activities of cancer registries worldwide. It is primarily for population-based registries, which collect information on the occurrence and outcome of cancer in defined population groups (usually the inhabitants of a city, region, or country). For each new cancer case, registries record details of the individual affected: the nature of the cancer, information on treatment, and on follow-up especially with respect to survival from the disease.

Registries play an important role in research into the cause of cancer, both by providing data on patterns and trends, and in different types of epidemiological studies (in particular, in their ability to follow up groups of persons exposed to potential hazards). Registries are an essential element in the planning and monitoring of cancer control strategies, and in identifying priorities in public health.

To ensure that cases are properly recorded, and that the statistical data gathered are complete and can be used to make valid comparisons, cancer registries must conform to accepted working practices and standards. The IACR was created to foster the exchange of information between cancer registries internationally, with the goal of improving the quality of data and comparability between registries.

The IACR membership is composed of cancer registries that are or have the potential of becoming population based cancer registries PBCRs), Networks and Associations of registries, organizations (who promote the goals and mission of IACR) and individuals who demonstrated professional commitments in cancer registration. More information is available here: http://www.iacr.com.fr/

## About the IACR Annual Scientific Conferences

The IACR Annual Scientific Meeting has been held regularly since 1970 is an ideal forum for exchanging knowledge with other cancer registry professionals. Hosted on a different continent each year, the IACR annual conference attracts an average of 300 delegates and offers a rich programme on topics related to the impact of cancer (incidence, survival), the evaluation of cancer screening and treatments, the aetiology of different cancers, among others.

# ENCR-JRC

**ENCR**
European Network
of Cancer Registries

## European Network of Cancer Registries

The European Network of Cancer Registries (ENCR) was established in 1990 within the framework of the 'Europe Against Cancer' programme of the European Commission. The initiative was supported by the International Agency for Research of Cancer (IARC), Association of Nordic Cancer Registries (ANCR), International Association of Cancer Registries (IACR) and the Group for Cancer Epidemiology and Registration in Latin Language Countries (GRELL).

The ENCR promotes collaboration between cancer registries, establishes data quality standards, provides training for cancer registry personnel and supports the dissemination of cancer burden indicators in Europe.

The ENCR is governed by the Steering Committee, composed of elected and co-opted members representing different European countries/regions, as well as representatives from IARC and IACR. The ENCR Steering Committee leads the scientific activities of the network promoting harmonisation of cancer registries' data, and works in close collaboration with the European Commission's Joint Research Centre (JRC) in supporting actions aimed at adding value to the ENCR data and in recognising and valuing cancer registry activity in Europe.

The current term of the Steering Committee will end in 2023, and elections for the Steering Committee are ongoing for the term 2024-2026.

## Joint Research Centre (JRC)

The Joint Research Centre (JRC) is a Directorate General of the European Commission that provides independent, evidence-based knowledge and science, supporting European Union policies to positively impact society. Scientists at the JRC carry out research in various fields, offering independent scientific advice to EU policymakers with high-quality research accompanied by high standards of scientific integrity and transparency.

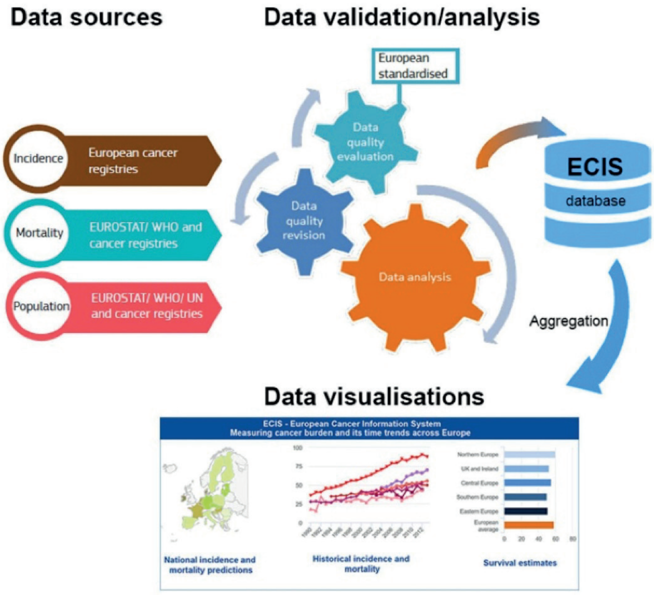
The JRC works closely with other Commission departments, EU institutions and agencies, as well as with scientific partners and policy organisations in Europe and internationally.

Since 2012, the JRC is supporting the ENCR towards further coordination and harmonisation of European cancer data. The JRC hosts the ENCR Secretariat, coordinating its tasks, organising its meetings, supporting its dissemination activities and more in general promoting the role of registries and the registration of cancer across Europe.

As an outcome of the collaboration between the JRC and the ENCR, the JRC has developed and maintains the European Cancer Information System, as the tool providing indicators that quantify cancer burden across Europe which builds on existing data and cooperation of cancer registries affiliated with the ENCR.

**Know more**

## European Cancer Information System



**The European Cancer Information System** (ECIS) is a comprehensive health and research infrastructure harmonising cancer registries' data and producing meaningful information to help the interpretation of the dynamics of cancer burden in Europe.

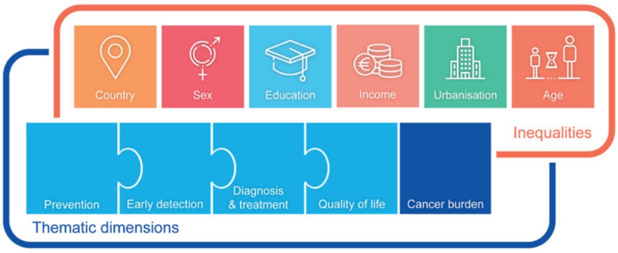
ECIS disseminates cancer burden indicators by cancer type, geographical area, sex, age and year, allowing the exploration of geographical patterns and temporal trends of incidence, mortality, and survival across European areas for up to 58 different cancer entities.

**The ECIS web application is organised in different modules:**

- historical incidence and mortality indicators at registry level
- national incidence and mortality predictions
- childhood cancer incidence historical data
- national survival estimates

The database feeding ECIS is dynamic and is updated as new data become available. It currently hosts more than 34 million cancer cases submitted by approximately 150 European population-based cancer registries in 34 European countries. A new module on cancer prevalence is currently under development.

## European Cancer Inequalities Registry



The European Cancer Inequalities Registry (ECIR) is a flagship initiative of the Europe's Beating Cancer Plan, helping policy makers and researchers to address cancer inequalities and disparities.

**ECIR** data tool is built on the pillars of the Europe's Beating Cancer Plan and presents data and indicators of inequalities in cancer of the whole cancer continuum, from prevention, screening, diagnosis and treatment to survival and quality of life, as well as indicators quantifying the burden of cancer.

These thematic dimensions are assessed from the perspective of different inequalities, ranging from disparities between countries and regions, to inequalities due to age, sex, income, education or even the level of urbanization.

# Andalusian School of Public Health (EASP)

www.easp.es

The Andalusian School of Public Health (EASP for Escuela Andaluza de Salud Pública in Spanish) is a public company of the Andalusian Government, attached to the Regional Ministry of Health and Consumer Affairs. EASP is dedicated to teaching, consultancy, and research. It contributes to health system innovation, improvement of population health, and promotion of scientific and technical collaboration and exchange at national and international levels.

EASP is a member of the main international associations of schools of public health and health management both in Europe and Latin America: EHMA (European Health Management Association), ASPHER (Association of Schools of Public Health in the European Region) and ALAESP (Latin American Association of Schools of Public Health).

EASP collaborates with the University of Granada and the International University of Andalusia, which both recognize the Master and Expert courses taught by EASP as their own degrees. EASP maintains collaboration agreements with a large number of universities and national organizations. Its main clients include the Ministry of Health and Consumer Affairs and the Andalusian Health Service. EASP also works for professional societies, hospitals, and regional health services throughout Spain, as well as for third countries through projects of the European Union, the Pan American Health Organization, the World Bank and the Inter-American Development Bank. EASP is a 'WHO Collaborating Center on Primary Health Care'.

## Granada Cancer Registry

https://www.registrocancergranada.es/
The Granada Cancer Registry (GCR) (Registro de Cáncer de Granada in Spanish) is a population-based cancer registry, attached to the Andalusian School of Public Health. It began its activity in 1985 as a project of the Ministry of Health and Consumer Affairs of the Government of Andalusia. Since 2007 it has been part of the Andalusian Cancer Registry.

The GCR is a member of the International Association of Cancer Registries (IACR), coordinated by the International Agency for Research on Cancer (IARC), and the Steering Committee of the European Network of Cancer Registries (ENCR). The GCR also belongs to the Spanish Network of Cancer Registries (REDECAN) and is one of the 14 Spanish population-based cancer registries that have published their data in successive editions of Cancer Incidence in Five Continents, edited by IARC.

Thanks to its excellent research trajectory since its inception, besides as an information system, the GCR is considered as a research unit focused on cancer. The research team of the GCR is integrated into the CIBER of Epidemiology and Public Health (CIBERESP) and the Biomedical Research Institute of Granada (ibs.Granada). Its research focuses mainly on descriptive epidemiology of cancer, risk factors in cancer and other chronic diseases, and healthcare aspects and evaluation of health outcomes in cancer patients.

The GCR has participated in multiple European projects such as the European Prospective Investigation into Cancer and Nutrition (EPIC), EUROCARE, CONCORD, BENCHISTA, ACCIS, RARECARE, EUROCHIP, and the European High-Resolution Studies.

Mon

13 Nov

# Pre-conference training and workshop

| | **MONDAY** 13 November 2023 | | Venue |
|---|---|---|---|
| 08:00 | Workshop Registration | | EASP entrance |
| 09:00-10:00 | **WORKSHOP 1:**<br>Registration of treatment variables in population-based cancer registries | **WORKSHOP 2:**<br>Population-based cancer survival metrics | W1:Rooms 1/2<br>W2:Main Hall |
| | Welcome and introduction to the workshop<br>**Liesbet van Eycken**<br>*Belgian Cancer Registry*<br>Treatment data availability. Working Group on treatment data harmonisation in European cancer registries: Overview of first ENCR recommendations<br>**Francesco Giusti**<br>*Belgian Cancer Registry*<br>Data sources in Surgery:<br>Classifications for Billing or Coding (ICD-9-CM, ICD-10-PCS, ICHI) versus Standard Terminology (SNoMed-CT)<br>**Filip Ameye**<br>*Belgian Cancer Registry* | Welcome<br>**Mark Rutherford**<br>*University of Leicester*<br>Crude and net survival metrics<br>Choice of framework: relative survival or cause-specific | |
| 10:00-10:30 | *Coffee Break* | | |
| 10:30-12:00 | WORKSHOP 1 (continued): | **WORKSHOP 2** (continued): | W1:Rooms 1/2<br>W2:Main Hall |
| | Terminology and cornerstones to describe radiotherapy. Data sources, classifications and practical tools to collect information<br>**Lien van Walle**<br>*Belgian Cancer Registry*<br>Systemic therapy (chemotherapy, targeted therapy, immunotherapy, hormonal therapy)<br>**Otto Visser**<br>*Netherlands Cancer Registry*<br>Discussion and Conclusion | Choice of framework: relative survival or cause-specific<br>Age-standardisation<br>Survival metrics for different audiences/purposes<br>Gains in life expectancy and avoidable deaths<br>Discuss estimation approaches available in both a model-based and non-parametric setting<br>Final questions & Closing remarks | |
| 12:00 | *Lunch Break* | | |

| | | |
|---|---|---|
| 12:00-17:00 | IACR Board of Directors Meeting | Room 7 |
| 15:30-17:30 | GRELL Steering Committee Meeting | Room 6 |
| 17:30 | *Departure for the Welcome Reception Venue*<br>*Buses will depart at 17.30h from the EASP and at 17.40h from Jardines de Triunfo (central location close to the majority of hotels, for people who did not participate in the workshops or just arrived). One can also walk from the city centre.* | |
| 18:00 | *Welcome Reception*<br>*Hosted by the Andalusian School of Public Health (EASP) and the Granada Cancer Registry.*<br>*Address: Paseo de los Mártires, s/n, 18009 Granada, https://maps.app.goo.gl/1WqUuva3Q1Jp6br46*<br>*After the Reception, buses will transport the delegates back to Jardines de Triunfo. Those who can may also walk on the way back.* | Carmen de los Martires |

# Pre-conference training and workshop

| | **MONDAY** 13 November 2023 | | Venue |
|---|---|---|---|
| 13:00-15:00 | **WORKSHOP 3:**<br>Recurrences | **WORKSHOP 4:**<br>IT tools and novel AI approaches for cancer registration | W3:Rooms 1/2<br>W4:Main Hall |
| | Introduction to the workshop<br>**Anna Gavin**<br>*Queens University, Belfast, Northern Ireland*<br><br>Experience of recording recurrence and progression in the Netherlands; implications for the resources<br>**Otto Visser**<br>*Netherlands Cancer Registry*<br><br>Machine learning algorithm to estimate distant breast cancer recurrence at the population level with administrative data<br>**Freija Verdoodt**<br>*Belgian Cancer Registry*<br><br>Using data and patient pathways to capture and improve recurrence data submissions in England<br>**Jenni Lai & Karen Graham**<br>*NHS England*<br><br>Discussion<br><br>Cancer registry survey results regarding recurrence data<br>**Luciana Neamtiu**<br>*Cluj Cancer Registry/UBB Cluj, Romania* | Introduction to the workshop<br>**Mats Lambe, Volker Arndt, Maciej Trojanowski**<br>*ENCR Steering Committee*<br><br>Building a federated oncology data network in the Netherlands (HERACLES)<br>**Dimitris Katsimpokis**<br>*IKNL, Netherlands*<br><br>Data harmonization and data use in a federated rare cancer network<br>**Maaike van Swieten**<br>*IKNL, Netherlands*<br><br>TextMining of pathology reports for uniform classifications (TeMeK)<br>**Marco Halber**<br>*Stuttgart, Germany*<br><br>Merging and validating cancer registry data using AI techniques (ZuVaKI)<br>**Philipp Leppert**<br>*Mainz, Germany*<br><br>AI-supported linkage and evidence from data from of clinical cancer registries, SHI, and hospitals (onkoFDZ)<br>**Kees Kleihues van Tol & Bianca Franke**<br>*ADT, Berlin, Germany*<br><br>AI-assisted use of cancer registry data to explore quality of cancer care (AI-CARE)<br>**Alexander Katalinic**<br>*Lübeck, Germany*<br><br>Discussion | |
| 15:00-15:30 | *Coffee Break* | | |
| 15:30-17:00 | WORKSHOP 3 (continued): | **WORKSHOP 4** (continued): | W3:Rooms 1/2<br>W4:Main Hall |
| | ENCR working group conclusions defining recurrence, progression & transformation<br><br>Presentation of the flow diagrams for solid and haematological malignancies with worked examples of recurrence coding<br>**Sinead Hawkins**<br>*N. Ireland Cancer Registry*<br><br>Discussion and Conclusion<br>**Anna Gavin** | Making quality check rules more IT-Friendly: streamlining implementation in cancer registry software<br>**Łukasz Taraszkiewicz**<br>*Greater Poland Cancer Registry*<br><br>The importance of hematooncology data in cancer registries and ensuring high-quality reporting<br>**Irmina Michałek**<br>*National Cancer Registry, Poland*<br><br>Best practices for implementing quality check software and reporting tools: lessons learned from Nordcan, and future direction<br>**Siri Larønningen**<br>*Norwegian Cancer Registry*<br><br>Rapid cancer registration in England created in response to the COVID pandemic<br>**Carolynn Gildea**<br>*NHS England*<br><br>Discussion and Conclusion<br>**Mats Lambe, Volker Arndt, Maciej Trojanowski** | |
| 17:00 | **End of Workshop** | **End of Workshop** | |

# Detailed meeting programme

| | **TUESDAY** 14 November 2023 | Venue |
|---|---|---|
| **08:00-09:00** | **Conference Registration**<br>**Poster Sessions** | EASP Entrance<br>Rooms 1/2 and 3/4 |
| **09:00-09:15** | Welcome from the Organisers and Hosts: IACR, ENCR, EASP and the Government of Andalucía<br>**Joanne Aitken** (IACR), **Liesbet Van Eycken** (ENCR), **Blanca Fernández-Capel** *(Managing Director, Escuela Andaluza de Salud Pública (EASP)*, and **Isaac Túnez** *(General Secretary of Public Health and R&D, Government of Andalucía)* | Main Hall |
| **09:15-09:30** | Opening Address: The importance of Cancer Registration for Public Health: the Andalusian Cancer Registry<br>**Jorge del Diego Salas**, *General Director of Public Health and Pharmaceutical Regulation, Government of Andalucía*<br>Moderated by **Dafina Petrova** | Main Hall |
| **09:30-10:00** | Keynote Presentation: Cancer Information in the Era of Precision Medicine<br>**Marina Pollán Santamaría**, *Professor, National Center of Epidemiology of the Health Institute Carlos III and Scientific Director, CIBER of Epidemiology and Public Health*<br>Moderated by **María José Sánchez Pérez** | Main Hall |
| 10:00-10:30 | *Coffee Break · Poster Sessions (Rooms 1/2 and 3/4)* | |
| **10:30-12:00** | **Plenary Presentations 1:**<br>**Registry Innovations, Research, and Health Policy**<br>Session Chairs: **Vesna Zadnik** and **Maciej Trojanowski** | Main Hall |
| 10:35 | Do Investments in Cancer Registry Databases and Tools Bring Added Value? NORDCAN as an Example<br>**Hans Storm**, *Danish Cancer Society* | |
| 10:45 | Streamlining Cancer Data Management: Linking OpenMRS and DHIS2/Oncology Tracker for Automated Cancer Data Entry<br>**Daniel Sabushimike**, *Rwanda Biomedical Centre* | |
| 10:55 | Evaluation of Parsed Pathological Reports in the Data Collection Process of a Cancer Registry<br>**Johannes Hüsing**, *Landeskrebsregister Nordrhein-Westfalen* | |
| 11:05 | Artificial Intelligence and Cancer Registry Data to Predict Rare Events in Cancer Survivors<br>**Alice Bernasconi**, *Department of Epidemiology and Data Science, Fondazione IRCCS Istituto Nazionale dei Tumori* | |
| 11:15 | Cancer Registry Enrichment via Linkage with Hospital-Based Electronic Medical Records in China<br>**Hongmei Zheng**, *National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences* | |
| 11:25 | The Cancer Pathchart Initiative and the Future of Tumor Site-Histology Standards for Cancer Registration<br>**Serban Negoita**, *National Cancer Institute* | |
| 11:35 | Reference Adjusted Cancer Survival Measures: What Are They and When Should They Be Used?<br>**Paul Lambert**, *Karolinska Institutet* | |
| 11:45 | Discussion | |
| 12:00-13:30 | *Lunch Break*<br>*Poster Sessions* (Rooms 1/2 and 3/4) | |

# Detailed meeting programme

| | **TUESDAY** 14 November 2023 | Venue |
|---|---|---|
| **13:30-17:00** | **Plenary Presentations 2:**<br>**COVID 19 – Impact on Cancer Surveillance, Services, and Outcomes**<br>Session Chairs: **Marianna de Camargo Cancela** and **Les Mery** | Main Hall |
| 13:35 | Incidence Gap in Screening-Detectable Cancers During the First Year Of COVID-19 Pandemics – Wielkpolskie, Poland<br>**Irmina Maria Michalek**, *Maria Sklodowska-Curie National Research Institute of Oncology* | |
| 13:45 | Early Mortality of Children with Cancer During the COVID-19 Pandemic Period in Colombia (2020-2021)<br>**Oscar Ramirez**, *Fundación POHEMA* | |
| 13:55 | How Did Breast Cancer Patients Fare During and After the COVID Pandemic Compared to Controls?<br>**Karianne Svendsen**, *Cancer Registry of Norway* | |
| 14:05 | Stark Impact of COVID-19 on Cancer Pathways - Affecting Incidence, Presentation, Diagnosis, Stage, Treatment, Survival<br>**Damien Bennett**, *Northern Ireland Cancer Registry* | |
| 14:15 | COVID-19 Pandemic Impact on Cancer Incidence, Stage, and Referrals in Wales Using Rapid Cancer Data<br>**Dyfed Huws**, *Knowledge and Research Directorate, Public Health Wales* | |
| 14:25 | Discussion | |
| 15:00-15:30 | *Coffee Break · Poster Sessions (Rooms 1/2 and 3/4)* | |
| **15:30-17:00** | **European Network of Cancer Registries (ENCR) General Assembly:**<br>**Updates from the ENCR Steering Committee and the EC Joint Research Centre on ENCR activities**<br>· Welcome and report on ENCR-JRC activities 2021-2023<br>· ECIS: the JRC and the ENCR registries<br>· 2022 ECIS data call<br>· The JRC-ENCR Data Quality Check Software new version (QCS 2.1)<br>· 2022 cancer burden estimates and long-term estimates<br>· Cancer Registration practices in Europe – survey results<br>· Q&A<br>*(Open to all Delegates)* | Main Hall |
| 17:15 | **Departure for the Alhambra**<br>*(Shuttle bus/es will depart 17:15 from the EASP, 17:30 from Jardines del Triunfo)*<br>*Please do not forget your passport and Alhambra ticket (to be picked up during the day)!* | EASP Grounds |
| 18:00 | **Guided group visit to the Alhambra**<br>*PLEASE NOTE THE FOLLOWING: Each guest will be asked to present their passports. Please do not forget to bring this document with you. A snack/light dinner-in-a-bag will be provided.*<br>*After the Alhambra visit, the buses will transport the delegates to a central location in proximity to the hotels. Those who can may also walk on the way back (it would be a beautiful walk!)* | Alhambra Palace |

# Detailed meeting programme

| | **WEDNESDAY** 15 November 2023 | Venue |
|---|---|---|
| **08:00-09:00** | **Poster Sessions**<br>**Special Meeting: Cancer RADAR** | Rooms 1/2 and 3/4<br>Room 6 |
| **09:00-09:30** | **2023 Johannes Clemessen Lecture:**<br>Cancer Surveillance in India: The Role of National Cancer Registry Programme<br>**Prashant Mathur**, *Director of the ICMR National Centre for Disease Informatics and Research, India*<br>Moderated by **Freddie Bray** | Main Hall |
| **09:30-10:45** | **Plenary Presentations 3:**<br>**Descriptive Epidemiology Including Special Populations**<br>Session Chairs: **Hiromi Sugiyama** and **Otto Visser** | Main Hall |
| 09:35 | Current and Future Cancer Burden in the Gulf Cooperation Council Countries<br>**Saleh Alqahtani**, *King Faisal Specialist Hospital & Research Centre* | |
| 09:45 | Patterns of Cancer Incidence in Setif, Algeria: Analyzing 34 Years of Cancer Registration 1986-2019<br>**Mokhtar Hamdi Cherif**, *Setif Cancer Registry* | |
| 09:55 | A Nordic Cohort Study on Cancer Incidence and Mortality Among Non-Western Immigrant Women<br>**Sirpa Heinävaara**, *Finnish Cancer Registry / Cancer Society of Finland* | |
| 10:05 | The Incidence of Female Breast Cancer in Nairobi County for the Period 2011-2016<br>**Hellen Rugut Oburu**, *Kenya Medical Research Institute* | |
| 10:15 | Thyroid Cancer Incidence and Trends According to a Population-Based Study in Girona, Spain, 1994-2020<br>**Rafael Marcos Gragera**, *Registre Càncer Girona, Institut Català d'Oncologia – IDIBGI* | |
| 10:25 | Discussion | |
| 10:45-11:15 | *Coffee Break · Poster Sessions (Rooms 1/2 and 3/4)* | |
| **11:15-12:40** | **Plenary Presentations 4:**<br>**Registry Innovations, Research and Health Policy**<br>Session Chairs: **Betsy Kohler** and **Francesco Cuccaro** | Main Hall |
| 11:20 | Socio-Economic Inequalities in Adherence to Clinical Practice Guidelines: a Population-Based Study of Breast Cancer Patients<br>**Dafina Petrova**, *Cancer Registry of Granada, Andalusian School of Public Health* | |
| 11:30 | Obtaining Stage-Specific Life Expectancy Estimates for a Range of Cancer Sites in England<br>**Mark Rutherford**, *Department of Population Health Sciences, University of Leicester* | |
| 11:40 | Clinical Characteristics of Breast Cancers Based on Detection Modes: A Luxembourg Nationwide Study (2013-2018)<br>**Quentin Rollet**, *National Cancer Registry of Luxembourg* | |
| 11:50 | Improved Forecasting of Cancer Incidence Using Leave-Future-Out Validation<br>**Maarten Jacob Bijlsma**, *Netherlands Comprehensive Cancer Organisation (IKNL)* | |
| 12:00 | Centralization of Cancer Patients to Designated Cancer Care Hospitals in Japan<br>**Hiromi Sugiyama**, *Radiation Effects Research Foundation Japan* | |
| 12:10 | Canstaging+ and Staging Childhood Cancer for Population-Based Cancer Registries<br>**Isabelle Soerjomataram**, *International Agency for Research on Cancer* | |
| 12:20 | Discussion | |
| 12:40-14:00 | *Lunch Break*<br>*Poster Sessions (Rooms 1/2 and 3/4)* | |

| | **WEDNESDAY** 15 November 2023 | Venue |
|---|---|---|
| **14:00-15:00** | **Plenary Presentations 5:**<br>**Childhood Cancer Registration**<br>Session Chairs: **Eva Steliarova** and **Joanne Aitken** | Main Hall |
| 14:05 | Childhood Cancer Incidence and Survival in Argentina 2000-2021: From the Net Argentine Oncopediatric Registry (ROHA)<br>**Agustina Chaplin**, *Instituto Nacional del Cáncer Argentina* | |
| 14:15 | Overall and Progression Free Survival of Younger Vs. Older Adults with Lung Adenocarcinoma<br>**Annika Waldman**, *Institute for Social Medicine and Epidemiology, University of Lübeck* | |
| 14:25 | Trend of Childhood Cancer Incidence in Aden Cancer Registry Over 20 Years' Experience<br>**Huda Basaleem**, *Aden Cancer Registry and Research Center, University of Aden* | |
| 14:35 | Survey of Childhood and Adolescent Cancer Registration in Europe and the Example of Slovenia<br>**Ana Mihor**, *Epidemiology and Cancer Registry, Institute of Oncology Ljubljana* | |
| 14:45 | Discussion | |
| **15:00-15:30** | Keynote Presentation:<br>The 50th Anniversary of the SEER Program in the United States, its History and Impact<br>**Lynn Penberthy**, *Associate Director for the Surveillance Research Program (SRP), Division of Cancer Control and Population Sciences (DCCPS), US National Cancer Institute (NCI)*<br>Moderated by **Charles Wiggins** | Main Hall |
| 15:30-16:00 | *Coffee Break · Poster Sessions (Rooms 1/2 and 3/4)* | |
| **16:00-17:15** | **Plenary Presentations 6:**<br>**Clinical and Epidemiological Studies from Cancer Registry Data**<br>Session Chairs: **Laetitia Daubisse-Marliac** and **Volker Arndt** | Main Hall |
| 16:05 | Development and Validation of Registry Derived Stage at Diagnosis for Gastro-Intestinal Tract and Gynaecological Cancers<br>**Kris Ivanova**, *Cancer Council Victoria* | |
| 16:15 | Trastuzumab Deruxtecan Versus Ramucirumab+Paclitaxel for Patients with HER2-Positive Gastric Adenocarcinoma: A Propensity Score Matched Comparison<br>**Rob Verhoeven**, *Netherlands Comprehensive Cancer Organisation (IKNL)* | |
| 16:25 | Linking Comorbidity Data into Cancer Registries: Cardiovascular Comorbidities of Cancer Patients in Northern Ireland<br>**Hüseyin Küçükali**, *Centre for Public Health, Queen's University Belfast* | |
| 16:35 | Rare Cancers In Europe: The EUROCARE-6 Updated Results<br>**Laura Botta**, *Fondazione IRCCS Istituto Nazionale dei Tumori, Milano* | |
| 16:45 | M1 Registration: Signaling Patients Who Develop Metachronous Metastases After Primary Breast Cancer<br>**Linda De Munck**, *Netherlands Comprehensive Cancer Organisation (IKNL)* | |
| 16:55 | Discussion | |

| | **WEDNESDAY** 15 November 2023 | Venue |
|---|---|---|
| **17:15-18:30** | **Plenary Presentations 7:**<br>**COVID 19 – Impact on Cancer Surveillance, Services, and Outcomes**<br>Session Chairs: **Tomohiro Matsuda** and **Jaume Galceran** | Main Hall |
| 17:20 | The Pandemic-Related Disparities in 2020 Cancer Incidence by Sex and Age – Greater Poland, Poland<br>**Maciej Trojanowski**, *Greater Poland Cancer Registry, Greater Poland Cancer Centre* | |
| 17:30 | Impact of the COVID-19 Pandemic on the Diagnosis and Treatment of Cancer in India<br>**Prashant Mathur**, *ICMR-National Centre for Disease Informatics and Research* | |
| 17:40 | Impacts of the COVID-19 Pandemic on Cancer Incidence in Ireland: Data from the National Registry<br>**Paula Tierney**, *National Cancer Registry Ireland* | |
| 17:50 | Involvement of the European Cancer Registries in Studies Measuring the Impact of COVID-19 Pandemic<br>**Luciana Neamtiu**, *Oncology Institute 'Prof.dr. Ion Chiricuta'* | |
| 18:00 | Stage Shift and Survival Declines for Head and Neck Cancers During the Belgian COVID-19 Pandemic<br>**Liesbet Van Eycken**, *Belgian Cancer Registry* | |
| 18:10 | Discussion | |
| **18:30** | **Poster Sessions** | Rooms 1/2 and 3/4 |
| 19:15 | **Departure for the Dinner Venue**<br>*Buses will leave from EASP at 19.15h and from Jardines del Triunfo at 19.30h.* | |
| 19:45 | **GALA DINNER**<br>*Address: Jardines Caballo Blanco, 18015 Granada https://maps.app.goo.gl/U8zMhX5aCvecL2dJ9*<br>*Shuttle buses will be available to bring the delegates back to Granada – Center (near hotels)* | Caballo Blanco Gardens |

| | THURSDAY 16 November 2023 | Venue |
|---|---|---|
| **08:00-09:00** | Poster Sessions<br>Special Meeting: BENCHISTA Breakfast Meeting *(by invitation only)* | Rooms 1/2 and 3/4<br>Room 6 |
| **09:00-10:00** | **International Association of Cancer Registries (IACR) Session:**<br>**Updates from IACR**<br>**Updates from IARC**<br>· Cancer Incidence in Five Continents Volume XII<br>· Report on the Global Initiative for Cancer Registry Development (GICR)<br>· Other Related Projects | Main Hall |
| **10:00-10:45** | **Co-Presentation and Discussion: The International Classification of Diseases (ICD-11) and the International Classification of Diseases for Oncology (ICD-O)**<br>**Eva Krpelanova**, *World Health Organization (WHO)* and<br>**Ariana Znaor**, *International Agency for Research on Cancer (IARC)*<br>Moderated by **Nadine Walker** | Main Hall |
| 10:45-11:15 | *Coffee Break · Poster Sessions (Rooms 1/2 and 3/4)* | |
| **11:15-12:30** | **Plenary Presentations 8:**<br>**Descriptive Epidemiology Including Special Populations**<br>Session Chairs: **Ann Chao** and **Rob Verhoeven** | Main Hall |
| 11:20 | Second Primary Neoplasms among Childhood Cancer Survivors in Europe: a Population-Based Study<br>**Neimar De Paula Silva**, *International Agency for Research on Cancer* | |
| 11:30 | Cancer Burden in Adolescents and Young Adults in İzmir, Türkiye<br>**Su Ozgur**, *İzmir Provincial Health Directorate, Non Communicable Diseases, Cancer Section* | |
| 11:40 | Cancer in Adolescents (Aged 18-24 Years Old) in the Ibadan Cancer Registry (IBCR), Nigeria, 2018-2022<br>**Olufemi Ogunbiyi**, *University of Ibadan, Nigeria* | |
| 11:50 | International Benchmarking of Childhood Cancer Survival by Tumour Stage, First Results of the Benchista Project<br>**Fabio Didonè**, *Fondazione IRCCS Istituto Nazionale di Tumori di Milano* | |
| 12:00 | Discussion | |
| 12:15 | *Lunch Break*<br>*Final Poster Sessions (Rooms 1/2 and 3/4)* | |
| 12:30 | **Anglesio** Prize Alumni Meeting | Room 6 |

Thu

# Detailed meeting programme

16 Nov

| | **THURSDAY** 16 November 2023 | Venue |
|---|---|---|
| 13:45-15:00 | **Plenary Presentations 9:**<br>**Descriptive Epidemiologic Studies Using Registry Data**<br>Session Chairs: **Marc Maynadie** and **Kyu-Won Jung** | Main Hall |
| 13:50 | Main Cancers Incidence in Metropolitan France in 2023 and Trends Since 1990<br>**Bénédicte Lapotre-Ledoux**, *Somme Cancer Registry, CHU Amiens-Picardie* | |
| 14:00 | Cervical Cancer Survival Trends by Age and Stage: Women Diagnosed During 2000-2014 (CONCORD-3 and VENUSCANCER)<br>**Pamela Minicozzi**, *London School of Hygiene and Tropical Medicine, London* | |
| 14:10 | Esophageal and Gastric Cancer Incidence Trends in Golestan, Iran: an Age-Period-Cohort Analysis 2004-2018<br>**Gholamreza Rshandel**, *Golestan Research Center of Gastroenterology and Hepatology, Golestan University of Medical Sciences* (to be presented by **Dr Freddie Bray**) | |
| 14:20 | Population-Based Cancer Registries in Mexico: Lessons Learned During the First Five-Years of Tijuana's 'Bajareg' Registry<br>**Rebeca Rivera Gómez**, *US-Mexico Border Health Commission, Tijuana Population-Based Cancer Registry* | |
| 14:30 | Time Trends in 5-Year Relative Survival for Common Cancer Types in Zurich, Switzerland<br>**Miriam Wanner**, *Cancer Registry Zurich, Zug, Schaffhausen and Schwyz, University Hospital Zurich* | |
| 14:40 | Discussion | |
| 15:00-15:45 | **Conference Awards and Tributes:**<br>- Poster Prizes<br>- Enrico Anglesio Prize<br>- IACR Honorary Membership Awards<br><br>**Announcements:**<br>- Presentation of the 2024 IACR Scientific Conference Host and Venue<br><br>Moderated by **Charles Wiggins** and **Rob Verhoeven** | Main Hall |
| 15:45-16:00 | **Conference Closing Remarks:**<br>**Francisco Javier Vázquez Granado,** *Secretary General of Humanization, Planning, Social Healthcare and Consumption. Government of Andalucia*<br>Moderated by **María José Sánchez Pérez** | Main Hall |
| 16:00-16:30 | *End of Programme and Farewell Coffee Break* | |
| 16:30-18:30 | **Special Meeting:** EUROCARE Working Group | Room 6 |

Fri

17 Nov

| | **FRIDAY** 17 November 2023 *(Post Conference)* | Venue |
|---|---|---|
| 09:30-11:30 | **Special Meeting:** CONCORD-VENUSCANCER Working Group | Main Hall |
| 11:30 | *Coffee Break* | |

Dr. **Marina Pollán Santamaría**, studied medicine at the University of Salamanca in Spain and obtained her PhD from the Autonomous University of Madrid, specializing in preventive medicine and public health. She is professor and former Scientific Director of the National Center of Epidemiology at the Health Institute Carlos III, where she is Head of the Cancer Epidemiology Service in the Environmental Epidemiology and Cancer Area. She is currently Scientific Director of the CIBER of Epidemiology and Public Health (CIBERESP), a national research consortium, where she leads a research group. She is also principal investigator of the new Spanish IMPacT population-based cohort, currently recruiting 200.000 people all over Spain, with the goal to contribute to the effective deployment of Public Health and Precision Medicine in the National Health System. This year she was named 'Doctora Honoris Causa' by the University of Granada in Spain. During the COVID-19 pandemic, she was the scientific coordinator of the ENE-COVID national population-based sero-epidemiological study.

Dr. Pollán has been the Principal Investigator behind many research projects, primarily about breast cancer but also other frequent tumors such as colorectal, stomach, and prostate cancer. Dr. Pollan co-leads the multicenter project MCC-Spain (Multi case-control study) and is member of the Spanish Breast Cancer Research Group. Her main research line focuses on lifestyle determinants of cancer risk and the role of mammographic density in breast cancer.  She has published more than 350 scientific articles in collaboration with researchers from different fields (molecular biologists, geneticists, oncologists, pathologists, surgeons…), in addition to working with public health professionals in the field of epidemiology and cancer control.

## Cancer information in the era of Precision Medicine

The goal of this lecture is to present a reflection on the possible implications of the new paradigm of precision medicine in cancer surveillance systems, particularly cancer registries. Precision medicine, defined as 'a healthcare approach that uses molecular information (genomic, transcriptomic, proteomic, metabolomic and others), phenotypic and health data from patients and other sources of information to generate care insights to prevent, diagnose and treat human diseases in a personalized way, with the goal of improving health outcomes', makes a particular emphasis in including prevention among the main activities of the health system, while a new battery of biomarkers will be consider to individualized diagnosis and treatment. Cancer registries are the gold-standard surveillance system, not only for cancer, but are also the model for other chronic diseases that would like to have good quality information to monitor their impact. To continue playing such a relevant role, cancer registries will have to adapt to the new paradigm, enrich the information they provide and look for new ways of updating it. They should keep playing this key role in areas such as personalized primary prevention and cancer screening, together with an assessment of the inequalities that the new paradigm may imply, derived from different access to genetic testing, new biomarkers and increasingly sophisticated treatments. The European Beating Cancer Plan stablishes the need of providing information around four key action areas: prevention, early detection, diagnosis and treatment and quality of life of cancer survivors. Cancer registries are important to validate the data obtained with new cancer information systems, such as the one that the Ministry of Health is developing here, in Spain. In the near future, cancer data lakes will serve to foster investigation taking advantage of the wealth of data that health systems generate. This information will be valuable and complement but not substitute current cancer registries, with their population-based approach.

# Invited speakers

**Prashant Mathur** is a Pediatrician, having completed his post-graduation and PhD in Pediatric Gastroenterology & Hepatology from the All India Institute of Medical Sciences (AIIMS) New Delhi. Dr Mathur has further experience in clinical epidemiology, program evaluation and evidence to policy translation, having initiated several major projects of ICMR, worked with WHO and was nodal officer of ICMR international collaborations with several agencies and universities.

At present Dr Mathur is the Director of ICMR National Centre for Disease Informatics and Research, Bengaluru, Indian Council of Medical Research, since May 2016 wherein work involves research on epidemiology, patterns of care and survival studies on cancer, stroke, cardiovascular diseases, diabetes and their risk factors. He is in charge of the National Cancer Registry Program in India. The work at NCDIR informs policy and program for NCD prevention and control in India. Dr Mathur is author in more than 90 peer-reviewed publications in national and international journals and chapters in 19 books.
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## Cancer Surveillance in India- Role of the National Cancer Registry Programme

### 2023 Johannes Clemmesen Lecture

Cancer surveillance involves systematically collecting, analysing, interpreting, and disseminating cancer data to facilitate prevention and control programs. Cancer registries play a vital role in surveillance by collecting and managing data on cancer patterns, treatment access, and quality of care in a specific geographical area. In India, the Indian Council of Medical Research (ICMR) established the National Cancer Registry Programme (NCRP) in 1981 to strengthen cancer surveillance which is coordinated by the ICMR-National Center for Disease Informatics & Research (NCDIR), Bengaluru through a network of 38 Population-Based Cancer Registries (PBCRs) and 230 Hospital-Based Cancer Registries (HBCRs). The PBCRs' population coverage enables the study of risk factors and prevalence of exposure in specific areas, facilitating research studies on cancer aetiology and formulating hypotheses. Cancer registries also serve as study sites for patterns of cancer care and survival studies. The projected increase in cancer cases in India provides strong evidence to plan robust cancer control strategies. The NCRP data provides evidence for informed policymaking, enabling the development of targeted interventions for cancer prevention, early detection, and treatment through government initiatives, such as the National Programme for Non-Communicable Diseases (NP-NCD), leading to better screening and disease outcomes. It has also influenced the establishment of Regional Cancer Centres and Tertiary Care Cancer Centres. NCRP data is extensively used for cancer research since regional variations in cancer rates necessitate research into potential causes and risk factors. Additionally, cancer registries have helped identify the proportion of cancers associated with tobacco use, guiding the formulation of tobacco control policies and other preventive actions. Cancer is not yet a nationally notified disease and thus its registration is active. This poses challenges related to incomplete data collection, delayed transmission and limited resources. The path ahead involves addressing challenges in sustaining cancer registries through strong political will, resource allocation, and linkages with relevant public programs and databases.

**Johannes Clemmesen** (1908- 2010) was a pioneer and founder of Danish cancer epidemiology. He founded and led the Danish Cancer Registry under the auspices of the Danish Cancer Society in 1942 giving Denmark a unique position in understanding cancer causes, development and incidence. He led the Danish Cancer Registry until 1980. His publication series in 5 volumes 'Statistical studies in malignant neoplasms' still stand as a milestone in cancer epidemiology with observations and analysis and literature review up to 1977. He was one of the first honorary members of the International Association of Cancer Registries.

**Dr. Lynne Penberthy** is the Associate Director for the Surveillance Research Program (SRP), which is within the Division of Cancer Control and Population Sciences (DCCPS) at the National Cancer Institute (NCI). Dr. Penberthy obtained her MD from the University of Michigan and her MPH in epidemiology at Johns Hopkins. Dr. Penberthy's career includes a surgical internship in Baltimore, Maryland, at the Sinai Hospital and a preventive medicine residency at Johns Hopkins University. After her residency, she completed her post-doctoral training in epidemiology with the CDC as an epidemic intelligence service (EIS) officer with the Commonwealth of Virginia. She is licensed to practice medicine in the state of Maryland.

Prior to her NCI appointment, Dr. Penberthy was the Director of Cancer Research Informatics and Services and Associate Professor of General Internal Medicine at the Virginia Commonwealth University Massey Cancer Center. She directed a team in the development of innovative software with the objectives of using existing data for clinical trials eligibility screening, automated capture of treatment data from oncology practice claims, and the extraction of clinical characteristics from various electronic medical records (EMR) components. Dr. Penberthy was also involved in biobanking and annotation of specimens using clinical data. She has 20 years of experience in cancer surveillance and automation using secondary data. Dr. Penberthy has worked on more than 20 grants and contracts as well as 31 publications related to using secondary data and/or informatics tools for cancer surveillance and clinical trials assessment.

### The 50th Anniversary of the SEER Program in the United States, its History and Impact

This presentation reports on the history of the Surveillance Epidemiology and End Results (SEER) program from its inception in 1973 through its 50 years of collecting and reporting on cancer trends in the US. The program has grown dramatically to include nearly 50% of the US population. In addition the presentation highlights *1)* several of the novel methods and solutions developed for use of the data; *2)* recent enhancements to data included in the SEER program and *3)* new processes for controlled release of the data.

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# Invited speakers

**Eva Krpelanova**, is medical officer in the team of Classifications and Terminologies, WHO. She is a pathologist, worked in the Netherlands both in the clinical pathology and as a medical officer responsible for the mortality statistics at the Statistics Netherlands until joining WHO in 2021. Eva is responsible for the medical related matters in the WHO – Family of International Classifications (WHO-FIC), especially International Classifications Diseases 11th revision (ICD-11). Eva was born and raised in Slovakia.

The International Classification of Diseases, 11th revision (ICD-11) provides a standardized digital system for classifying and coding diseases, including cancer. ICD has played a crucial role in cancer registries by facilitating the collection, analysis, and reporting of cancer-related data both from morbidity and mortality sources.

ICD-11 has improved accuracy and specificity in classifying cancer types and subtypes. The classification offers a more detailed categorization of different types of cancer, allowing for better tracking and monitoring of specific cancer cases. This enhanced specificity enables cancer registries to capture the evolving landscape of cancer diagnoses and treatments, providing valuable insights for research and healthcare planning.

ICD-11 includes information on cancer stages and prognostic factors. The classification emphasizes the importance of capturing data on the severity and progression of cancer cases. This enables cancer registries to evaluate patient outcomes, survival rates, and the effectiveness of various treatment interventions. The ability to track and analyze cancer stages and prognostic factors provides insights into the effectiveness of different treatment approaches and helps inform clinical decision-making.

The use case of ICD-11 for cancer registries is instrumental in improving the accuracy, specificity, and comprehensiveness of cancer-related data collection and analysis. The standardized classification system enables better tracking and monitoring of cancer cases, facilitates personalized treatment approaches, and provides insights into patient outcomes and survival rates. ICD-11 has the potential to contribute to advancements in cancer research, policy-making, and healthcare planning, ultimately leading to improved cancer prevention, diagnosis, and treatment outcomes.

**Ariana Znaor** is a scientist at the Cancer Surveillance Branch at the International Agency for Research on Cancer (IARC). Within the Global Initiative for Cancer Registry Development program (GICR), she is responsible for coordination of the Regional Hub for Cancer Registration in Izmir (covering Northern Africa, Central and Western Asia).

Before joining IARC in 2013, Dr Znaor was the director of the Croatian National Cancer Registry for 13 years, as well as associate professor of epidemiology at the Andrija Stampar School of Public Health, Zagreb. She completed her MD, MSc and PhD degrees at the University of Zagreb, Croatia.

Her areas of expertise are cancer registration and descriptive epidemiology. She is one of the editors of the Cancer Incidence in Five Continents publications (Volume XI and Vol XII, in progress) with a specific area of interest in tumour classifications. Since the establishment of the Izmir Hub in 2013 she organised more than 25 regional cancer registration courses and workshops and has been providing support to cancer registries in the Hub region. Dr Znaor is author of more than 140 peer-reviewed articles (https://www.ncbi.nlm.nih.gov/pubmed/?term=Znaor+A).

### The future of the International Classification of Diseases (ICD-O-4) and its implementation strategies

The International Classification of Diseases for Oncology, now in its 3rd Edition (ICD-O-3) is specifically developed for coding cancer according to its site of origin (topography- modified from ICD), appearance under the microscope (morphology), and behaviour (malignant, benign, in situ or uncertain), and is optimal for use in cancer registries. In the current 4-digit morphology structure there is a lack of available codes for new morphological diagnoses.

Methods: An addition of a 5th digit was proposed for the next ICD-O edition (ICD-O-4). This approach, with the addition of a ‘0’ where there is no need for a more specific code, or other values if needed, was chosen for the ease of conversion and consistency with ICD-O-3 (similar to a MOTNAC to ICD-O-1 conversion), including the possibility to collapse to previous versions.

Results: Following the completion of the 5th Edition of the WHO Classification of Tumours (Blue Books), ICD-O-4 codes have been compiled and are now undergoing a review. In addition to the updated morphology list including the new diagnostic terms and other changes reflecting the 5th Edition Blue Books cycle, new topography codes, such as C16.7 for gastroesophageal junction have also been proposed.

Discussion and conclusion: Draft ICD-O-4 will be published on IARC website and open for comments for a six-month consultation period. We will present the work of the IARC/WHO ICD-O Committee and the status of ICD-O-4 at the time of IACR Conference and discuss implementation strategies and possible implications for cancer registries.

# Do investments in cancer registry databases and tools bring added value? NORDCAN as an example

Hans Storm,[1] Siri Larønningen,[2] Freddie Bray[3]

[1]Danish Cancer Society, Copenhagen, Denmark [2]Cancer Registry of Norway, Institute of Population-based Cancer Research, Department of Registration, Oslo, Norway [3]The International Agency for Research on Cancer (IARC), Cancer Surveillance Branch, Lyon, France

## Background

In the 1990s, the large-scale collaboration Kreftbildet i Norden (KIN) drew attention to the need for timely cancer statistics for cancer control planning in the Nordic countries. Supported by the Nordic Cancer Union (NCU), a web-based version of NORDCAN was continually developed by the Association of Nordic Cancer Registries (ANCR) from 2003, with website support and hosting by the International Agency for Research on Cancer (IARC). Despite empirical evidence of its global reach, the question of whether recurrent investment in NORDCAN brings added value was raised; we sought to formally assess this.

## Methods

Scientific value was determined by extracting publications citing NORDCAN from PubMed. We compared the funds allocated to the KIN project and later Nordic studies on cancer predictions and survival, with those allocated to NORDCAN.

## Results

96 publications in 43 journals were retrieved. Two publication peaks, in 2010 and in 2016 relate to Nordic cancer survival and Danish age care projects, respectively. Papers citing NORDCAN increased substantially from 4 published in 2017 to the 24 papers in 2022. The integration of survival and prediction projects into NORDCAN reduced the costs of investment to one-quarter of the those required in earlier years, in real terms.

## Conclusions

User statistics and scientific output clearly points to NORDCAN bringing added value given resources expended, even with the additional costs imposed to ensure GDPR compliance. Research funding indicates that the databases and interactive tools are critical as both research and education resources. Nonetheless, a sustainable funding model is needed if NORDCAN is to continue to fulfil its utility in cancer control, health care planning and cancer research.

## Streamlining Cancer Data Management: linking OpenMRS and DHIS2/oncology tracker for automated cancer data entry

Daniel Sabushimike,[1,4] Lydia Businge,[1] Marc Hagenimana,[1] Uwinkindi Francois,[1] Baily Rurangirwa,[2] Adolf Kamugunga,[2] Blaise Mafende,[2] Maurice Jules Mulisa,[2] Jean Berchmas Ndikubwimana,[3] Jules Maurice Muhire cyiza[4]

[1]Rwanda Biomedical Centre, Kigali, Gasabo, Rwanda [2]HISP Rwanda, Kigali, Nyarugenge, Rwanda [3]Butaro Cancer Centre of Excellence, Northern, Burera, Rwanda [4]Rwanda NCDs Alliance, Kigali, Gasabo, Rwanda

### Background

The Rwanda National Cancer Registry (RNCR) has adopted the DHIS2/ oncology tracker system for the collection and entry of cancer data, which plays an essential role in the provision of reliable and timely data. To improve the completeness and accuracy of data collection, the RNCR initiated a pilot project to integrate OpenMRS, an electronic medical record system, with DHIS2/Oncology Tracker. This integration aimed to automate the transfer of cancer data from OpenMRS to DHIS2/Oncology tracker, ensuring a continuous flow of data.

### Methods

This pilot project took the period of 6 months and was first tested on the OpenMRS Butaro cancer center of excellence. The work involved developing a data linkage mechanism between OpenMRS and DHIS2/Oncology Tracker. This mechanism facilitated the automatic transfer of cancer-related patient data, including diagnosis, treatment, and outcomes, from OpenMRS to DHIS2/Oncology Tracker. Standardized data exchange formats and protocols were utilized to ensure compatibility between the two systems.

### Results

The pilot project successfully showcased the automated data entry process for both systems, eliminating the requirement for manual input. This achievement not only reduces the potential for errors but also saves valuable time for cancer registrars involved in data collection. Moreover, the seamless exchange of data between the two systems demonstrated the ability to access comprehensive cancer data in real-time, thereby enhancing the monitoring and analysis of cancer cases.

### Discussion and Conclusion

Overall, the successful implementation of this integration showcases its potential to improve the completeness, accuracy, and efficiency of cancer data collection in the RNCR, ultimately contributing to better cancer care and management in Rwanda. The lessons learned from this initiative can also serve as a valuable resource for other countries and organizations seeking to enhance their cancer registries and improve health outcomes.

## Evaluation of parsed pathological reports in the data collection process of a cancer registry

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### Background

Pathological reports on cancer tissue lend themselves to text recognition and parsing methods. A text-mining product, before rolled out to the North Rhine-Westphalian (NRW) cancer registry, is thoroughly explored. Methods of appraisal are described.

### Methods

Labeled documents on morphology, topography, laterality, UICC-TNM classification and lymph nodes were provided from routine manual coding of reports (gold standard) and used for optimizing the text-mining product. For morphology, topography and laterality, individual Convolutional Neural Networks (CNN) were trained on datasets containing ten-thousands labeled documents. These models provide confidence scores for their predictions. For other traits (including TNM), the text mining product is based on rules and dictionary logic. For evaluating the tool, documents with diagnosis information on the four most common cancers in NRW (colon, breast, prostate, and lung) from the year 2019 have been collected. Manually coded pathology reports are compared to text-mining results. We defined automatic results as acceptable if their positive predictive value (PPV), based on coding result and, if CNN-based, confidence score, surpasses 95 percent on all categories. Cross-tabulation and fluctuation diagrams are used to visualize data. Results are discussed in panels involving experts on epidemiology, oncology, data management and biostatistics. Rule sets are derived as decision support on acceptance.

### Results

From 15148 (lung) to 21742 (breast) reports were examined. Confidence score proved to be discriminative. The proportion of reports which would not have to be manually processed varies around 1 in 6, depending on tumour site.

### Discussion and Conclusion

As tumour documentation practice keeps evolving, it is important to view the analysis of text-mined data as an ongoing process, and check a certain proportion of the 'good enough' data for continuous consistency with manual coding. Especially, the free choice of thresholds may lead to an over-optimistic estimation of matches between text-mined and manually processed reports.

## Artificial intelligence and cancer registry data to predict rare events in cancer survivors

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### Background

Prediction of cancer survivors at risk of late effects is essential for tailoring follow-up plans. Anyway, it is very complex if the outcome is rare and predictive information is scarce. We propose Bayesian Networks (BNs) and data piercing techniques to address these complexities and present a use-case focused on predicting cardiovascular diseases (CVDs) in young female breast cancer (BC) survivors.

### Methods

We used the Italian population-based cohort of AYA cancer survivors to select a cohort of 1-year young (18-39 years) BC survivors. We retrieved CVDs from the administrative databases available in the cohort and linked to each BC survivor. We trained and validated a BN model on the BC survivors' cohort using k-fold validation. We used the synthetic minority over-sampling technique to overcome the imbalance classification due to rarity of the events. We compared the classification performance of the BN model to that of other machine learning (ML) models using standard metrics and graphical evaluation with lift charts. We collected detailed clinical data from an hospital registry to integrate the treatment and risk factors details (data piercing).

### Results

We selected a cohort of 1557 BC survivors diagnosed in 2009-2015 (mean follow-up=5 years). Sixty survivors developed CVDs. Compared to random forest and XGBoost, the BN model showed the highest sensitivity performance (59%, *i.e.* the ability to correctly detect those who will develop the event). The enrichment of the model with data collected on 340 clinical cases is ongoing.

### Discussion and Conclusions

We showed that BN models can predict survivors at highest risk of developing late, albeit rare, effects better than other ML models. Moreover, BN models have the advantage of supporting a causal interpretation of the results through their graphical structure. With this easily generalizable use-case, we confirmed the importance of CRs for studying late effects in cancer survivors.

## Cancer registry enrichment via linkage with hospital-based Electronic Medical Records in China

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### Background

Integrating data from Electronic Medical Records (EMR) with existing population-based cancer registration (PBCR) data has the potential to establish a highly-efficient 'high-resolution' cancer database.

### Methods

China National Central Cancer Registry initiated a multicentre, hospital-based cancer registration program, aiming to collect detailed, high-quality cancer data on patients' lifestyle factors, family history of cancer, stage at diagnosis, first-line treatment options, and medical expenses which were not previously available through population-based cancer registries. We included 23 areas in 12 provinces that have high-quality, PBCR data across six geographical regions of China. We invited the largest specialised cancer hospital or general hospital within the areas to participate in the study. We established common data model for five major cancer types (cancers of the lung, stomach, oesophagus, colorectum, and female breast) by using Delphi technique, which enabled standardised data structure. We constructed a simplified staging abstraction framework to achieve information on stage at diagnosis. We further used unique identifiers to link the database with PBCR data to retrieve information on patients' outcome annually.

### Results

We included of 52103 eligible patients. The dataset includes baseline information for all subjects on demographics and lifestyle factors. The stage completeness was 80%. The proportion of patients who received surgery were highest in breast cancer patients with stage I at diagnosis (97.9%). Annual follow-up is ongoing through linking prognostic information from PBCRs.

### Discussion and Conclusion

Linking EMR with PBCR data improved data collection efficiency as well as data value and usability. The standardised database enabled deep analyses of stage and treatment, which were not routinely available in PBCRs from developing countries.

## The cancer pathchart initiative and the future of tumor site-histology standards for cancer registration

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### Background

As the most foundational data items collected about cancer patients and their diagnoses, tumor site, histology, and behavior determine much of the subsequent data collected. If inaccurate, the remaining data items may be misattributed. Because such data impact public health program funding, cancer control planning, and cancer research funding, their accuracy is of paramount importance.

### Methods

The Cancer Pathology Coding Histology And Registration Terminology (Cancer PathCHART) initiative is a groundbreaking collaboration of three global (WHO/IARC, IACR, and ICCR) and eight North American cancer registry, cancer registrar, clinical, and pathology organizations that aim to update and harmonize cancer surveillance standards for tumor site, histology, and behavior code combinations and associated terminology. Through the Cancer PathCHART initiative, multilevel reviews are being conducted of these combinations, terminology, and coding with leading, subspecialty matter expert pathologists, followed by a cancer registrar review process and a statistical impact analysis.

### Results

Reviews have been completed for breast, digestive system, female genital, and male genital and urinary sites. While many previously valid tumor site, histology, and behavior combinations and those triggering a software edit are now considered biologically impossible post-review, they either accounted for a small proportion (<1%) of cases in the US Cancer Statistics Database (2015-2019) or had zero case counts during this timeframe.

## Reference adjusted cancer survival measures. What are they and when should they be used?

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### Background

Comparing cancer survival between population groups requires consideration of differences in mortality rates due to other causes. Traditionally, net/relative survival measures are used where the probability of surviving in a world where it is not possible to die from other causes is estimated. Such measures are frequently misinterpreted by scientists, media, health care professionals and patients.

An alternative approach is to use reference adjusted measures which enable estimation of all-cause survival or crude probabilities of death, adapted so that any differences between population groups are solely due to the cancer under study. We will present extensions of the work and discuss situations when presenting these measures could be beneficial for cancer registries.

### Methods

Reference adjustment enables quantification using all-cause survival, crude probabilities of death and loss in life expectancy. The approach allows fair comparisons between population groups with different covariate profiles and competing mortality patterns. Each population group's own expected mortality rates are used for estimation of relative/net survival, but additionally reference expected mortality rates are incorporated when converting to all-cause and crude probabilities of death. This ensures comparisons are fair, so any survival differences are solely due to differential cancer mortality. We will discuss estimation both parametrically and non-parametrically. Non-parametric estimates use extensions of the Pohar Perme method and may be advantageous when presenting simple summaries of survival in cancer registry reports.

### Results

We will illustrate the methods using a range of examples, including some work from recent publications highlighting the differences and similarities between standard measures and the newer measures and make recommendations of when they should be used.

### Discussion and Conclusion

Reference-adjusted cancer survival measures are an alternative approach to traditional survival measures complementing existing methods. They are less prone to misinterpretation and should be used more in national and international survival comparisons.

## Incidence gap in screening-detectable cancers during the first year of COVID-19 pandemics – Wielkpolskie, Poland

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### Introduction

The COVID-19 pandemic has significantly impacted medical care globally and is predicted to affect cancer epidemiological metrics. This study aimed to determine the COVID-19-related incidence gap in screening-detectable malignancies in the Wielkopolskie region of Poland in 2020.

### Methods

Data on breast, cervix uteri, and colorectal cancer cases diagnosed between 2010 and 2020 were sourced from the regional cancer registry. To estimate the change in the number of incident cancer cases during the pandemic, we calculated the standardized incidence ratio (SIR) and, to assume the pandemic-attributable gap in cancer incidence, the incidence rate difference (IRD). The number of observed cases was retrieved directly from the registry database. Using simple linear regression analysis, we attempted to predict the expected number of incident cancer cases in 2020 and the age-standardized incidence rate, deploying registry data from ten years before the COVID-19 pandemic (2010-2019).

### Results

In 2020, in Wielkopolskie, the registered number of incident female breast cancer cases decreased by 12% (SIR 0.88, 95%CI 0.88-0.92, observed 1,848, expected 2,101), which was reflected by IRD at -6.3 per 100K. The number of registered cervical cancers decreased by 15% (SIR 0.85, 95%CI 0.73-0.98, observed 181, expected 213), and the IRD was -0.8 per 100 K. In the case of colorectal cancer, the observed decrease in the number of new cases was 16% (SIR 0.84, 95%CI 0.78-0.90) among females and 15% (SIR 0.85, 95%CI 0.80-0.91) among males, with the IRD at -3.04 and -5.29 per 100K, respectively.

### Conclusion

In 2020, the COVID-19-pandemics-related gap in screening-detectable cancers was approximately 15% of undiagnosed cancer cases, independent of cancer sites. Future studies should analyze how this delay in cancer diagnosis influences the disease stage and survival, and if it is more pronounced in screening age groups.

## Early mortality of children with cancer during the COVID-19 pandemic period in colombia (2020-2021)

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### Background

Public health measures to prevent COVID-19 spread affected cancer care and the socioeconomic status of patients and families. We investigated the effects of the pandemic on early mortality (≤24 months) in children with cancer in Colombia.

### Methods

We analyzed data from the Childhood Cancer Outcomes Surveillance System (VIGICANCER). VIGICANCER operates in 10 Colombian cities and yields prospective information from 27 pediatric oncology units. We estimated the cumulative mortality from cancer diagnosis at 6 and 24 months in the 2020-2021 cohort (exposed to the COVID-19 pandemic) and compared it with the 2017-2019 cohort (historical). We used Kaplan-Meier and adjusted the hazard ratio (aHR and 95%CI) estimates for covariates with multivariate Cox's regression.

### Results

From 2017-2021, 4124 children were registered in VIGICANCER; (1627:2497 exposed:historical). Exposed patients with solid extracranial tumors had an increased 6-month (aHR=1.7; 1.1, 2.7) and 24-month mortality (aHR=2.0; 1.1, 3.6). Furthermore, exposed patients with bone tumors had an increased 6-month (aHR=4.3; 1.3, 14.1) and 24-month mortality (aHR=2.2; 1.3, 3.7). We observed an increased 24-month mortality (aHR=5.4; 1.3, 22.8) in exposed patients with retinoblastoma, but only among those with public insurance. Excluding metastatic retinoblastoma status at diagnosis did not nullify the effect. The diagnosis of retinoblastoma was most frequent in >1 year of age in those exposed vs. historical (83% vs. 60%; p <0.01). Overall, solid tumor mortality was attributed more to progressive disease (62% exposed vs. 26% historical; p <0.01).

### Conclusion

We observed a two-fold increase in early mortality in children with malignant solid tumors. The leading cause of death was progressive disease suggesting limited and/or delayed access to timely cancer care (*e.g.*, delays and/or interruptions to surgery, radiation, or chemotherapy). The effect was particularly evident in patients with bone tumors and retinoblastoma. Our data suggest that delays in diagnosis and barriers to access to uninterrupted care contributed to mortality.

## How did breast cancer patients fare during and after the COVID pandemic compared to controls?

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### Background

The COVID-19 pandemic was a particularly stressful and durable event characterized by periods of uncertainty. This is also true for having a breast cancer diagnosis. We studied if the pandemic had a different impact on health-related quality of life (HRQoL) for breast cancer patients than for cancer-free controls, and if age and family status affected HRQoL.

### Methods

We utilized data from a Norwegian population survey sent to all breast cancer patients (cases) diagnosed between September 2020-June 2022 and age-matched controls from the general population. The EORTC QLQ-30 was used to measure patient-reported HRQoL across multiple symptomatic and functional domains. Multivariable regression analyses (adjusted for age, smoking, BMI & physical activity) were used to compare HRQoL between cases (N=3378) and controls (N=2593). The COVID pandemic period was defined as September 2020-September 2021.

### Results

There were smaller differences in global health (p for interaction =0.027) and fatigue (p=0.015) between cases and controls after the pandemic than during. Overall, cases reported lower HRQoL than controls. Cases <60 years scored worse than cases≥ 60 years on all HRQoL domains, but particularly on global health (effect size (95%CI): 7.28 (6.22,8.34). Cases with children under age 18 scored worse on social (-16.2 (-18.1,-14.2)) and role functions (-14.6 (-16.9,-12.4)) compared to those without children. Age and children did not impact HRQoL in controls, but being in a relationship was positively associated with HRQoL. DCIS patients seemed to fare better than patients with invasive cancer on several HRQoL domains.

### Discussion and Conclusion

Global health and fatigue were worse in breast cancer patients during the pandemic compared to after. Throughout, breast cancer patients <60 years and patients with children reported worse HRQoL than their counterparts. These findings should be considered when evaluating the effects of the pandemic on people with breast cancer.

## Stark impact of COVID-19 on cancer pathways – affecting incidence, presentation, diagnosis, stage, treatment, survival

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### Background

The COVID-19 pandemic had a major impact on cancer patients and services but has been difficult to quantify.

### Methods

We examined how the entire cancer pathway – from incidence, presentation, diagnosis, stage, treatment and survival – was affected during April-December 2020 compared to equivalent periods in 2018-2019 using Northern Ireland Cancer Registry (NICR) data.

### Results

Incident cases (excluding non-melanoma skin) decreased by 13% (almost 1,000) from an average 7,724 in Apr-Dec 2018-2019 to 6,748 in Apr-Dec 2020. Significant differences were found across age cohorts and deprivation quintiles, with reductions greatest for younger people (<55 yrs; 19% decrease) and those from less deprived areas (22% decrease). Reductions differed by tumour type (*e.g.* Lung-7%, Female breast-11%, Colorectal-12%, Prostate-14%). A significantly higher proportion had an emergency admission prior to diagnosis (16%-to-20%) and significantly lower proportion diagnosed pathologically (85%-to-83%). There was significant stage shift, with lower proportions of early stage (29%-to-25%) and higher proportions of late-stage (21%-to-23%). A significantly lower proportion received surgery (41%-to-38%) and radiotherapy (24%-to-22%) with no significant differences in chemotherapy or hormone therapy. A significantly higher proportion did not receive any treatment (29%-to-33%). One-year observed survival (any cause) significantly decreased from 73.7% to 69.8% and one-year net survival (cancer-specific) decreased from 76.1% to 72.9%.

### Discussion and Conclusion

The COVID-19 pandemic had a profound impact across cancer patient pathways, with almost 1000 fewer cases, greater proportions diagnosed by emergency admission and significant stage-shift away from early to more advanced stage disease. There was major treatment impact with lower rates of surgery and radiotherapy. There were significant reductions in one-year observed (any cause) and net (cancer-specific) survival. This is the first study to reveal the stark, adverse impact of COVID-19 on the entire cancer patient pathway at population level – from presentation, diagnosis, stage, treatment to survival – which will need close monitoring for recovery.

## COVID-19 pandemic impact on cancer incidence, stage, and referrals in Wales using Rapid Cancer Data

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### Background

During the COVID-19 pandemic, concerns were raised about delayed/missed cancer detection in Wales. We developed the Rapid Cancer Diagnostic Dataset (RCDD) for timely surveillance to assess pandemic impact.

### Methods

We developed algorithms to create RCDD 2019-2021 using multiple data sources- electronic cancer patient record system, hospital admissions/clinic and mortality data.

For all-malignancies (excluding C44) and 20 cancer types, we determined annual/monthly incident counts, stage distribution, and counts/proportion diagnosed by healthcare pathway. We compared 2020 and 2021 to 2019 using count/% differences and incidence rate ratios (IRR).

### Results

All-cancer counts fell 11.9% 2019 to 2020 (IRR 0.86[95%CI 0.85,0.88], p<0.001). Melanoma (-23.9%), stomach (-22.7%) and prostate cancers (-21.8%) decreased most. Female breast (-18.0%) and colorectal (-17.4%) cancers decreased modestly. Diagnoses decreased rapidly in April/May 2020, after pandemic mitigations. Subsequent monthly incidence recovery varied by cancer type.

By 2021, no rebound of 2020 missing cases occurred. In fact, 2021 incidence did not reach 2019 levels (all-cancer IRR 0.97 [0.95,0.99], p<0.01). Stomach (-19.5%) and prostate (-15.7%) cancers remained furthest below.

Only colorectal, female breast, oesophageal and stomach cancers could be staged in RCDD. There was a shift to later stages during 2020, especially for stage I female breast cancer. By 2021, stage-shift persisted for most, although % unknown stage increased markedly compared to 2020 and 2021.

Quarterly counts for cases diagnosed through emergency, general practice referral and screening pathways changed considerably from April 2020. Patterns varied by cancer type. Detailed results will be presented.

### Discussion and Conclusion

The COVID-19 pandemic and health system/ social responses in Wales resulted in cancer under-diagnosis, with a shift to later stages. Our findings suggest late-stage detection with health service and patient implications may persist. Continued rapid surveillance is imperative, although ongoing registry-based cancer incidence remains vital and definitive, especially for staging.

## Current and future cancer burden in the Gulf Cooperation Council countries

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### Background

Cancer is a leading cause of morbidity and mortality in the Gulf Cooperation Council (GCC) countries. This study provides an overview of the pattern of cancer incidence and mortality estimates in 2020 and estimates of the future burden of cancer by 2040 in the GCC countries.

### Methods

The numbers of new cancer cases and deaths were extracted from the GLOBOCAN 2020 database developed by the International Agency for Research on Cancer (IARC) and mortality data over time from IARC's cancer mortality database. New cancer cases, cancer type, deaths, and corresponding age-standardized rates per 100,000 person-years are presented. The data will be updated to GLOBOCAN 2022 when available.

### Results

An estimated 42,900 new cancer cases and 20,000 deaths occurred in the GCC countries in 2020, with age-adjusted incidence and mortality rates being 97.6 and 52.7 per 100,000. Breast (15%), colorectal (13%), and thyroid (8%) cancers were the most common type, accounting for almost 50% of all cancer incidence, while colorectal (13%) cancer followed by breast (9%) were the leading cause of cancer-related death. However, rates varied substantially between the GCC countries. Colorectal, Non-Hodgkin lymphoma, and prostate cancers were the most common in males, while in females, breast, thyroid, and colorectum were the most common cancers. If these rates remain unchanged, the cancer burden is predicted to increase between 150% to 370% in some countries, reaching an estimated 104,000 cancer cases by 2040.

### Discussion and Conclusion

Cancer is a major health burden in the GCC countries. The sharp estimated increase in cancer incidence and mortality in the coming years will add a major economic burden to the healthcare systems. It is, therefore, crucial to strengthen the prevention and early interventions and develop strategic plans and policies to control efforts and care to alleviate this burden in each country.

## Patterns of cancer incidence in Setif, Algeria: analyzing of 34 years of cancer registration 1986-2019

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### Background

Our study aimed is to describe the patterns of cancer incidence for 34 years of cancer registration in Setif province.

### Methods

Setif Cancer Registry is population-based cancer registry established since 1986 in province of Setif. Canreg 5 software, which is maintained and provided by IARC/WHO, is employed for recording and analyzing data. while the SEER STAT software is employed for thorough analysis. Cancer classification is based on the second version ICD-O-3. The study results present new case figures, crude rates, and age-standardized ratios.

### Results and discussion

From 1986 to 2019, 35,604 new cases of cancers of all cancers were recorded, including 16,237 in men (45.6%of all cancers) and 19,367 in women (54.4%). The male sex-ratio decreased from 1.0 in 1986-1995 to 0.67 in 2016-2019, which represents an increase of more than 50% in the incidence of female cancers, mainly due to increased incidence of breast cancer in women. The incidence of cancers across all locations among men showed a gradual rise, whereas a significant increase was observed in women in recent years. The proportion of incidence of cancers across different age groups and periods in women did not show any significant changes over the years. However, in men, there was a rise in the proportion of cancers in individuals aged 65 and above. Breast cancer remained the primary form of cancer in women, and its proportion relative to other cancers increased significantly from 18.3% during 1986-1995 to 51.4% during 2016-2019.

### Conclusion

In Algeria, cancer has become a major concern for public health due to the epidemiological transition. The Cancer Registry based on the population is an essential resource for cancer monitoring and management. The Cancer Registry offers trustworthy information to policymakers and researchers.

## A Nordic cohort study on cancer incidence and mortality among non-Western immigrant women

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### Background

Cancer risk varies geographically, and migrants are influenced by different risk factors before, during, and after migration. Increased migration from non-Western countries to the Nordic countries calls for a better understanding of the migrants' cancer risk and the change in risk patterns over time. We used population-based registry data to compare the incidence and mortality of breast, colorectal and lung cancer between non-Western immigrant and native female population in Denmark, Finland, Iceland, and Norway.

### Methods

Data from national registries were processed and pre-analysed in each country. Multivariable Poisson regression models were used to model the relative differences in incidence and mortality as rate ratios (RR) between the non-Western immigrant women and native population. The country-specific estimates and summary statistics were pooled together using random effects model.

### Results

Non-Western immigrant women had significantly lower incidence of breast (RR 0.71, 0.65-0.78), colorectal (RR 0.72, 0.57-0.92), and lung (RR 0.55, 0.42-0.72) incidence than native women. Their risk of these cancers increased with the duration of residence. The findings were similar in breast, colorectal, and lung cancer mortality. Among the non-Western migrants, higher education increased risk for breast cancer and decreased it for lung cancer.

### Discussion and Conclusion

The results complement and add to the previous findings of cancer burden and cancer burden transition among migrants and provide evidence of a prolonged cancer risk advantage among non-Western immigrant women. However, the findings show an increasing risk of life-style related cancers with the duration of residence in the host country.

## The incidence of female breast cancer in Nairobi County for the period 2011-2016

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### Background

In 2020, there were 2.3 million women diagnosed with breast cancer and 685000 deaths globally. It is responsible for one in every-eight cancers identified, making it a major health concern. Nairobi Cancer Registry is a population-based registry that was established in the year 2001 at the Kenya Medical Research Institute (KEMRI) Nairobi. It covers a population of approximately 4.3 million (2.1 million men and 2.2 million women). Our aim was to determine the incidence of female breast cancer (FBC) in Nairobi County for the period of 2011-2016.

### Method

Active case finding method was used by trained cancer registrars to abstract new cases from different health facilities in Nairobi. Coding was done using ICD-O-3 and data management was done using CanReg5 including entry, quality checks and data analysis. Further analysis of breast cancer cases for the period 2011-2016 was done using R.

### Results

A total of 2282 breast cancer cases were recorded during this period, comprising 2211 (96.89%) females and 71 (3.11%) males. The mean age is 58.3 ± 14.18 years. The Breast cancers accounted for 27.9% of all female cases and 1.2% of all male cases. The age standardized rate (ASR) for female breast cancer was 49.7/100,000.

### Discussion and Conclusion

Breast cancer is the most commonly diagnosed cancer in Nairobi, and the incidence is much higher compared to other counties in Kenya and other countries in Eastern Africa. The need for building strong cancer surveillance programs is inevitable.

Breast cancer is a growing concern in developing countries, Kenya included. The high rates may be associated with aging population and lifestyle changes. Uptake of screening is still low due to cost implications yet the economic value gained by saving the lives of women far outweigh these costs. More research to understand genetic mechanism is needed.

# Thyroid cancer incidence and trends according to a population-based study in Girona, Spain, 1994-2020

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## Background

Thyroid cancer (TC) is a common endocrine tumour that has increased in the last decades, partly due to overdiagnosis. The aim of this study is to analyse the incidence of TC by sex, histology, and stage in Girona, Spain.

## Methods

Population-based study of thyroid tumours registered in the Girona Cancer Registry between 1994 and 2020. Cases were grouped into 6 subtypes: papillary, follicular, medullary, anaplastic and poorly differentiated, NOS, and other types. Stages were available from the period 2002-2020. Age-standardised incidence rates (European 2013) (ASRE) were calculated by sex, stage, and subtype and expressed per 100,000 inhabitants. Incidence trends and annual percentage change (APC) were analyzed.

## Results

1,149 TC cases were recorded; the median age was 47 years [IQR:37-60] and 76.8% were female. Papillary carcinoma was observed in the 80.4% of cases, follicular carcinoma in 10.1% and medullary carcinoma in 4.8%. Stage I was observed in 74.0%, 7.7% showed stage II, 8.3% stage III and 9.5% stage IV. The overall ASRE was 6.42 (95% CI: 6.05-6.81), 3.06 (95%CI:2.70-3.45) in men and 9.78 (95%CI:9.14-10.46) in women. According to subtype, the highest ASRE was observed for papillary carcinomas (5.12; 95% CI: 4.79-5.46) followed by follicular carcinomas with an ASRE of 0.66 (95%CI:0.54-0.79). By stage, stage I had the highest incidence (ASRE: 4.61 (95%CI:4.26-4.98), followed by stage IV (ASRE:0.71;95%CI:0.56-0.87). TC incidence has increased significantly over the study period with an APC of 2.23 (95%CI:1.67-2.78), and the increase was observed specifically in women (APC:2.41; 95%CI: 1.52-3.30), papillary carcinoma (APC:2.31; 95%CI:1.71-2.91) and stage I (APC:2.44; 95%CI:1.31-3.57).

## Conclusion

The incidence of TC continues to increase over the years at the expense of women and mainly due to papillary carcinoma and early stages. This increase may be due to improvements in health care and increased medical screening as well as environmental factors.

# Socio-economic inequalities in adherence to clinical practice guidelines: a population-based study of breast cancer patients

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## Background

Breast cancer survival is lower among women with lower socioeconomic status and differences in treatment could be driving these disparities. This study investigated possible socioeconomic inequalities in adherence to clinical practice guidelines for the diagnosis and treatment of breast cancer.

## Methods

We conducted a retrospective, high-resolution, population-based study of 3,367 incident cases of invasive breast cancer (C50 according to ICD-O-3), diagnosed 2010-2014 in women over 15 years old and residing in six Spanish provinces covered by population-based cancer registries. Socioeconomic status was measured using an area-deprivation index and divided in quintiles. Adherence to clinical practice guidelines was measured with 16 indicators based on recommendations for breast cancer diagnosis and treatment of the European (2011) and Spanish (2013) Societies of Medical Oncology and was compared for women living in more vs. less deprived areas.

## Results

There was no significant difference in the percentage of women surgically treated with breast-conserving surgery (59% vs. 64% for women living in the most vs. least deprived areas) and the percentage of women with 10 or more lymph nodes removed and examined during lymphadenectomy (77% for both). However, women living in the most deprived areas were less likely to receive a sentinel node biopsy overall (58% vs. 68%) and when the axillary lymph nodes were clinically negative (72% vs. 81%). Women living in the most deprived areas were also less likely to receive timely treatment, such as undergoing surgery within 30 days after pathological diagnosis (26% vs. 40%) or starting adjuvant treatment within six weeks after surgery (28% vs. 41%).

## Discussion and Conclusion

Despite the overall coverage of the Spanish Health system, women living in more deprived areas are less likely to be treated according to clinical practice guidelines. It is important to know the reasons behind these inequalities and their impact on patients' survival.

# Obtaining stage-specific life expectancy estimates for a range of cancer sites in England

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## Background

Measures of the loss in life expectancy due to a diagnosis of cancer provide tangible metrics to measure both the overall burden of cancer on society and on the lifetime of an individual. Rather than simply reporting snapshot estimates of survival at specific timepoints, life expectancy measures provide an overall summary of the impact of cancer, and can be compared to estimates of life expectancy without cancer. Stage at diagnosis is a key determinant of cancer survival outcomes, but stage-specific life expectancy estimates are rarely reported. One reason for this is due to the lack of completeness of recording for cancer stage at diagnosis over a sufficient range of calendar years. For certain cancer registries recording of stage has been poor historically, making it challenging to provide the long-term stage-specific survival estimates required.

## Methods

Here we offer an approach to estimating stage-specific life expectancy in the face of historical incompleteness of stage at diagnosis, and have applied the methodology to a range of cancer sites in England. Period analysis was applied to obtain up-to-date estimates and missing stage at diagnosis information was imputed in a way that respects the time-dependent nature of the effect of stage on survival. We used flexible parametric relative survival models to extrapolate all-cause survival to a lifetime horizon.

## Results

We illustrate the methods using a range of example cancer sites using data from England. We show life expectancy metrics for each cancer stage, and also when conditioning on survival times post diagnosis to highlight how the prognosis changes for patients who survive to later timepoints.

## Discussion and Conclusion

Stage-specific life expectancy offers an alternative metric for reporting the impact of cancer. These measures are comparatively easy to interpret and can be compared to general population life expectancy metrics to give a more complete picture.

# Clinical characteristics of breast cancers based on detection modes: a Luxembourg nationwide study (2013-2018)

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## Background

Breast cancer is the most frequent and lethal cancer in women in Luxembourg. Since 1992, a national organized population-based breast cancer screening programme is implemented in Luxembourg. The screening programme invites all residents affiliated to the National Health Insurance (Caisse national de santé, CNS) aged between 50 to 69 years to perform a mammogram every two years in one of the registered radiotherapy centres in Luxembourg. The aim of this study was to realise, for the first time, data linkage between the screening programme's and Luxembourg's National Cancer Registry data, and to evaluate and to quantify the effectiveness of the breast cancer screening programme.

## Methods

A pseudo-identifier was used to link data from all first breast cancer cases diagnosed in women aged between 50 to 71 years during the period of 2013-2018. Three detection modes were defined being screened cancers, interval cancers and diagnosed cancers.

## Results

1,621 breast cancer cases diagnosed between 2013-2018 with known laterality will be presented by detection modes. Preliminary results showed that screened cancers were less invasive, smaller, had less advanced stage at diagnosis and less invaded lymph nodes compared to interval and diagnosed cancers. We also led complementary analysis, comparing initial and subsequent participations, interval cancers occurring the first or the second year after participation, whether the penultimate mammogram was performed on time or lapsed for interval and screened cancer and time since last participation for diagnosed cancer.

## Discussion and Conclusion

Luxembourg breast cancer screening programme seems to achieve its goals of detecting breast cancers earlier. This study generates the first set of indicators and a method for monitoring of the breast cancer screening programme in Luxembourg. In addition, the study will yield international insights into the applications of high-resolution data from population-based cancer registries for the evaluation of cancer screening programmes.

## Improved forecasting of cancer incidence using leave-future-out validation

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### Background

For the purposes of capacity planning in health care, forecasting future cancer incidence is essential. Age-period-cohort (APC) models are commonly used; these models allow us to identify birth cohort effects that aid in forecasting changes in age-specific incidence over time. However, these models impose arbitrary solutions and misestimate variance. By introducing a validation step, we can justify our chosen solution and improve forecast interpretation.

### Methods

We separate our data into training, validation, and test data, containing 37.5%, 37.5% and 25% of a time series respectively. We fit models with many different solutions on the training data, and subsequently determine their performance in the validation data based on mean absolute error (MAE). We pick the model with the best performance. Subsequently, the best model and a model with a traditional GLM APC ('Nordpred') specification are applied to the training and validation data, and then used to predict the test data to determine their out-of-sample performance. This is done with empirical cancer data and with simulated datasets under both a log-linear trend and trend-break scenarios.

### Results

In the empirical all-cancer case, the validation approach overestimated incidence by 7.4%, compared to 10.1% and 10.9% by Nordpred with power5 and log-link functions, respectively. In 337 out of 500 simulations (71%) where the future trend is an extrapolation of the trend underlying training and validation data, the validation approach outperforms the Nordpred approach. In cases where the future trend alters strongly, both approaches can result in substantial misprediction.

### Discussion and Conclusion

Due to its design, the validation-based approach results in models that are interpretable as 'the model that best extrapolates the trend in the validation dataset'; the traditional approach does not guarantee this. Further improvement is underway; when time series are volatile, it is important to incorporate techniques that accurately estimate variance.

## Centralization of cancer patients to designated cancer care hospitals in Japan

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### Background

We examined the extent to which the diagnosis and treatment of cancer patients are centralized in designated cancer care hospitals (DCCHs) in Japan.

### Methods

Subjects were cancer patients diagnosed from 2016 through 2019 and registered in the population-based National Cancer Registry and had cancers classifiable by the RARECAREnet list. In-situ cases and those registered by death certificate only were excluded. The coverage of DCCHs for first diagnosis and as main treatment hospitals (the highest priority hospital among those that provided any of the following treatments in the order of surgery, radiotherapy, and chemotherapy) were calculated by patient characteristics (age, cancer type, and patient address by prefecture).

### Results

Among 3,908,227 cancer patients, the overall DCCH coverage for first diagnosis was 52.9%, decreasing inversely with age (71.4% for 0-14 years, 64.7% for 15-39 years, 57.2% for 40-74 years, and 46.9% for 75 years and older). By cancer type, coverage was higher in rare cancer families (62.2%) and lower in common cancer families (50.7%). The DCCH coverage for first diagnosis by prefecture varied, ranging from 73.0% to 33.2%. The DCCH coverage for main treatment was 47.8%, that of non-DCCH was 27.7%, and 24.4% had no or unknown main treatment. The DCCH coverage for main treatment by patient characteristics was similar to those for the first diagnosis.

### Discussion and Conclusion

Overall, while approximately one in two cancer patients in Japan is diagnosed and treated at DCCHs, DCCH coverage varies by age, cancer type, and prefecture. In the future, the evaluation of the effect of centralization of cancer patients to the DCCH is warranted, including the comparison of survival rates between DCCHs and non-DCCHs.

## Canstaging+ and staging childhood cancer for population-based cancer registries

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### Background

In 2018 the WHO launched the Global Initiative for Childhood Cancer to address global inequality in childhood cancer survival. Cancer staging is important for treatment planning and discussion with patients and to facilitate monitoring of cancer outcomes at population level. Population based cancer registries (PBCRs) are key partners in assigning stage at diagnosis yet it is complex and required adherence to international standards and regular updates.

### Methods

We developed a user-friendly electronic staging tool, CanStaging+, for PBCRs based on UICC TNM classifications for adult cancers and on Toronto Paediatric Cancer Stage guidelines for childhood cancers, publicly available both online and as an offline tool, which will be demonstrated during the presentation.

### Results

CanStaging+ with anatomical drawings is designed to help maximise availability, standardisation and comparability of cancer staging internationally. The tool provides automatic calculation of the TNM staging classification for a variety of tumour sites. CanStaging+ also provides the two-tiered approach of Toronto childhood cancer staging for fifteen cancer types including the complete guideline of the Toronto Paediatric Cancer Stage. A batch function exists to allow registries to stage or derive stage groups of each case recorded. Additionally it hosts guideline for the Essential TNM including its diagram. Today the tool is available in English, and an expansion including translation to Spanish, French, Italian, Turkish and Japan is ongoing, with a view to expand this to other languages in the future.

### Discussion and Conclusion

CanStaging+ is a tool for PBCR available on and offline to enhance the completeness and comparability of cancer staging internationally. Specifically, for this conference we will present the new updates on the childhood cancer staging tool. The project has been a true international collaborative effort, and continued collaboration is seek to join different sub-works of CanStaging+ *e.g.*, expansion, implementation or capacity building.

# Childhood cancer incidence and survival in Argentina 2000-2021: from the net Argentine Oncopediatric Registry (ROHA)

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## Introduction

The Argentine Oncopediatric Registry (ROHA) has collected data on childhood cancer cases in Argentina since 2000. With over 90% coverage and mandatory registration under the Child/Adolescent Cancer Protection Law since February 2023, ROHA provides valuable information on the incidence and survival trends of childhood cancer in the country. Objective: This study presents the incidence and survival trends of childhood cancer in Argentina from 2000 to 2021.

## Methodology

Data from ROHA were analyzed to assess childhood cancer incidence trends from 2000 to 2021 and survival rates from 2007 to 2017. The registry collects data from pediatric oncology units nationwide, ensuring comprehensive coverage.

## Results

Over the study period, 29,920 new cases of childhood cancer were documented, with an age-standardized incidence rate of 131.6. Most pediatric cancer diagnoses showed stable incidence rates, although there was a notable decline in lymphomas and kidney tumors. In the period 2007-2017(n=15,537), the five-year overall survival (OS) for all tumors was 69.4%. Survival analysis revealed improving five-year OS rates for all tumors, with rates of 61.0% (2000-2005), 66.9% (2006-2011), and 71.0% (2012-2017). Lymphoblastic leukemia exhibited favorable five-year survival rates of 65.2%, 72.5%, and 73.5% for the corresponding periods.

## Conclusion

The incidence rates of major pediatric cancers in Argentina have remained relatively stable, comparable to those of other Latin American countries and lower than rates observed in more developed nations. However, there is still room for improvement in survival rates. Initiatives such as early diagnosis programs, standardized clinical practices, oncology unit categorization, and nursing education have been implemented to address this issue, now included under the Child/Adolescent Cancer Protection Law. The Argentine Oncopediatric Registry (ROHA) serves as a valuable tool for monitoring childhood cancer trends, informing policy decisions, and striving for better outcomes for pediatric cancer patients in Argentina.

## Overall and progression free survival of younger vs. older adults with lung adenocarcinoma

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### Background

Adenocarcinoma is the predominant histological subtype of non-small cell lung cancer (NSCLC), the latter being uncommon in young patients. Real-world evidence concerning the clinical characteristics, treatment and outcomes of these patients is limited.

### Methods

We pooled data from four German cancer registries (Baden-Württemberg, Hamburg, North Rhine-Westphalia, Schleswig-Holstein; covering 35% of the German population) and included patients with lung adenocarcinoma (ICD-10 C34) and residence in the respective federal states at time of diagnosis (years: 2016-2019).

Clinical, treatment and follow up information on recurrences/progression were provided by the registries. Vital status was achieved by the registries via linkage with registration offices' data. We report descriptive statistics, median overall survival (OS), and Kaplan-Meier survival estimates. These analyses were conducted as part of I-O Optimise, which is a multi-country observational research initiative that utilizes real-world databases to provide valuable insights on the evolving treatment landscape for thoracic malignancies.

### Results

Of 26,559 individuals 0.5% were aged 18-39 years ('very young') and 3.9% were aged 40-49 years ('young') at diagnosis with lung adenocarcinoma. Very young (74%) and young individuals (67%) presented more often with metastatic disease compared to those aged 70+ years (53%; 'old') and were more likely to receive a multimodal treatment regime including systemic anticancer treatment. During follow up (median: 13 months) 54% experienced progression and 63% deceased. Although progression was more likely and occurred earlier in very young individuals, median OS was twice as long compared to older ones (21 [95% CI: 16-32] vs. 10 [95% CI: 10-11] months). The survival advantage persisted after stratification according to UICC stage.

### Discussion and Conclusions

Young individuals contribute a substantial proportion of those presenting with lung adenocarcinomas. Despite their tendency to present with advanced disease stages and their higher probability to experience progress, their overall survival prospects are comparatively better than those of older individuals.

## Trend of childhood cancer incidence in Aden Cancer Registry over 20 years' experience

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### Background

Childhood cancer comprises a variety of malignancies with incidence varying worldwide by age, sex, ethnicity, and geography. These variations in the incidence of cancer, have provided important insights into cancer etiology. In Yemen, data regarding these cancers are very scarce. This paper aimed at describing data on childhood cancer registered in Aden Cancer Registry during 20 years.

### Methods

All registered cancers for patients under 15 years in Aden Cancer Registry – a population-based cancer registry covers around four million inhabitants – were collected and analyzed for the period 1997-2016. These include cancers from main hospitals, public and private clinics, diagnostic centers, and abroad treatment registry at Ministry of Public Health and Population. CanReg 5 for cancer registry was used in the analysis. Validation checks of each entered data was carried out to maximize data validity. The World Standard Population and the local covered population were used in the calculation process.

### Results

A total number of 860 cancer cases were registered with an increment of 30% from the first five-year report (1997-2001), 70% from the second one (2002-2006), and 90% from the third report (2007-2011). Childhood cancers accounted for 11% with more male patients (61.4%). Around one – third of patients were from Aden (32%). The most leading cancers were: leukaemia (39.3%), non-Hodgkin's lymphoma (18.7%), Hodgkin's disease (10.2%), brain (8.6%) and bone and connective tissues (5.9%). Both sexes showed similarities in the first five ranking cancers but they differed in their relative frequencies.

### Discussion and Conclusion

There is an increasing trend in childhood cancers registration in Aden cancer registry which make these cancers important public health problem. Furthermore, there are differences in the pattern of childhood cancers in comparison with neighbouring countries. Further in-depth analysis is obviously needed.

*Keywords: Childhood cancer, cancer registry, trend, Aden, Yemen*

## Survey of childhood and adolescent cancer registration in Europe and example of Slovenia

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### Background

Monitoring childhood and adolescent (CA) cancer burden together with late effects is becoming more prominent, but practices vary. We aimed to explore what type and level of detail of data is available in European registries, as well as present the Slovenian example.

### Methods

In summer of 2022, members of the European Network of Cancer Registries were contacted to participate in a CA cancer registration survey. Questions were divided into sections: *i*) coverage (national/regional, age range, malignant and non-malignant entities); *ii*) which and how detailed data registries collect/are planning to collect (on diagnosis, staging, treatment, progression, follow-up and other); and *iii*) whether they have/are planning to introduce late effects registration and how this data is (to be) collected. Results were analysed using descriptive statistics. We also described the development and features of the Slovenian Childhood Cancer Clinical Registry (SCCCR).

### Results

27 registries from 16 different European countries responded (response rate 19.3%). Of those, over 80% register data for International Classification of Childhood Cancer, vital status, death and second primary cancers. Less than 20% collect cumulative radiation and systemic therapy doses or data on progression. Other items had between 20 and 80% availability. Several registries expressed intention to introduce Toronto staging and expand the detail on systemic therapy and disease progression. Only three had in place late effects surveillance with low intention among others to introduce it. The SCCCR includes an expanded dataset on disease and follow-up and could serve as an example for other registries, though its implementation revealed several obstacles, such as a lack of international standards.

### Discussion and Conclusion

Detailed CA cancer and late effects registration is not common in Europe. To promote it, we need to standardize variable sets, their definitions and classifications. Registries should share good practice examples and collaborate in harmonization incentives.

## Development and validation of registry derived stage at diagnosis for gastro-intestinal tract and gynaecological cancers

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### Background

In 2021, Victorian Cancer Registry led a project to develop business rules to capture registry-derived stage at diagnosis (RD-Stage) for pancreatic, liver, stomach, endometrial and ovarian cancers.

### Methodology

Business rules to collect RD-stage were developed by using the 8th edition of AJCC for each of the five cancers. The developed business rules were endorsed by tumour specific Expert Working Groups comprised by wide range of medical advisors and registry leaders.

Endometrial and pancreatic cancers were assessed to understand whether RD-stage could be calculated (a) using data routinely available at national level; (b) using Natural Language Processing (NLP) applied to pathology reports, and (c) using NLP on imaging reports and a Multidisciplinary meeting software.

A validation study was undertaken to compare RD-stage for endometrial and pancreatic cancer with the stage collected by Clinical Quality Registries (CQRs).

### Results

Level of completeness of RD-stage data captured by Population Based Cancer Registries (PBCRs) at baseline ranged from 0-75% for pancreatic cancer and from 0-98% for endometrial cancer. Three Australian jurisdictions used the SEER degree of spread which was not compatible with RD-stage requirements.

Analysis of the NLP’s ability to accurately auto-extract stage data showed that performance varied depending on the data source and the data elements extracted.

The validation study conducted by VCR to compare the RD-stage with stage data from CQRs showed level of agreement of 95.8% for endometrial cancer and 95.2% for pancreatic cancer.

### Discussion and Conclusion

The lack of standardisation of data elements and data sources available to PBCRs at a national level resulted in poor capacity to capture RD-Stage. However, the validation study indicated high level of concordance for both endometrial and pancreatic cancer with CQRs data, indicating that, when information is available, RD-stage model enables PBCRs to collect reliable data of stage at diagnosis for population epidemiological purposes.

# Trastuzumab Deruxtecan versus Ramucirumab+Paclitaxel for patients with HER2-positive gastric adenocarcinoma: a propensity score matched comparison

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## Background

The single arm phase 2 DESTINY-Gastric02 (DG-02) study investigated the objective response rate, overall survival (OS) and safety of patients treated with Trastuzumab Deruxtecan (T-DXd) as second-line therapy in Western patients with HER2+ unresectable or metastatic gastric or gastro-esophageal junction (GEJ) adenocarcinoma who progressed during or after trastuzumab-based first-line therapy. As the DG-02 study had no control group, the aim of the current study was to compare patients in the DG-02 study to a real-world reference group treated with Ramucirumab+Paclitaxel (Ram+Pac) as second-line therapy.

## Methods

DG-02 patients who received trastuzumab in a non-metastatic setting (N=8) were excluded, due to absence of similarly treated patients in the Netherlands Cancer Registry (NCR). All other DG-02 patients (N=71) were included. A comparable set of patients with HER2+ esophageal, gastric or GEJ adenocarcinoma who received trastuzumab in first-line and Ram+Pac in second-line setting were identified from the NCR (N=120). Propensity score trimming and propensity score matching based on sex, age, performance status, primary tumor location, BMI, renal function, number of metastatic sites, presence of liver metastases, and duration of first-line treatment were used to select a reference group for the DG-02.

## Results

Propensity score trimming resulted in exclusion of 12 DG-02 and 33 NCR patients. Thereafter, propensity score matching resulted in a balanced group of patients from the NCR (N=78) and DG-02 (N=58). Median OS was significantly longer among patients treated with T-DXd (11.6 months, 95%CI: 9.0-20.5) compared to the Ram+Pac group (6.2 months, 95%CI: 4.5 – 10.0) (HR: 0.39, 95%CI: 0.26 – 0.59, $p<0.0001$).

## Conclusions

Compared to propensity score-matched patients with metastatic, trastuzumab-pretreated HER2+ gastric or GEJ adenocarcinomas who received Ram+Pac in the real world as a second line therapy, overall survival was better for patients who received T-DXd. Due to the nature of the comparison, the results should be interpreted with caution.

# Linking Comorbidity Data into Cancer Registries: Cardiovascular Comorbidities of Cancer Patients in Northern Ireland

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## Introduction

Cancer registries play a crucial role in capturing and analysing cancer occurrence and outcomes in the population. However, many registries worldwide do not routinely collect data on comorbidities, which are known to influence cancer treatment and prognosis. Sharing many risk factors, cancer and cardiovascular disease (CVD) are leading causes of deaths in Northern Ireland, with 31.1% and 29.8%, respectively. This study demonstrates the utility of linking cancer registry records with comorbidity data using the example of CVD.

## Methods

The records of Northern Ireland Cancer Registry (excluding non-melanoma skin cancers) were securely linked with hospital admission records from 2006 to 2019. Diagnoses of 11 CVDs were extracted using ICD-10 codes. The pattern of CVDs for each of the 24 cancer types was analysed by demographic and socioeconomic variables.

## Results

Of 107,131 cancer patients diagnosed between 2006-2019, 99,721 (93.1%) with valid comorbidity data were analysed. Overall, 38.3% of cancer patients had CVD either before (22.9%) or after (15.3%) their cancer diagnosis with angina 18.1%, atrial fibrillation 13.3%, myocardial infarction 8.5%, congestive heart failure 8.3%, peripheral vascular disease 7.7%, other cardiac arrhythmias 5.9%, valvular disease 4.5%, pulmonary circulation disorder 4.1%, embolism and thrombosis 1%, cardiac arrest 0.8%, and myocarditis and pericarditis 0.8%. 19.3% had multiple CVDs.

## Conclusion

This study, by reporting key statistics on 11 common CVD comorbidities across 24 cancer types, demonstrates the potential of collecting and integrating comorbidity data within cancer registries. The findings show high levels of CVD among cancer patients which is likely to affect survival. Standardizing comorbidity data collection in cancer registries internationally will enable investigators to explore complex interactions between health problems, foster precision public health and support evidence-based health system planning.

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## Rare cancers in Europe: The EUROCARE-6 updated results

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### Objective

To update survival estimates for rare cancers (RC) in Europe and to describe differences between countries and over time.

### Methods

We used the EUROCARE-6 database (106 cancer registries; 29 European countries). We analysed about 2,000,000 adults (aged 15-85+ years) diagnosed with solid RC (the 10 families defined by the Joint Action on Rare Cancers) in 2000-13 followed up to the end of 2014. We analysed the differences in 5-year relative survival (RS) by country (2010-2014) and over time (2004-06 vs 2010-14) using period analysis. Moreover, for trends the RS was age-standardized using the International Cancer Survival Standard. Funnel plot were used to identify relevant RS differences between countries and over time.

### Results

RS of RC was 54% with differences by family type and subtype. Specifically, RS was:
<20% for mesothelioma, central nervous systems and gallbladder and extrahepatic biliary tract tumours; 50%-70% for sarcomas, neuroendocrine and tumours of vulva and vagina, anal canal, head and neck and thymus;
(>70%) for testicular and paratesticular and endocrine tumours. For each RC family, survival decreased with increasing age. Differences in RS between countries were not due to chance for all the RC families and were generally lower for eastern European countries and UK. RC survival increased over time for all RC except for tumour of Pelvis and Ureters, with bigger increase (+8%) for neuroendocrine of Lung, Oropharynx and Trachea.

### Discussion and Conclusions

This is the first time that survival for adult solid RC families is reported and differences by country are analysed. Our results show similar RS differences between countries suggesting weaknesses in the management of RCs. Finally, the time frame of our analyses precedes the implementation of the European Reference Networks (ERNs) to improve outcomes for RCs and thus provides an important baseline from which to evaluate the effectiveness of the ERNs.

# M1 Registration: signaling patients who develop metachronous metastases after primary breast cancer

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## Background

Data on primary breast cancer (BC) is registered in the Netherlands Cancer Registry (NCR). Due to the vast amount of survivors, it is not feasible to actively monitor all patients to signal and register metachronous metastases. This project aimed to develop an M1 detection algorithm based on hospital data to signal patients who developed metachronous metastases.

## Methods

The NCR collects data on all individuals newly diagnosed with cancer. Dutch Hospital Data (DHD) collects and processes data from hospitals, including data on diagnosis and treatment. DHD data from 2019-2020 were linked to the NCR using a probabilistic matching method. We matched on date of birth, gender, diagnosis, postal code, hospital and patient ID. From previous studies, manually registered data on metastases were available for subgroups of BC patients (‘golden standard’). First, 80% of these data was used to train the model, 20% was used to validate the model. Second, a pilot study was performed in which 928 patients files were checked, sampled with variance in prediction probability, to evaluate a diverse range of cases.

## Results

We included 4,395 patients. Variables that were included to predict metastases were i.e. specific medication, counselling for metastatic BC, Carcinoembryonic Antigen test, a confirmed diagnosis of metastases, and number of patient visits. The first validation step showed a precision of the model of 0.91 to predict metachronous metastases, 0.93 to predict free of metastases. The pilot study confirmed that a higher prediction probability of >0.8 correlated with a higher chance that a patient has metachronous metastases. However, false positive predictions occurred.

## Conclusions

We developed an M1 detection algorithm to signal patients with metachronous metastases after BC treatment on a national level. With this algorithm we are one step closer to identify all patients with metachronous metastases to reach a complete registration reusing existing data sources.

# The pandemic-related disparities in 2020 cancer incidence by sex and age – Greater Poland, Poland

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## Background

COVID-19 has changed the organization of healthcare services in Poland. Due to the stay-at-home policy addressed primarily to seniors, some patients chose not to seek medical care or participate in cancer screening programs. This study aimed to determine the COVID-19-related incidence gap by sex and age.

## Methods

Data on cancer cases diagnosed between 2010 and 2020 were sourced from the regional cancer registry. To estimate the change in the number of incident cancer cases during the pandemic, we calculated the standardized incidence ratio (SIR) and, to assume the pandemic-attributable gap in cancer incidence, the incidence rate difference (IRD). The number of observed cases was retrieved directly from the registry database. Using simple linear regression analysis, we attempted to predict the expected number of incident cancer cases in 2020 and the age-standardized incidence rate, deploying registry data from ten years before the COVID-19 pandemic (2010-2019).

## Results

Among children, adolescents, and young adults, the decrease in cancer incidence was significant only among males aged 30-34 years (SIR 0.76, 95% CI 0.59 to 0.97). Among older adults, the decrease in newly diagnosed cancer cases was more pronounced with rising age at diagnosis. In both sexes, all age groups ≥ 55 years were affected, with the most significant decrease in 65-69-year-olds (SIR 0.69, 95% CI 0.66 to 0.73) in males and 85+-year-olds (SIR 0.66, 95% CI 0.59 to 0.73) among females.

## Discussion and Conclusions

In 2020, the incidence gap related to COVID-19 pandemics, by sex and age, was higher in males than in females, with a 20% and 17% decrease, respectively. It was particularly significant in patients aged ≥ 55 years, with the most affected age groups showing a gap of 31% in males and 34% in females. Future studies should analyze the variation by cancer sites.

## Impact of the COVID-19 pandemic on the diagnosis and treatment of cancer in India

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### Introduction

The COVID-19 pandemic had an adverse effect on cancer care in India, but there is limited understanding of how it specifically influenced the diagnosis and treatment of different types of cancer. Therefore, this study aimed to examine the effects of the COVID-19 pandemic on the diagnosis and treatment of various cancers in India.

### Methods

Data from 45 Hospital Based Cancer Registries (HBCRs) under National Cancer Registry Programme of India were considered for the study. The HBCRs were selected as they provide consistent data since 2015. The information on age, gender, diagnosis, clinical extent, treatment modalities, time between diagnosis and treatment were compared for the pre-COVID period (2018-2019) and COVID period (2020-2021). Chisquare test and Mann Whitney test were employed to assess associations and differences, as appropriate within the data.

### Results

Overall, there was a reduction of -17.6% in the number of cancer cases registered in HBCRs during the COVID-19 period. This reduction was consistent across both males and females, with no significant difference between the two genders. The largest decline was observed among elderly (70+ years, reduction %: -20.4%), clinical only (-59.4%), locoregional (-20.8%), Surgery and Radiotherapy (-17.0% approximately). Substantial decline in Brain cancers, thyroid cancers, soft tissue, and prostate cancer were observed. The decline in numbers correlated with the peak months of COVID-19 outbreak in India across various clinical extent and treatment modalities. The time between diagnosis and treatment reduced by 3 days, which coincided with the decrease in treatment proportions.

### Conclusion

The impact of COVID-19 on cancer diagnosis and treatment was evident in India, with decreased number of diagnosis and treatments of cancers in India. The time to treatment from diagnosis was shortened, potentially reflecting overstretched cancer care before the pandemic.

## Impacts of the COVID-19 pandemic on cancer incidence in Ireland: data from the national registry

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### Background

The onset of the COVID-19 pandemic caused unprecedented disruption to cancer services worldwide. To assess the impact of COVID-19 on cancer incidence in Ireland, we present the numbers of cases diagnosed in 2020 and preliminary numbers of cases diagnosed in 2021 and assess the shortfall in diagnosed cancer cases in 2020 and 2021 compared to pre-pandemic predictions.

### Methods

We modelled cancer cases from 1994 to 2019 to identify the last stable trends prior to the pandemic onset. 'Expected' case counts for 2020 and 2021 were projected from the model (representing the expected numbers for each cancer had COVID-19 not occurred) and compared to registered cancer cases for 2020 and 2021.

### Results

10% fewer cancer cases were diagnosed in Ireland in 2020 than expected based on pre-pandemic trends. Preliminary findings indicate that case counts for 2021 were 6% lower than expected based on pre-pandemic trends, with largest percentage shortfalls in leukaemia, liver, kidney, and pancreatic cancers. Some cancers which had been severely impacted in 2020, *e.g.* colorectal and female breast cancer, were within expected limits in 2021.

### Discussion and Conclusion

While the preliminary shortfall of 6% in cancers registered in 2021 indicates that the impact of COVID-19 on cancer diagnoses continued into 2021, this figure represents an improvement over 2020 shortfalls. The impact of COVID-19 on cancer varied by cancer type, with leukaemia, liver, kidney, and pancreatic cancers being most severely impacted according to preliminary numbers in 2021. Conversely, case counts of other cancers such as colorectal and female breast cancer in 2021 indicate a recovery in the diagnoses of these cancers from earlier impacts of the pandemic. More detailed assessment of the impact of COVID-19 on the diagnosis, staging and treatment of breast cancer in Ireland will be completed in the coming months and included in the final presentation.

## Involvement of the European cancer registries in studies measuring the impact of COVID-19 pandemic

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### Background

The COVID-19 pandemic increased the challenges faced by the oncology community. During the first wave of the pandemic, the cancer registries started to perform studies on the impact of COVID-19 in the diagnosis, treatment, and survival.

The goal of this study is to explore the involvement of the European cancer registries in measuring the impact of the pandemic in cancer diagnosis and care.

### Methods

Searches were done in Pubmed for studies performed by the European cancer registries regarding the impact of pandemic in diagnosis and care. Studies published until May 2023 with an abstract in English were included.

### Results

The searches retrieved 42 studies fulfilling the inclusion criteria from registries from Belgium, Denmark, Germany, Italy, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, and United Kingdom. 29% of the studies are performed in the Netherlands. The retrieved publications are describing the impact of the pandemic in the diagnosis and stage, cancer screening programs, cancer trends. Few studies are measuring the impact in special populations (*e.g.* childhood cancers).

### Discussion and Conclusion

In Europe, most of the registries are reporting similar trends in cancer diagnosis with a decrease in the number of cases in the first year of the pandemic. More research is needed to quantify the long term impact of the pandemic in the cancer burden.

## Stage shift and survival declines for head and neck cancers during the Belgian COVID-19 pandemic

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### Background

In Belgium, as in many countries, the first wave of the COVID-19 pandemic lead to suspension of 'non-essential' healthcare and the order to socially isolate. Underdiagnosis of cancers was observed worldwide, including in Belgium. Head and neck cancers (HNC) were the most profoundly underdiagnosed cancers in 2020 in Belgium, which is concerning given the rapidly progressing nature of some entities.

### Methods

Using data from our nationwide, population-based Belgian Cancer Registry, we extrapolated the trends in HNC incidence, clinical TNM stage and 1-year relative survival (1yRS) for 2017-2019 to create a predicated value for 2020 and compared this to the observed values in 2020, by pandemic phase.

### Results

There were 9.5% fewer HNCs diagnosed in 2020, which could not be explained by underreporting. Underdiagnosis was larger for males (-11.8%), patients aged 50-64 (-11.2%) and 65-79 (-11.1%), and for oral cavity cancer (-17.6%). Shifts to more advanced stages during or following the first wave of the pandemic were observed for larynx and oropharynx tumors and for (male) patients aged 80+. A 2.4 percentage point decline in 1yRS was observed, relative to the increasing trends in 1yRS (2017-2019), which remained when the analyses were stratified by stage and age group. Incidence, stage and survival results for diagnoses made in 2021 will also be presented.

### Discussion and Conclusion

The COVID-19 pandemic led to substantial underdiagnosis of HNC, with diagnostic delay and shift to more advanced stage at presentation in certain subgroups. Additionally, HNC patients diagnosed in 2020 suffered higher than expected mortality. Uniquely, we used predicted values for 2020 extrapolated from trends in the reference period, rather than comparing to the average of previous incidence years. Our method accounts for annual increases in incidence and survival, and evolutions in stage distribution, thereby avoiding underestimating the impact of the COVID-19 pandemic.

# Second primary neoplasms among childhood cancer survivors in Europe: a population-based study

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## Introduction

Childhood cancer survivors (CCS) are at a high risk of developing second primary neoplasms (SPN). Within the Cancer Risk in Childhood Cancer Survivors (CRICCS) study, funded by Children with Cancer UK, we assessed the incidence of SPN among CCS in Europe.

## Methods

We pooled data from 73 population-based cancer registries operating in 31 European countries that provided data to the Automated Childhood Cancer Information System database over variable time periods (1949-2011). We included only malignant tumours; either diagnosed before the age 20 years, or subsequent tumours in these patients. All cancers were classified by the International Classification of Childhood Cancer. We computed cumulative incidence (CI) of SPN in 5-year CCS.

## Results

The 149,205 5-year CCS were followed-up for a median of 13.6 years and 2.4 million person-years, giving rise to 1,937 SPN. The median age at SPN diagnosis was 27 years. Incidence rate of SPN was 81.1 per 100,000 person-years. Most common SPN were carcinomas, soft tissue sarcomas, and CNS tumours. The CI of SPN increased with time since diagnosis from 0.4% at 10-years to 5.5% at 40-years. CNS and bone tumours developed at younger median age (14 years) than leukaemia (19), soft-tissue sarcomas (23) or carcinomas (32). Overall, carcinomas were the most common SPN, while retinoblastoma was most often followed by a bone tumour.

## Discussion

Our study shows that SPN incidence among CCS increases with time and age. These findings highlight the importance of long-term follow-up of CCS, both in medical setting and in PBCRs. Study of additional determinants would contribute to SPN prevention.

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# Cancer burden in adolescents and young adults in İzmir, Türkiye,

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## Background

Cancer burden among adolescents and young adults (AYAs) is increasingly recognized as a significant health concern. However, comprehensive data on cancer burden in AYAs is limited. By utilizing a population-based cancer registry database, we can obtain a more accurate understanding of the burden of cancer in AYAs and identify areas for targeted interventions. Aim of this study is to analyze the burden of cancer in AYAs in Izmir, Türkiye using the Izmir Cancer Registry Database, focusing on age standardized incidence rates (ASR).

## Methods

We utilized 1994-2018 data on cancer cases among AYAs aged 15-39 years from Izmir Cancer Registry. We provide age standardized incidence rates for 15-19, 20-29 and 30-39 age groups by five-year periods. We included all cancers except C44 but malign melanoma by sex.

## Results

There are 33,291 (13,343 men, 19,948 women) cases in 1993-2018 in AYAs in Izmir. ASRs* per 100,000 were: for 15-19 agegroup 1.4 and 1.1 in 1994-1998, 2.1 and 2.3 in 2014-2018; for 20-29 agegroup 3.3 and 3.2 in 1994-1998, 6.7, and 8.5 in 2014-2018; for 30-39 agegroup 5.8 and 8.3 in in 1994-1998, 9.0 and 17.3 in 2014-2018, respectively in males and females.

In 15-39 age group, most common cancers in 2014-2018 were (percentages and ASRs per 100,000 respectively), testicular (18.6%, %3.5), thyroid (12%, 2.1), colorectal cancers (7.2%, 3.1), and NHL (6.2%, 1.1) in men; thyroid (34.5%, 10.0), breast (25.9%, 6.7), ovarian (3.2%, 1.0) and cervical cancers (3.5%, 0.9) in females.

## Conclusion

ASRs were increasing between first 5-year and last five-year periods both in males and females in every sub-agegroups, increase were striking in 20-29 and 30-39 agegroups though. Our findings highlight the need for targeted interventions for this agegroup.

* *WSPop*

# Cancer in adolescents (aged 18-24 years old) in the Ibadan cancer registry (IBCR), Nigeria, 2018-2022

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## Background

Whereas, globally, cancer incidence increases with age, and certain cancers are associated with childhood, adolescent cancer (ADL) appears insufficiently addressed despite the high mortality rates and its implication for developmental attainments in low-middle-income countries (LMICs) like Nigeria, which population is mostly youthful. Healthcare professionals require an understanding of Adolescent cancer patterns for optimal cancer care planning.

We, therefore, report the pattern of adolescent cancers in the Ibadan Cancer Registry, a population-based cancer registry, relative to all cancers seen over a 5-year period.

## Methods

All adolescent tumours registered in the registry during the period of 2018-2022 were included in this review. Canreg5 software was used for data capture, including patient's age, gendre, sites, diagnosis, and basis of diagnosis. Analysis of the data was done using both Canreg5 and Microsoft Excel.

## Results

Adolescent cancers (ADL) accounted for 1.83% out of 10136 cases of total malignancies seen within the study period with an incidence rate of 5.9 per 100,00 population.

There were 94 (50.8%) females and 91 (49.2%) males respectively. Connective, subcutaneous, and other soft tissue cancers topped the list with 22 cases (11.9%) followed by bone cancers (18 or 9.7%), Brain cancers (16 or 8.7%), Nasopharyngeal cancer (16 or 8.7%) and Lymphomas (13 or 7.0%).

The diagnoses were morphologically verified in 66% of cases, clinical in 33%, and by death Certificate only in 1%. Carcinomas accounted for 43.2% of histologically verified cases.

## Discussion and Conclusion

The pattern of cancer in Nigeria differs from that in developed countries, even among adolescents. It appears that environmental influence on cancer development likely starts early, impacting this group of potentially resourceful population members. The observed data is relevant for monitoring cancer in the catchment zone and can be used by healthcare planners in policy formulation.

## International benchmarking of childhood cancer survival by tumour stage, first results of the BENCHISTA project

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### Background

Variation in tumour stage at diagnosis may explain international differences in childhood cancer survival. The BENCHISTA project aims to test this hypothesis and to encourage the application of Toronto Stage Guidelines (TG) by Population Based Cancer Registries (PBCRs).

### Methods

Participating PBCRs collected TG at diagnosis for all cases of six paediatric solid tumours diagnosed between 2014-2017. PBCRs submitted patient-level, depersonalized datasets with Tier 1 or Tier 2 staging information. Online training followed by quality assurance tests were used for standardization. Three-years overall survival by tumour type and stage were analysed using Kaplan-Meier methods.

### Results

PBCRs from Australia, Brazil, Canada, Japan and twenty-four European countries participated. Analysis of 10,504 cases received by May 2023 (~98% of expected total) showed stage completeness is highest for Wilms tumours (97%) and lowest for medulloblastoma (93%). The proportions with metastases at diagnosis were 18% for Wilms tumours (2,109); 33%(M) +8%(MS) for neuroblastomas (2,845); 30%(M1-M4) for medulloblastomas (1,535); 25% for osteosarcomas (1,500); 33% for Ewing sarcomas (1,102) and 26% for rhabdomyosarcomas (1,413). 3yrs OS for all cases were 94%(WT); 83%(NBL); 75%(MBL); 74%(osteosarcoma); 76%(Ewing); 75%(RMS).

For all 6 tumours a gradient was present in 3-year survival by stage; large differences were observed in the 3 sarcomas, which had 3-year OS of 44%, 48% and 53% for metastatic disease for Rhabdomyosarcoma, Osteosarcoma and Ewing Sarcoma, respectively, compared to 94% for stage 'I' Rhabdomyosarcoma, 82% and 85% respectively for localized osteosarcoma and Ewing. Medulloblastoma showed the largest gap between M0 (81%) and M4 (25%).

### Discussion and Conclusion

PBCRs have successfully applied the TG to share data on stage at diagnosis. The BENCHISTA Project is strengthening collaborative relationships between PBCRs and clinicians to interpret geographic variations in childhood cancer outcomes and to improve their outcome.

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## Main cancers incidence in metropolitan France in 2023 and trends since 1990

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### Background

As part of a cancer surveillance partnership between the French network of cancer registries, biostatistics team and French public health institutions, cancer incidence and mortality indicators are produced regularly. The aim of this study was to estimate the incidence of the 19 most common cancers and of all cancers in metropolitan France in 2023. It also aimed to provide an analysis of trends since 1990.

### Methods

Data collected from French metropolitan cancer registries from 1985 to 2018 observed were considered. Incidence was estimated from 1990 to 2018, and projected from 2019 to 2023, for this reason, possible impacts of the pandemic linked to COVID-19 could not be take into account. Rates were expressed as age-standardized incidence rates (ASIR) using the age structure of world population as reference.

### Results

In 2023, 433,136 new cancers were estimated in France. Breast, prostate, lung and colon-rectum cancers remained the most frequent. In men, the 'all cancer' ASIR was 355 per 100,000 person-years in 2023, a rate which decreased over 2010-2023 (-0.3% per year) while in women, it was 274 per 100,000 person-years and increased over the same period (+0.4% per year). Men were still the most affected and trends differed according to gender. Overall, compared with the previous study (2018), results remain quite similar: slow decline in the ASIR of tobacco-related cancers in men in contrast to an increase in women, and an increase in the ASIR for pancreas cancer and melanoma in both sexes.

### Discussion and Conclusion

These variations in the ASIR associated with demographic changes have led to a doubling of the number of new cancer cases since 1990. In this context of increasing for several cancers, preventive strategies must be strengthened. Moreover, etiological studies must be carried out to understand and identify unexplained causes of certain upward trends.

## Cervical cancer survival trends by age and stage: women diagnosed during 2000-2014 (CONCORD-3 and VENUSCANCER)

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### Background

In CONCORD-3, we analysed individual records for 660,774 women (15-99 years) diagnosed with cervical cancer during 2000-2014 in 62 countries world-wide. Age-standardised 5-year net survival ranged from 52% in Ecuador to 77% in Korea during 2010-2014. Survival was below 55% in Argentina, Bulgaria and Poland, but reached 73% in Cuba and Norway. Here, we examine the impact of age and stage at diagnosis.

### Methods

We designated five age groups (15-24, 25-44, 45-64, 65-84, 85-99 years) and four stage groups (early [T1N0M0]; locally-advanced [T2-3N0M0; T1-3N+M0]; advanced [T4anyNM0, M1]; unknown). Stage-specific analyses were restricted to data sets in which stage was known for at least 70% of records.

We estimated net survival up to 5 years using the Pohar Perme estimator. To control for background mortality, we used life tables of all-cause mortality in women by single year of age, region or country, single calendar year, and where possible by race. Stage-specific estimates were age-standardised with the International Cancer Survival Standard weights.

### Results

Cervical cancer was mostly diagnosed in women aged 45-64 (41%). Survival was generally lower among older women. During 2010-2014, survival for women in the screening age range (25-64 years) was low in Ecuador, Argentina, Bulgaria and Poland, and high in Korea, Norway and Denmark.

Data on stage were available for 199,851 women diagnosed during 2001-2014 in 30 countries. During 2009-2014, early stage varied from 23% in Thailand to 57% in Norway; advanced stage was highest in Finland (27%). Stage-specific survival was lowest in Puerto Rico for early stage disease, and in Austria for advanced stage. In Poland, survival was low for both stage groups.

*Survival trends will be presented.*

### Discussion and Conclusion

Persistent world-wide disparities in survival may be due to differences in the organisation of screening programmes. Access to treatment may also play a role.

## Esophageal and gastric cancer incidence trends in Golestan, Iran: an age-period-cohort analysis 2004-2018

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### Background
Golestan province in the northeast of Iran is part of the Asian esophageal cancer belt and is known as a high-risk area for esophageal (EC) and gastric cancers (GC).

### Methods
Data on incident cases of EC and GC during 2004-2018 were obtained from the Golestan Population-based Cancer Registry (GPCR). The age-standardized incidence rates (ASRs) were calculated and presented per 100,000 person-years. The estimated annual percentage change (EAPC) with 95% confidence interval (95% CI) were calculated. We also fitted age-period-cohort (APC) models to assess non-linear period and cohort effects as incidence rate ratios (IRRs).

### Results
Overall, 3004 new cases of EC (ASR=15.7) and 3553 cases of GC (ASR=18.3) were registered in the GPCR. We found significant decreasing trends in incidence rates of EC (EAPC=-5.0; 95% CI: -7.8, -2.2), and less marked non-significant trends for GC (EAPC=-1.4; 95% CI: -4.0, 1.4) during 2004-2018. There was a strong cohort effect for EC with a consistent decrease in the IRR across successive birth cohorts, starting with the oldest birth cohort (1924) (IRR=1.9 versus the reference birth cohort of 1947) through to the most recent cohort born in 1988 (IRR=0.1).

### Discussion and Conclusion
The marked declines in EC incidence rates in Golestan relate to generational changes in its underlying risk factors. Despite favourable trends, this population remains at high risk of both EC and GC. Further studies are warranted to measure the impact of the major risk factors on incidence with a view to designing effective preventative programs.

# Population-based cancer registries in Mexico: lessons learned during the first five-years of Tijuana's 'BajaREG' registry

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## Background

Challenges in implementing population-based cancer registries (PBCR) in low-middle income countries (LMIC) are well-known. Mexico, has fragmented healthcare and lacks comprehensive hospital information systems hindering assessment of cancer incidence.

## Methods

In 2017, we implemented 'BajaREG', the first PBCR in North-western Mexico in Tijuana, the largest Mexico-US border city and 6th in Mexico (population>1.9 million). BajaREG joined the population-based cancer registry network (PBCRN) in Mexico from 2018-2020. We describe the challenges faced in data collection during the first five years of 'BajaREG'.

## Results

Sixty-two sources of information were identified in 2017. Access was obtained in 38(61%) and active data collection was completed in 100% (2017-2020). In 2020, access was limited to 22 sources (35%): in 19(86%) data collection was active and in 3(14%) was passive. 14,392 cancer cases have been collected from 2018-2022. 7,163(49.8%) lacked an address to confirm place of residency. Fifty-nine percent of cases were female and 41% male. Most common diagnoses were breast (16%), colo-rectal (10%) and cervix (7%). Most common diagnoses in females were breast (27%), cervix (11%) and colo-rectal (8%). Most common diagnoses in males were colo-rectal (13%), prostate (11%) and lung (9%).

## Discussion and Conclusion

We found a significant proportion of medical records in all sources with incomplete information to fulfill essential data in cancer registration. In Mexico, there is still resistance to sharing information in institutions where the purpose of PBCRs has not converged into systematic data collection, management, and dissemination. Over the past 5 years, Tijuana has faced three different state secretaries of health affecting continued support to emerging initiatives. In addition, the COVID-19 pandemic and closure of the PBCRN affected 'BajaREG' expansion. Therefore, it is critical to engage healthcare authorities and institutions to overcome these barriers. Despite challenges, 'BajaREG' has continued operating and collaborating at state, national and international levels.

## Time trends in 5-year relative survival for common cancer types in Zurich, Switzerland

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### Background

Survival trends help to evaluate the progress made to reduce the burden of cancer. Our study aimed to estimate the trends in five-year relative survival of patients diagnosed with breast cancer, prostate cancer, lung cancer, colon/rectum cancer, or skin melanoma in the Canton of Zurich, Switzerland, by comparing the incidence periods 1980-89, 1990-99, 2000-09 and 2010-15. Furthermore, we investigated relative survival differences by stage and age group.

### Methods

Data from the Cancer Registry of Zurich, Zug, Schaffhausen, and Schwyz were used from 1980 to 2015, including incident cases of breast cancer (N=26,060), prostate cancer (N=23,858), colon/rectum cancer (N=19,305), lung cancer (N=16,858) and skin melanoma (N=9,780) with follow-up until 31 December 2020. The cohort approach was used to estimate 5-year relative survival in STATA.

### Results

The 5-year relative survival increased significantly between 1980-89 and 2010-15: from 0.70 to 0.89 for breast cancer, from 0.60 to 0.92 for prostate cancer, from 0.09 to 0.23 (men) and from 0.10 to 0.27 (women) for lung cancer, from 0.46 to 0.66 (men) and from 0.48 to 0.68 (women) for colon/rectum cancer, and from 0.74 to 0.94 (men) and from 0.86 to 0.96 (women) for skin melanoma. Survival for stage IV tumors was considerably lower compared to earlier-staged tumors for all localisations. Furthermore, relative survival was similar for the age groups <80 years but lower for patients aged 80 years and older.

### Discussion and Conclusion

The observed increasing trends in survival are encouraging and likely reflect raised awareness around cancer, improved diagnostic methods, and more efficient treatments. The fact that stage I tumor patients have generally high relative survival supports the efforts made regarding early detection of tumors, such as screening.

# Poster Presentations

## Delay in diagnoses in the first Corona year

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### Background

The COVID pandemic led to various lockdowns in Austria where people were obliged to stay at home by law, except for defined reasons. Medical care was geared toward emergency operations. Now data on cancer incidence for the first year of the COVID pandemic are available and analysed focusing on delayed or missed diagnosis.

### Methods

Data on cancer incidence from the Austrian National Cancer Registry were analysed on a monthly basis comparing the results of 2020 with the average of 2017 to 2019.

### Results

The onset of the pandemic in Austria deferred diagnoses to later in the year. Unexpectedly in January and February about 540 more diagnoses were made than in the average of previous years. Compared to previous years, about 1 600 fewer diagnoses were made between March and May 2020. Much of this was made up between June and September 2020 (about 1,070 cancer diagnoses). From October to November, about 220 fewer diagnoses were made compared to previous years, while in December the number of new cancer diagnoses was nearly 180 cases higher than the average for previous years.

### Discussion and Conclusion

The number of new cancer cases in 2020 was 43 014, similar to the previous years (average 2017-2019: 43 048 new cancer diagnoses). However, the onset of the pandemic in Austria led to a significant shift in diagnoses to later in the year. Temporally, the periods with declines match the timing of the 2020 lockdowns, with the magnitude of change varying depending on tumour location. The impact of delayed diagnoses on therapy and the chances of cure will emerge only in a few years.

## COVID-19: Nationwide impact assessment of initial treatment of patients diagnosed with breast cancer in 2020

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### Background

The first COVID-19 wave necessitated temporary suspension of non-essential medical services including organized cancer screening programs in Belgium. This study assessed the impact of the pandemic on breast cancer (BC) treatment in Belgium in 2020.

### Methods

All Belgian residents diagnosed with invasive BC in 2015-2020 in the population-based cancer registry database were included. National health insurance reimbursement data were used to examine treatment strategies. Treatment strategy trends for 2015-2019 were extrapolated to predict treatment choices for 2020 and these predictions were compared with the observed data. Exact tumor diameter and nodal involvement were analyzed for 2019 and 2020.

### Results

55,466 patients were selected. In 2020, the proportion of patients receiving surgery as part of their treatment remained similar (85%) compared to 2015-2019. A significant shift from upfront surgery towards neoadjuvant treatment (NAT) was noted for patients with BC clinical stage I-II. For patients who received upfront surgery there was no difference in time to surgery in 2020, for patients treated with NAT time from incidence to start of NAT was significantly shorter. Among all patients receiving NAT, the time from start of NAT to surgery was significantly shorter in 2020, while specifically among patients receiving neoadjuvant hormonal treatment, there was no difference in time from start NAT to surgery. Finally, there was no difference in average pathological tumor diameter or nodal involvement in 2020 compared to 2019.

### Discussion and Conclusion

Observed treatment adaptations for patients with newly diagnosed BC during the COVID-19-year 2020 in Belgium were successful in prioritizing patients for surgery while preventing tumor progression in those with surgical delay.

## Impact of COVID-19 pandemic on educational differences in cancer incidence in Finland

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### Background

COVID-19 pandemic has resulted reduction in the number of incident cancers both in Finland and in other Nordic countries. The deficit in 2020 has not been reduced in Finland in 2021. This study assesses the effects of COVID-19 on the differences in cancer incidence between educational groups.

### Methods

Monthly data on new cancer cases diagnosed in Finland in 2015-2021 were used to estimate cancer incidence by education level (basic, secondary and high). The pandemic period was divided into four subperiods: a four-month period from March 2020 to June 2020, and three six-month periods from July 2020 to December 2021. We estimated incidence rate ratios (IRR) to compare incidence in the four pandemic-periods by education to those expected based on a Poisson regression model with a log-linear trend. In addition to all cancer sites combined, the most common sites were analysed separately by sex.

### Results

Preliminary results show that cancer incidence decreased significantly in the first four-month period: IRR was 0.88 (95% CI 0.85-0.91) in women and 0.9 (0.87-0.93) in men. The relative decrease was the largest in skin melanoma: IRR was 0.59 (0.5-0.7) in women and 0.71 (0.61-0.82) in men. In all sites combined, IRRs were similar between education groups. Some evidence of heterogeneity in IRRs was found in colorectal cancer among women (p value 0.06): IRR from Jul 2020 to Dec 2020 was 20% larger among females with secondary (95% CI 2%-42%) and high education (1%-43%) compared to IRR (0.88; 0.78-1.00) among females with basic education.

### Discussion and Conclusion

No clear heterogeneity in the decrease of cancer incidence was observed between educational groups in Finland during the COVID-19 pandemic in 2020-2021. The potential confounding effect of region will be considered in the further analyses of this study.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Impact of COVID-19 on breast cancer stage and time to treatment in Côte d'Or

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### Background

Due to the COVID-19 pandemic, and ensuing overcrowding in the French health system, management of patients with COVID-19 was given priority over that of patients with other pathologies, including chronic diseases. The aim of this study was to study the impact of COVID-19 on the stage of discovery of cancers diagnosed in the context of an organized breast cancer (BC) screening programme, as well as the impact on time to treatment.

### Methods

All women diagnosed with cancer in the Côte-d'Or via organized BC screening (first or second reading) from January 1, 2019 to December 31, 2020 were included in this study. Using data from pathological laboratories, clinical centers, and the breast cancer registry of Côte-d'Or, France, we collected socio-demographic, clinical and treatment data on all patients. We compared data from the year 2019 (before COVID) with the year 2020 (COVID).

### Results

For the year 2019, 201 BC cases were diagnosed compared to 186 in 2020. The number of invasive cancers increased in 2020 compared to 2019 (88% vs 80%, p= 0.03). Similarly, there was a significant increase in the clinical size of in situ cancers in 2020 compared to 2019 (15 mm vs 10.50 mm, p= 0.03). We did not observe any significant difference in the stage of BC at discovery, or in time to treatment. Multivariate analysis showed that the year of diagnosis did not affect time to treatment.

### Discussion and Conclusion

Patients treated for BC were not diagnosed at an advanced stage, and had not longer times to treatment during the COVID-19 pandemic in Côte-d'Or Department. This may be due to the adoption of consensus guidelines and mitigation strategies for the treatment of BC patients during the pandemic. Because these strategies were evidence-based, it also suggests that timely, high-quality care continued to be provided during this period.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Impact of the COVID-19 pandemic: seasonal effects on diagnosis and stage shift of malignant diseases

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### Background

Since the outbreak of SARS-Cov-2 in 2019, expected negative effects on oncological health care – like delayed diagnoses, undetected neoplasms, or shifts to larger tumour stages – have been widely discussed. We here use cancer registry data to analyse the effect of the COVID-19 pandemic on *a)* the number of cancer diagnoses, *b)* the distribution of tumour stages (UICC), and *c)* differences in seasonal patterns of cancer diagnoses in Brandenburg and Berlin (Germany).

### Methods

We used data of neoplasms of all entities recorded in the Clinical-epidemiological Cancer Registry Brandenburg-Berlin. To detect temporal trends and seasonal fluctuations, we compare the pre-COVID phase (diagnosed or treated between March 2017 and February 2020) with the COVID phase (from March 2020 on). As statistical method, we use Generalised Additive Mixed Models (GAMM) with Poisson-distributed residuals and cyclic cubic regression splines. Furthermore, we applied ordinal regression models to detect shifts in cancer stages (UICC). All analysis were carried out using R.

### Results

The effects of the COVID-19 pandemic differ according to neoplasm and entity showing either no effect, decreases in the number or seasonal fluctuations in cancer diagnoses. Overall, significantly fewer cancer cases were diagnosed in Brandenburg and Berlin during the COVID phase. For some entities, for *e.g.* breast, bronchial or prostate carcinoma, the seasonal diagnose pattern changed, while for others, *e.g.* pancreatic carcinoma, it did not. Furthermore, there is a significant increase of higher UICC stages in individual tumour entities (*e.g.* bronchial or prostate carcinoma).

### Discussion and Conclusion

Our results demonstrate a negative effect of the COVID-19 pandemic on cancer diagnoses as well as shifts towards higher cancer stages in Brandenburg and Berlin. Further spatial and long-term survival analyses are necessary in order to assess long-term consequences of the pandemic on cancer and to be able to guarantee care.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Impact of COVID-19 pandemic conditions on disease progression and prognosis of patients with malignant melanoma

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### Background

During the Coronavirus disease (COVID-19) pandemic, access to routine medical healthcare services was hampered at a global scale and resources were rededicated towards COVID-19 diagnosis and treatment. Based on a case-control study using cancer registry data, we here tested the hypothesis that prognosis in patients suffering from multiple melanoma was affected negatively (ICD10: C43.).

### Methods

Analyses were based on data extracts from the Hamburg Cancer Registry (January 2016 until December 2021). We included patients with a primary diagnosis of malignant melanoma who were at least 18 years old and residents in Hamburg. Patients diagnosed in 2016 and 2017 with follow-up until December 2019 and thus unaffected by the COVID-19 pandemic were assigned to the control group. Patients diagnosed in 2018 and 2019 with follow-up until December 2021 were assigned to the case group. Study outcomes overall and progression-free survival were investigated using Kaplan-Meier functions, relative survival and multivariate Cox regression models. To account for differences among the study groups, we adjusted for patient and tumour characteristics and baseline treatment modalities.

### Preliminary Results

A total of 1.938 patients registered in the HCR were included (mean age 67, females 48%). Of these, 883 were assigned to the control group and 1.055 to the case group. At the end of follow-up, 82.7% of the control group (N=883) and 85.3% of the case group (N=1.055) were alive ($p < .073$). At 4 years after diagnosis relative survival was 93.0% in the control group (95% CI [90.3,95.7]) and 97.3% in the case group (95% CI [94.7,99.8]).

### Discussion and Conclusion

Initial preliminary analyses did not confirm the hypothesis that the COVID-19 outbreak negatively affected disease progression and prognosis in patients suffering from multiple melanoma. Ongoing analyses focus on the impact of confounding and treatment modalities at baseline, explore variations according to socio-economic status.

## Breast cancer incidence and surgical treatment in Baden-Württemberg (Germany) during the COVID-19 pandemic

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### Background

Reports from individual patients suggested anecdotal evidence for a shift from breast conserving surgery (BCS) towards mastectomy (ME) in order to reduce number of visits in the radiation unit during the early months of the COVID-19 pandemic.

### Methods

Using data from the Baden-Württemberg cancer registry, breast cancer incidence (women) and the type of surgery in 2018-2021 was investigated. Incidence was age-standardized to the population in Baden-Württemberg in 2021. Cases with missing information on month of diagnosis and death certificate only cases were excluded. Differences over time in type of surgery (BCS, ME) among pre-operative stage I/IIA breast cancer patients were investigated using logistic regression models adjusting for age and stage.

### Results

Breast cancer incidence dropped from 166.6 (2018) and 167.7 (2019) per 100.000 women to 156.4 in 2020 and increased to 164.1 in 2021. This reflects a drop by about 500 cases in 2020 (N= 9092) compared to 2018 (9559) and 2019 (9686). The drop resulted from a 38.7% lower incidence in April 2020 compared to 2019 that has not been recovered in the following months. It was most pronounced in the screening age groups (50-59 and 60-69 years) and for stage I and II. Surgical treatment was analyzed in 20.617 pre-operative stage I and IIA breast cancer patients. The proportion of mastectomies increased from 16.6% in 2018 and 16.0% in 2019 to 17.2% in 2020 and 2021 (adjusted odds ratios and 95% confidence interval (reference 2018/2019): 2020 – 1.09 (0.99-1.20), 2021 – 1.12 (1.02-1.23)). The increase was strongest in patients younger than 50 or older than 80 years and in stage IIA.

### Discussion and Conclusion

Breast cancer incidence dropped in 2020 and the missed cases have not been caught up until 2021. A slightly higher rate of mastectomies was observed in 2020 and 2021, which warrant further investigation.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Frequency and perceived burden of changes in cancer-treatment during the COVID-19 pandemic in Baden-Württemberg, Germany

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### Background

Modification, postponement, or cancellation of health care appointments during the COVID-19 pandemic affected all phases of cancer care spanning from screening over diagnostic work-up and therapy up to follow up care. The aim of our study is to assess the frequency and burden of COVID-19 related changes in social contacts and cancer care in cancer patients.

### Methods

A total of 2436 men and women diagnosed with either lung-, prostatic-, breast- or colorectal-cancer, or leukaemia/lymphoma were recruited in 2021 via the Cancer Registry of Baden-Württemberg (pop. 11 mio). Participants were sent a questionnaire asked whether and how they experienced changes in cancer care.

### Results

The sample comprised 1576 newly diagnosed cancer patients (diagnosed during 07/2019-06/2020) and 860 cancer survivors (diagnosed during 07/2015-06/2019). Changes in cancer care were reported by 21.9% (25.1% among patients, 15.9% among survivors, p-value: <0.001). Changes in surgery (3.0%), systemic (2.7%) or radiotherapy (0.7%), psycho-oncological support (2.7%) and nursing care (0.6%) occurred less frequent than in follow up care (7.0%) or rehab (9.7%). Most changes in cancer care were arranged by the health care providers except for changes concerning rehab which were mostly triggered by patients. Patients with acute diagnosis reported higher burden due to the changes than survivors. Changes in cancer care were associated with poorer health-related quality of life in all domains ($p<0.01$).

### Discussion and Conclusion

COVID-19 related changes in cancer care occurred in a substantial proportion of cancer patients and affected mainly follow-up and rehab whereas primary cancer therapy could be maintained as scheduled for the majority of patients. Nevertheless, changes in cancer care appear to have a substantial impact on cancer patients' quality of life.

## Anxiety and depression in cancer patients and survivors during the COVID-19 pandemic

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### Background

The COVID-19 pandemic has had a global impact on health care, including the reallocation of medical resources. Changes in health care, treatment delays and contact restrictions can be stressors for mental health. The aims of the current study were to assess differences in the prevalence of anxiety and depression between cancer patients and survivors with vs. without changes in oncological care due to the COVID-19 pandemic, and predictors of anxiety and depression.

### Methods

A total of 2436 participants (mean age 66 years, up to 5 years post-diagnosis), diagnosed with either lung, prostate, breast or colorectal cancer, or leukaemia/lymphoma were recruited in 2021 via the Cancer Registry of Baden-Württemberg, Germany. Sociodemographic information, changes in oncological care and social contact during the pandemic, and anxiety and depression (Hospital Anxiety and Depression Scale, HADS) were assessed via self-report. Scores of ≥ 8 for both anxiety (HADS-A) and depression (HADS-D) were considered as cut-off-scores. Clinical information (diagnosis, stage) was obtained via the cancer registry.

### Results

21.9% of the sample reported a change in their oncological care. The prevalence of anxiety after treatment change was 51.8% (no change: 44.3%, $p < .01$). Further risk factors for anxiety were younger age (<65 years), lower education (<10 years), female sex, and lung, colorectal and prostate cancer. The prevalence of depression after treatment change was 59.9% (no change: 51.2%, $p < .01$). Further risk factors for depression were lung cancer, recurrence, and contact restrictions. Protective factors were higher education (12 and more years) and end of treatment. All results were adjusted for age at survey, education, tumor, sex, stage, year of diagnosis, treatment phase and contact restrictions.

### Discussion and Conclusion

Changes in oncological care and contact restrictions are associated with mental well-being. Psychological consequences should be considered in crisis management.

## Impact of the COVID-19 pandemic on screening-related cancers in Bavaria, Germany

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### Background

Germany has implemented screening programmes for breast (since 2009), colorectal (since 2019, prior to that opportunistic), and cervical cancer (since 2020, prior to that opportunistic), while opportunistic screening exists for skin and prostate cancer. We explored the impact of the COVID-19 pandemic on these cancers in Bavaria, Germany, by comparing the first year of the pandemic (March 2020 to February 2021) with the preceding year (March 2019 to February 2020).

### Methods

We retrieved data on cancer cases from the Bavarian Cancer Registry (until 22nd April 2022) including malignant and in situ neoplasms reported by pathology departments with consistent reporting. We calculated the number of incident cases as well as relative changes during the first year of the pandemic and the preceding year with 95% confidence intervals (CI) using Bonferroni correction.

### Results

We were able to analyse data for 30 out of 58 pathology departments (51.7%) in Bavaria. For most screening-related cancers, the number of malignant cases declined by more than 10% during the first year of the pandemic, except for breast cancer (−4.9%; 95% CI −9.3% to −0.2%) as well as cervical cancer (+9.7%; 95% CI −10.2% to +34.1%). Declines were higher for in situ cases with the exception of cervical carcinoma in situ, which strongly increased (109.2%; 95% CI 86.0% to 135.3%).

### Discussion and Conclusion

The incidence of most screening-related cancers was significantly reduced during the COVID-19 pandemic in Bavaria, presumably due to measures taken by health care providers to respond to the pandemic as well as patient´s fear of infection. The incidence of cervical cancer, however, increased, which may be explained by the implementation of an organised screening programme in January 2020.

### References

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Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Decline of cases in the first pandemic year: a study from two italian cancer registries

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### Background

The COVID-19 pandemic has disrupted the health systems, including oncological services. The aim of this study was to assess the impact of the COVID-19 pandemic on the registration of new cancer cases in 2020 in two cancer registries from northern and southern Italy.

### Methods

Comparison of cancer incidence data registered in 2015-2019 and in 2020 by the Friuli Venezia Giulia cancer registry (FVG-CR), north-eastern Italy; and by the ASL Napoli 3 Sud cancer registry (ASLNA3-CR), southern Italy. Crude incidence rates (IRc) for cancers with at least 35 yearly cases were computed for 015-2019 and 2020, in men and women. The annual percentage change (APC) in 2015-2019 was computed to account for the pre-pandemic trend. The number of 2020 new cancer diagnoses was compared, after adjustment for APC, with expected ones based on 2015-2019 IRc.

### Results

360 diagnoses for all types by ASLNA3-CR (-12.2%) and 348 (-8.0%) by FVG-CR were missed in men in 2020. In women, missed cases in 2020 were 330 (-11.2%) and 239 (-4.4%), respectively. Noteworthy declines were noted for colon-rectum (-28.8% in men; -22.6% in women) in ASLNA3-CR; for bladder (-23.6% in men, -23.0% in women), and kidney (-19.2% in men; - 23.9% in women) in FVG_CR. In both registries, a decline in breast cancer cases was documented (-76 cases, -7.8% in ASLNA3-CR; and -31 cases, -1,4% in FVG-CR). Excesses in the number of expected cases in 2020 were also noted in both registries, e.g. in ASLNA3_CR, +16.3% for kidney cancer in men and +17.3% for central nervous system in women (CNS); in FVG_CR, +16.3% for CNS in women.

### Discussion and Conclusion

Study findings documented a drop in new cancer cases in 2020 after the COVID-19 pandemic in both areas, including for colon rectum and breast cancer likely due to a reduction of screening activities.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Cancer care EU country responses in times of the COVID-19 pandemic

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### Background

The COVID-19 pandemic dramatically disrupted the access to health care, particularly for vulnerable people. Among them, people suffering from cancer. All EU countries very quickly responded with various actions to on one hand minimise the spread of the virus and on the other hand retain or re-initiate the cancer care.

### Methods

Data were obtained from a survey amongst the European National Cancer Registries (ENCR) on cancer care during the COVID-19 pandemic, conducted by the European Commission Joint Research Centre. The aim was to compare the strategies taken up by individual countries to minimize the impact of the COVID-19 pandemic on cancer screening programs (colorectal, cervical and breast cancer), diagnosis and treatment practices from March to May 2020. In addition, data included in the Country Cancer Profiles for the EU 27, Norway and Iceland, which are part of the European Cancer Inequalities Registry (ECIR) was also considered.

### Results and Conclusion

Cancer care responses during the COVID-19 pandemic within the EU did not vary considerably between the vast majority of the EU countries. The responses overall included reducing or halting population-based screening programmes for cancer; postponed or halted visits to medical doctors and postponed disrupted and changed treatments. These measures and people's reluctance to come to public places led to a much lower number of diagnosis in 2020 of the above-mentioned cancers as well as reported later stages of diagnosis. Some countries rebounded swiftly to the backlog in diagnosis and treatment while in others the screening rates remained low over the whole course of 2020. This unquestionably leads to a predication of negative impact on survival. Remedial activities to boost the screening programmes and increase cancer care during the COVID-19 pandemic were implemented and varied from targeted screening awareness campaigns, telehealth via online prescriptions and real-time video consultations, self-applicable cervical tests.

# Continuity of care for patients with metastatic cancer during the COVID-19 pandemic in the Netherlands

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## Background

During the COVID-19 pandemic recommendations were made to adapt cancer care to prevent infections in vulnerable patients and decrease the burden on healthcare. This study aimed to investigate the treatment of patients with de novo metastatic cancer before and during the COVID-19 pandemic.

## Methods

Initial treatments of patients diagnosed with de novo metastatic cancer in five COVID-19 periods (weeks 1-12 2020: pre-COVID-19, weeks 12-20 2020: 1st peak, weeks 21-41 2020: recovery, weeks 42-53 2020: 2nd peak, weeks 1-20 2021: prolonged 2nd peak) were compared with reference data from 2017-2019, using data from the population-based Netherlands Cancer Registry. The proportion of patients receiving different treatment modalities within 6 weeks of diagnosis and the time between diagnosis and first treatment were compared by period.

## Results

A total of 74,208 patients were included. Overall, patients were more likely to receive hormone therapy, immunotherapy or targeted therapy and surgical resection of metastases within 6 weeks in the COVID-19 periods than in previous years. Lower odds of receiving treatments were also observed, namely for surgery of the primary tumor during the recovery period (OR 0.87; 95%CI 0.77-0.99) and for radiotherapy of the primary tumor during the prolonged 2nd peak (OR 0.84; 95%CI 0.72-0.98). The time from diagnosis to the start of first treatment was shorter mainly during the 1st peak (average 5.2 days shorter, $p<0.001$)

## Conclusion

During the first 1.5 years of the COVID-19 pandemic, minor changes were observed in the initial treatments of de novo metastatic cancer. Remarkably, time from diagnosis to first treatment was shorter possibly due to less primary cancer diagnosis and prioritization of cancer care. Overall, the results suggest continuity of care for patients with metastatic cancer during the pandemic.

## Using national SACT data to determine the impact of COVID-19 on cancer services in Scotland

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Fully understanding the impact of COVID-19 on the delivery of systemic anti-cancer therapies (SACT) is crucial in determining short and long-term consequences for patients. Public Health Scotland was tasked with developing a tool to centralise reporting and standardise definitions using data from the five Chemocare® instances in Scotland.

A 'minimum viable product' gave analysts access to raw prescribing data. While local values were used for some analysis, known differences in recording practices were addressed and standardisation was applied for the purpose of presenting national data. R-Shiny was used to build a publicly available dashboard, giving access to weekly updated appointment and patient numbers, by geography, tumour type and treatment administration route.

The SACT Activity dashboard uses innovative techniques to present complex treatment data that is easy to understand by decision makers and the public, adding a layer of transparency. This first application of national SACT data uses a once for Scotland approach easing pressure on local teams to provide data for monitoring and service planning. Cancer Network managers, Clinicians and Government used this to monitor the effect of COVID on SACT delivery, helping to interpret how services responded to COVID measures.

The data showed the significant impact of COVID:

- Up to 29.9% decline in activity following the first national lockdown.
- Recovery to pre-COVID levels in activity differed between tumour types: activity in breast cancer recovered by summer 2020, haematology and lung cancers, by November 2020; this is partially attributed to the vulnerability of certain patient groups.
- Since the beginning of 2021 treatment activity is consistently higher than pre-pandemic demonstrating the demand on cancer services.
- An increase in oral treatments and decline in intra-venous treatments, allowed more patients to be treated. This was seen consistently across tumour groups reflecting changes in practice, following guidelines of the National Cancer Medicines Advisory Group.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Emergency and non-emergency routes to cancer diagnoses in Scotland: a population-based study of 109,663 patients

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### Background

The COVID-19 pandemic disrupted normal pathways to cancer diagnosis, particularly for screening and non-acute symptomatic patients. While reductions in overall cancer diagnoses have been observed, any differential effects on emergency presentations, which are associated with poorer outcomes, have not been reported.

### Methods

Cross-sectional descriptive study based on International Cancer Benchmarking Partnership methods, where emergency route to diagnosis is defined as presenting as an emergency admission in the 30 days prior to cancer incidence date. Acute hospital records and cancer registrations were individually linked. Includes all individuals with a new diagnosis of breast (females), cervical, colorectal, head and neck, lung, prostate, and upper gastro-intestinal (GI) cancer on the national cancer registry. Poisson regression models were used to predict expected values for 2020 and 2021.

### Results

All cancers included showed reductions in observed non-emergency routes to diagnosis presentations in 2020 compared with predictions based on 2015-19, with the largest drop occurring in stage I diagnoses. For emergency routes to diagnosis, head and neck and upper GI increased while prostate decreased; the others did not change significantly. A small stage shift was observed for emergency diagnoses in 2020, with an increase in stage IV diagnoses and fewer stage I and stage II diagnoses. Diagnoses through non-emergency pathways returned to expected levels in 2021, with the largest proportional increases for cancers where screening programmes resumed.

### Discussion and Conclusion

In 2020, there were large reductions in numbers of cancers diagnosed through non-emergency pathways in Scotland, which returned to expected levels in 2021. Emergency routes remained at a similar level but with more advanced stages at diagnosis in 2020. The absolute numbers of decreases in non-emergencies were far greater than the differences in emergencies, suggesting that the observation was not due to a simple shift in pathways by the same patients.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Partial recovery of cancer diagnosis in Catalonia (Spain) almost three years after COVID-19 pandemic began

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### Background

Impact on cancer of COVID-19 pandemic has been multifactorial. We aimed to estimate potential undetected cancer cases over the whole COVID-19 pandemic in Catalonia.

### Methods

Specimens of the pathology laboratories in Catalan public health system feed into the population-based Catalan Pathology Registry (CPR). Primary health care (PHC) caseload and conventional and intensive care units (ICU) occupancy due to COVID-19 were supplied by the Catalan Health Department's Agency for Healthcare Quality and Evaluation. Period study was divided in: *(i)* prepandemic validation set (2019) and *(ii)* analysis pandemic set (14 Mar 2020-2 Nov 2022), comparing cancer incidence between both according to sex, age, tumour site and pandemic waves in the CPR. Expected incident cancers during the pandemic were estimated by applying 2019 CPR cancer incidence specific rates by sex and 5-year age groups to the 2020 and 2022 Catalan population pyramids. CPR incident cancers were considered observed. Standardized incidence ratios (SIR) and 95% confidence intervals (95%CIs) were calculated. Correlation between cancer diagnosis and COVID-19 health care workload was evaluated by Pearson's correlation coefficient (R).

### Results

After almost three pandemic years, cancer diagnosis decreased by 10% (SIR 0.89; 0.87-0.90) (9,466 undetected cancers including nonmelanoma skin cancer). 58.5% of them were generated in 2020. Cancer diagnosis decreased more in men (whole pandemic men: -12%, women: -8%), dropping significantly overall in all pandemic waves but the fifth, and across all adult age groups. In the first wave, cancer diagnosis was inversely correlated with COVID-19 caseload in PHC (R−0.91 (−0.97, −0.75)) and occupancy in conventional hospital wards (R−0.91 (−0.99, −0.48)) and ICU (R−0.91 (−0.98, −0.70)).

### Discussion and Conclusion

Cancer detection in Catalonia had not yet recovered to pre-pandemic levels. Awaiting incidence data from the population-based cancer registries, early CPR data could provide a reliable source of data for cancer planning and control.

## Impact of COVID-19 on pancreatic cancer incidence in Comunitat Valenciana, Spain, 2020

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### Background

COVID-19 pandemic restricted clinical and preventive activities, which might entail diagnostic and therapeutic delays. Pancreatic cancer incidence and mortality trends have been increasing over 2005-2019 in Comunitat Valenciana, Spain. The objective was to identify potential changes in incidence and mortality trends for pancreatic cancer – a tumor with high lethality and low survival, considering the first year of the pandemic.

### Methods

Cancer incidence data were collected by Cancer Information System of Comunitat Valenciana (SIC-CV). Mortality data came from the Mortality Registry of Comunitat Valenciana. Changes in proportion of all cancer new cases and deaths, and sex and age-adjusted rates in 2020 vs. 2015-2019, were estimated for all cancer groups and specifically for pancreatic cancer.

### Results

In 2020, incident cases for all tumor groups diminished by 15.89% in both sexes, compared to the average number for the 5 years prior to the pandemic. Mortality, however, increased by 5.11%. The changes were more pronounced in pancreatic cancer, in which incident cases decreased by 9,82%, and deaths raised by 14,17% for both sexes. For pancreatic cancer, the age-adjusted incidence and mortality rates presented a similar upward trend from 2015-2019, that changed in 2020 due to a decline in incidence. The incidence decrease was greater in those aged 70+ years-old, and more evident in men than in women.

### Discussion and Conclusion

The observed decrease in pancreatic cancer incidence by 2020 vs. 2015-2019 does not necessarily mean that there were fewer cases of cancer in Comunitat Valenciana. The increase in cancer mortality in 2020 points to potential diagnostic and treatment limitations due to the pandemic.

# COVID-19 pandemic impact on the incidence of childhood cancer in the Valencian Community in 2020

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## Background

The state of health alert for COVID-19 had a major impact on health care activity during the year 2020. This study aims to describe the incidence of tumors in childhood and adolescence in the Valencian Community (VC) according to sex, age and tumor group analyzing possible effects of the pandemic on the detection and notification of cases.

## Methods

Data were obtained from the Registry of Childhood and Adolescent Tumors (0-19 years) of the VC (RTIA-VC). All incident cases of the 12 tumor groups diagnosed between 2007-2020, coded according to ICD-O.3.1 and grouped according to the International Classification of Childhood Cancer 3rd edition, were included. We conducted a descriptive study incidence; we compared the age-standardized incidence rates per million inhabitants (ASIR) and number of cases for the year 2020 with those of 2019 and the period 2007-2019

## Results

In the year 2020, the RTIA-CV registered 161 new cases, (52% boys and 48% girls), with an ASIR of 163.9 (95%CI: 139.5, 191.7). In 2019, 169 cases were registered (59% boys and 41% girls), with an ASIR of 171.6 (95%CI: 146.7, 199.9). Between 2007-2019, an annual average of 172 cases (55% boys and 45% girls) was registered, with an ASIR 173.7 (95%CI: 166.6, 181.1). No statistically significant differences are observed. The age distribution of cases in 2020 was similar to that of 2019 and the period 2007-2019, however, we observed a slight increase in cases in <1 year old and a decrease in the 15-19 years-old group compared to 2019. No changes were observed in the incidence rates of the three most frequent tumor groups (leukemias, lymphomas, and CNS).

## Discussion and Conclusion

The incidence of childhood and adolescent tumors by sex and tumor group in 2020 in the Valencian Community has remained stable compared to 2019 and the period 2007-2019.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Increasing cases of skin cancers during the COVID-19 pandemic in Eastern Switzerland

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### Background

Skin cancers are the most common cancers worldwide. More than 1.5 million new cases were reported in 2020 and its incidence is increasing. In the years 2017-2021 some 1'680 cases of malignant melanoma (ICD-10: C43) and squamous cell carcinoma (SCC) of skin (C44) are reported each year to the Cancer Registries of Eastern Switzerland and Grisons-Glarus, making together one of the most frequent reported cancer cases. Furthermore, some 185 cases of melanoma in situ (D03) have been annually registered. In early 2020 the COVID-19 pandemic has started in Europe as well as in Switzerland.

### Methods

We used incidence data for the years 2017-2021 from the Cancer Registries of Eastern Switzerland and Grisons-Glarus. To investigate the effect of the COVID-19 pandemic, we compared the average number of cases of C43, C44 and D03 in the two Cancer Registries in the periods of 2017-2019 and 2020-2021. Carcinoma in situ of skin (D04) cases were excluded from the analysis, because they are not mandatory to report.

### Results

Cases of C43, C44 and D03 were increasingly registered in the years of the pandemic in 2020 and 2021. The number of skin cancer cases increased around 66% compared to the annual average of the years 2017-2019. The number of reported SCC cases increased greatly by around 93% for both Cancer Registries. An increase of around 25% was observed for C43 cases in the period 2020-2021 in the Eastern Switzerland Cancer Registry and around 18% increase in the Cancer Registry of Grisons-Glarus. For melanoma in situ cases an increase of 17% was observed for the period 2020-2021 in both registries compared to the annual average of 2017-2019.

### Discussion and Conclusion

Further studies are needed to find the reason for the change of pattern in reporting of skin cancers.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## COVID-19 impact on pathological cancer diagnoses in Netherland, Aotearoa New Zealand, and N. Ireland

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### Background

The COVID-19 pandemic was managed in Aotearoa New Zealand (NZ) by government-led elimination policy, involving border closure and a strict initial national lockdown. This was different to most European countries including Northern Ireland (NI) and the Netherlands (NED). We examined the effect of these policies on the diagnosis of three major cancers comparing NZ with these two European countries.

### Methods

Data from NED, NZ and NI population-based cancer registries were used to assess trends in pathologically diagnosed (PD) lung, breast, and colorectal cancers from March to December 2020 (COVID period) and compared to the similar pre-pandemic period 2017-2019. Data were also collated on COVID-19 cases and deaths per 100,000 in each population in the three countries.

### Results

Comparing the pre-pandemic period to the COVID-19 period there were statistically significant reductions in numbers of lung (↓23%) and colorectal (↓15%) PD cancers in NI and numbers of breast (↓18%) and colorectal cancer (↓18.5%) diagnosed in the NED. In NZ there was no significant change in the number of lung (↑10%) or breast cancers (↑0.2%) but a statistically significant increase in numbers of colorectal cancer diagnosed (↑5%).

### Conclusion

The impact of COVID-19 on cancer services was mitigated in NZ due to the strict elimination approach adopted with broad service continuity, minimal healthcare disruption and protection of cancer services ensuring cancer cases did not reduce in the early pandemic period. In contrast, the reduction in PD cancer cases in NED and NI were associated with higher COVID-19 rates and likely reflect the less strict government and societal COVID-19 restrictions in these countries. The causes of reductions found in NED and NI are probably multifactorial including delayed presentation to primary and secondary care, interruption to cancer screening and COVID-19 disruption of healthcare services including the shift of care COVID-19 patients, staff absence and infection.

## Creating rapid pipelines using cancer pathology samples to measure the impact of COVID-19 on surveillance

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### Background

During the COVID-19 pandemic, concerns were raised about delayed or missed detection of new cancers in Wales, given health service and social pandemic mitigation responses. With its inherent time lag, registry cancer incidence data could not rapidly validate these concerns.

Following similar work in Northern Ireland, we pipelined cancer pathology data to provide timelier surveillance of cancer incidence.

### Methods

We extracted routinely-submitted 2018-22 pathology data from laboratories in Wales. We cleaned the data and generated ICD-10 codes from available morphology and topography information using a hierarchical lookup. Samples for the same patient and cancer site were de-duplicated within a two-year period. The 2020-22 results were compared against a pre-pandemic average (2018-19).

### Results

We were able to generate ICD-10 codes on 89% of pathology samples and the data was sufficiently complete within 6 weeks following submission to be reported. In 2018-19, pathology samples accounted for approximately 75% of new cancers in Wales, showing good 'face validity' with the 2019 registry data and generally comparing well with the expected number of new cancers. However, some later-presenting cancers (*e.g.* lung) showed larger differences.

There were 3,000 fewer samples in 2020 compared to the pre-pandemic average, a decrease of almost 25%. Sample numbers in 2021 and 2022 have returned to pre-pandemic levels.

### Discussion and Conclusion

Pipelined pathology data has enabled rapid reporting of Welsh cancer incidence during the pandemic. Our results were included in a cross-nation UK study into cancer incidence during this period. The shortfall of samples indicating new primary cancers during 2020 has not yet been accounted for during 2021-22. Consequently, we may see increased late-stage detection in the near future.

Continued rapid surveillance with pathology data is imperative. Accurate staging is not possible with pathology data alone, however, meaning that ongoing registry-based cancer incidence surveillance remains vital and definitive.

## Excess mortality from breast and cervical cancer in the context of the COVID-19 pandemic

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### Background

Surveillance of general excess mortality is a useful strategy in monitoring the impact of the COVID-19 pandemic. The objective of this work was to measure the impact of the pandemic on mortality from breast and cervical cancer in Cali, Colombia.

### Methods

To obtain the baseline, the general mortality information from 2015-2019 was organized by week and the weekly average of deaths in the five-year period was calculated; that is, the average of week 1, week 2, and week 53. Excess mortality was defined as the number of reported deaths between January 2020 and December 2022, minus the expected number of deaths for the same defined time from the average of the historical data.

### Results

49,105 deaths were registered in Cali, 12,019 more than expected, which represents an excess of 32.4%. In deaths from malignant neoplasms there is no excess mortality, however, in deaths from breast and cervical cancer there was an excess of 6% and 1%, respectively. The public health surveillance system (SIVIGILA) showed a decrease in the notification of breast and cervical cancer with respect to the annual average of cases (2016-2019), of 26% and 13% respectively, and an upward trend in the number of cases. notification. of progressive cases for the years 2021 and 2022.

### Discussion and Conclusions

It is not possible to determine if the excess deaths are due to the virus, to a misclassification of the basic cause of death, or as a consequence of overload and/or inefficiency of the Health services. The impact of the pandemic is not yet evident in cancer patients, survival studies are expected to show the true implications.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## Opportunity of diagnosis and treatment before and after COVID-19 pandemic in Cali, Colombia

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### Background

Oncology practice has been transformed during the COVID-19 pandemic. The objective of this study was to describe opportunity of cancer diagnosis and treatment before and after COVID-19 pandemic.

### Methods

An observational retrospective study was performed. We included patients aged ≥ 8 years, diagnosed with cancer (breast, prostate, cervix, colon & rectum, stomach) who sought care at Fundación Valle del Lili, Cali-Colombia, period 2018-2021. Data was obtained from the hospital High-Cost Fund database. The range date for COVID-19 pandemic onset in Colombia was taken as March-April 2020. We estimated cancer risk management indicators for each tumor localization.

### Results

A total of 70,338 registries of cancer patients were reported between 2018-2021. In the information cascade it was found that the diagnosis (n=5,685), staging (n=25,093), treatment (n=14,413) and results of the oncological treatment (n=15,122) were performed at another institution, was in process/pending or lost to follow up. The median age was 64 years, 61% were women, 92% affiliated to contributory health system, 72% had histopathology study and 11% had palliative care evaluation. Top 5 cancer locations were breast (20%), skin (13%), prostate (12%), cervix (2.8%) and stomach (2.7%). Overall mortality was 2.8%.

A decrease in the number of diagnosed cases per month was observed after the pandemic onset (March-April 2020). Compared to the overall cancer risk management indicators for the city of Cali, the observed performance of the study institution's indicators were better. For breast cancer: staging 82.9% vs 52.9%, early stages at diagnosis 66.4% vs 50.7%, invasive cancer with palliative care 90.2% vs 5, 9% and median opportunity for general care 32 days vs. 99.5 days.

### Discussion and Conclusions

The COVID-19 pandemic affected the cancer care in Cali, Colombia. The fragmentation of the Colombian health system in the management of cancer patients affects the cancer risk management in the country.

Theme: **COVID 19 – Impact on cancer surveillance, services, and outcomes**

## The impact of the COVID-19 pandemic on cancer diagnosis and services

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### Background

The COVID-19 pandemic significantly impacted the delivery of cancer care and services. This systematic review assessed the magnitude and impact of pandemic-related delays and disruptions on cancer services including diagnostic procedures, screening, and treatment and ultimately on cancer diagnosis and outcomes.

### Methods

We searched WHO's COVID-19 global database from January 2020 to April 2022. Original research articles and commentaries/editorials with primary data on cancer care before and during the pandemic were included. Each step involved two reviewers with discrepancies resolved by a third reviewer. Meta-analysis was conducted using random-effects modelling. Quality assessment employed an adapted tool for before-after studies.

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### Results

Among 9458 retrieved articles, 245 from 46 countries were included representing approximately 77,959,519 individuals tested for cancer and 15,498,758 individuals with cancer. We found declines in cancer diagnoses (25.0%), diagnostic procedures (24.0%), screening for breast, colorectal, and cervical cancers (39.0%), and treatment (28.0%). Europe experienced a 24.0% decline in diagnoses and treatment, while the African region suffered the largest reductions with a 36.0% decrease in cancer diagnostic procedures and diagnoses.

### Discussion and Conclusion

The disruptions caused by the pandemic resulted in substantial decreases in cancer diagnoses and services across various cancer types and world regions. Overwhelmed health systems, coupled with factors such as reduced referrals, suspension of cancer screening programs, strict lockdowns, and fear of contracting SARS-CoV-2 infection, contributed to these declines. Non-urgent procedures were postponed and alternative treatment employed. Drug shortage impacted continuity of care. Middle HDI countries experienced a greater impact, suggesting the importance of health system resilience. Furthermore, data was missing from low HDI settings emphasizing the need for increased research investment and improved cancer surveillance. Drawing lessons from this pandemic is crucial for informing cancer control strategies and improving resilience in future crises.

## Association between access to primary care and excess mortality for patients with cancer in France

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### Background

Little is known about the effect of geographical inequalities in cancer care. The objective is to measure the influence of access to primary care on mortality in excess for ten major localisations for French mainland territory.

### Methods

The study used data from 21 french registries. We included the 10 most common solid invasive cancer sites in France between 1 January 2013 and 31 December 2015 (N=151,984). The effect of access to primary care was estimated using two indexes: SCALE index, a new multiscalar index available for all residential areas of France (approximativly 2.8 millions) and APL index, potential accessibility localised well-known index developed by IRDES and available for all communes.

The effect of access to primary care on mortality in excess was investigated, using additive excess hazard models with multidimensional penalised splines. All models were adjusted on year of diagnosis and European Deprivation Index.

### Results

Mortality in excess was associated with remoteness. An increase of SCALE index (evoking a worse accessibility to primary care) was associated with an increase of mortality for breast cancer in females (EHRmedian_scale vs ref =2.26[1.07 ; 4.80]), lung cancer in males (EHRmedian_scale vs ref =1.08[1.04 ; 1.13]) and liver cancer for both sex (EHRmedian_scale vs ref =1.20[1.00 ; 1.43] for males & EHRmedian_scale vs ref =1.51[1.12 ; 2.04 for females]). An increase of APL index (explaining a better accessibility to primary care) was associated with a decrease of mortality for colorectal cancer in males (EHRmedian_apl vs ref =0.83[0.73 ; 0.94]).

### Discussion and Conclusion

In addition to the previously demonstrated effect of social inequalities, our study shows that geographical accessibility to primary care is an independent prognostic factor for the survival of some cancer localisations. This loss of opportunity concerns more than 45% of patients diagnosed with cancer in France.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Survival of infants with neuroblastoma diagnosed in 2000-2009 in six European countries

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### Background

Neuroblastoma is the most common neoplasm diagnosed in infants (age<1 year) in high income countries. We tested a collaborative approach to collecting predictive and outcome data and compared population-based survival of infants with neuroblastoma in six European countries.

### Methods

All records of infant neuroblastoma registered in 2000-2009 in population-based cancer registries of England, France, Germany, Italy (Piedmont), Spain (selected regions) and Switzerland were included, along with additional information on diagnosis, stage, treatment and outcome from clinical records. Five-year observed survival (OS) with 95% confidence interval (95%CI) was calculated for patients' subgroups using the life-table method and compared in Cox model by hazard ratio (HR) of death and its 95%CI.

### Results

OS for all 1664 infants, followed-up over mean 9.9 years, was 91.5% (90.1-92.8). Patients symptomatic at diagnosis (N=457) had OS=85.8% (82.2-88.7), lower than in those detected incidentally or in screening (N=204, OS=95.1% (91.1-97.3)). Stage was highly predictive of outcome, with OS=97.9% (96.7-98.7) for stage 1-3 (N=916), OS=87.4% (83.6-90.4) for stage 4S (N=370) and OS=75.0% (69.3-79.9) for stage 4 (N=261). Patients with amplified MYCN gene (96 of 771 studied) had OS=48.6% (38.2,58.2), with HR=12.1 (8.0,18.4) adjusted for country, in comparison with non-amplified. Countries differed in the proportion of patients treated by different therapeutic approaches, but overall OS was similar by country.

### Discussion and Conclusion

Principal predictors of survival of infants with neuroblastoma were MYCN amplification, stage at diagnosis and mode of detection, confirming findings in previous clinical studies. Data collection was time consuming and conducting a study with similar design would be even more challenging in the GDPR era. However, this interdisciplinary collaboration shows that linking registry data with clinical records is feasible and instrumental in identifying predictors of outcome in rare cancers.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Cervical cancer epidemiology and primary care providers in Saxony-Anhalt, Germany

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### Background

Routine screening for abnormal cervical cytology and human papillomavirus has reduced the incidence and mortality of invasive cervical cancer in Europe. Thus, in Germany 2017-2018 almost half of the women with invasive cervical cancer were diagnosed at early stages. However, the incidence is not equally distributed across regions; there is an increased incidence of higher stage cervical cancer in rural areas. This association could be due to difficult access to health care providers.

### Methods

In Saxony-Anhalt, new cases of cervical cancer were documented by the local cancer registry. Age-standardized incidence rates (old Europe standard) 2018 to 2020 were calculated. The locations of gynaecologists, general practitioners and internists were taken from the directory of the National Association of Statutory Health Insurance Physicians. Ratio of health provider to number of inhabitants per county were calculated. Spearman rank correlations were used to compare the density of primary care providers to the overall cervical cancer incidence and the proportion of advanced stages cases (≥FIGO Ib).

### Results

This study includes 1815 patients diagnosed with invasive or in situ cervical cancer in Saxony-Anhalt 2018 to 2020. The results showed an association between the number of general practitioners and overall medical practices per 100,000 inhabitants and incidence of invasive and in situ cervical cancer ($r=0.7$, $p=0.01$ and $r=0.5$, $p=0.05$ respectively). No association was seen for advanced stage cervical cancer and density of health care providers.

### Discussion and Conclusion

Although there are large differences in the density of medical providers between the regions, no correlation was observed between health providers density and the incidence of advanced disease at diagnosis. The supply in urban areas was twice as high as in rural areas. Missing reports on diagnoses, their stages and socio-economic status of new patients could distort the analyses.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Lead-time corrected effect on breast cancer survival in Germany by mode of detection

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### Background

Screen-detected breast cancer patients tend to have better survival than patients diagnosed with symptomatic cancer. Main driver of improved survival in screen-detected cancer is detection at earlier stage. An important bias is introduced by lead time, *i.e.* the time span by which the diagnosis has been advanced by screening. We examine whether there is a remaining survival difference that could be attributable to mode of detection, for example because of higher quality of care.

### Methods

Women with breast cancer (BC) diagnosis in 2000-2022 were included from the population-based cancer registry of Schleswig-Holstein, Germany, which also registers the mode of cancer detection. Mammography screening was available since 2005. We compared the survival for BC detected by screening with symptomatic BC detection using Kaplan-Meier, unadjusted Cox regressions and Cox regressions adjusted for age, grading, UICC stage and lead-time. The lead-time bias correction assumed an exponential distribution of the period during which the tumour is asymptomatic but screen-detectable (sojourn time). We used a commonly and two recently published estimates of sojourn times.

### Results

The analysis included 32,169 women. Survival for symptomatic BC was lower than for screen-detected BC (unadjusted Hazard Ratio (HR): 0.23, 95% confidence interval (CI): 0.21-0.25). Adjustment for prognostic factors and lead-time bias with the commonly used sojourn time resulted in an HR of 0.84 (CI: 0.75-0.95). Using different sojourn times resulted in HR of 0.74 to 0.90.

### Discussion and Conclusion

Survival for symptomatic BC was only one quarter of screen-detected tumours, which must obviously be biased. After adjustment for lead-time bias and prognostic variables, including UICC stage, survival was 26% to 10% better for screen-detected BC, which might be attributed to BC screening, although further sources for residual confounding (*e.g.* self-selection) cannot be ruled out. This result fits quite well to published results for other countries with BC screening.

## A tale of two tumors: investigating dual malignancy in head & neck cancer

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### Background

Several factors, including genetic inheritance, medical treatments and environmental influences can increase the likelihood of a cancer patient developing another de novo malignancy during their lifetime. The study aims to understand demographics, risk factors like tobacco chewing addiction, and survival patterns in dual malignancies in Head and Neck Cancer (HNC), which is crucial for effective prevention and management strategies.

### Methods

A retrospective analysis was conducted at a tertiary cancer centre, examining dual malignancy cases involving HNC for nine years (2012-2020). Data was extracted from hospital records, including demographic, clinical, tobacco chewing, and survival details.

### Results

During study period, 127000 patients were registered out of which 76932 were malignant. Of the total malignancies, 636 had dual malignancy, of which 259 had HNC as their first primary (FP) or second primary (SP), and 133 had both, (FP) and (SP), as HNC. [Among the non-HNC, breast was most common (FP) and esophagus was commonest (SP) site]. Among 259 cases, 75.7% were metachronous (M) and 24.3% were synchronous (S). Male predominance was observed, with a male-to-female ratio of 3.88:1. Tobacco addiction was prevalent in 93.37% males and 6.62% females ($P=0.000$). The majority of HNC patients belonged to (40-60) years age group. The median overall survival was significantly higher in patients diagnosed with metachronous tumors compared to those with synchronous tumors (125 months versus 45 months, $P<0.001$). The median age for arrival of (FP) HNC and (SP) HNC were 54 and 57 years, respectively.

### Conclusion

The study highlights the need for effective tobacco cessation policies to address higher prevalence of tobacco chewing addiction among males with HNC. Individuals in 40-60 age group, facing work commitments, family responsibilities, and financial challenges, are at risk. Early intervention and awareness are crucial to reduce delays in treatment and alleviate the burden of HNC in this vulnerable population.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Estimation of cancer cure indicators for Italian breast and colorectal cancer patients by stage

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### Background

People living after breast (BC) or colorectal cancer (CRC) are increasing. Since information on long-term survival or cure for these patients is limited, this study aimed to describe four indicators of cancer cure for Italian patients with BC and CRC by sex, age, and stage at diagnosis.

### Methods

This study included 31 Italian cancer registries (CRs), 6 in the analyses by stage. Mixture cure models were applied to estimate: Net Survival (NS); Cure Fraction (CF); Time To Cure (TTC, 5-year conditional NS>95%); Prevalent patients who were not at risk of dying as a result of cancer; Patients living longer than TTC.

### Results

For women with BC aged<75 years, CF was 77% (>70% in all age groups), 99% for patients diagnosed at stage I, 84% at stage II, and 42% at stages III-IV. For CRC, CF was 60% in men (64% in women), 91% (both sexes) at stage I, and ~40% at stages III-IV.

At 1/1/2018, 2.6% of all Italian women (806,410) were alive after BC and 87.5% will not die of BC, 91.7% for women diagnosed >5 years, 94.7% >10 years (i.e., the residual proportion of deaths for BC was 8.3% for those alive since >5 years and 5.3% since >10 years). Persons living after CRC were 422,407, 90.3% will not die of their disease (97.3% since >5 years, 99.0% since >10 years).

TTC is <10 years for CRC regardless of sex, age, and stage, while only for stage I BC. The proportion of prevalent BC patients alive since >TTC was 53% (72% for stage I, 7% for stages III-IV), 51% for CRC in men, and 64% in women.

### Discussion and Conclusions

Indicators of cancer cure, in particular by stage, may be relevant for patients and clinical practice, reducing the gap between the currently available data and individual needs.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

# Impact of national health expenditure on long-term survival for Eurocare-6 lymphoid neoplasms: 10 year follow-up

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## Background

Among hematologic malignancies, Lymphoid Malignancies (LM) are the most frequent. Novel therapies have greatly prolonged survival. We aimed to investigate long term survival by LM subtype and its association with socioeconomic indicators.

## Methods

Using EUROCARE-6 database, we analysed data from 27 countries for 10 specific LM types defined according to ICDO-3 morphology codes. We included adult patients (aged 15+), diagnosed in 2000-2013 and followed-up to 2014. Age-standardized relative survival (RS) estimates (5- and 10-years) and 10-year RS conditional on surviving 5 years (10/5y) were calculated using the period approach. European estimates were weighted using countries' resident population. Countries were categorized according to their Total National Expenditure on Health (TNHE) quartile. Generalized linear models estimated, for each LM subtype, the effect of age, sex and TNHE on the Relative Excess Risks of death (RERs) at 10 years after diagnosis.

## Results

European ten-year RS ranged from 78% for Hodgkin lymphoma (HL) to less than 30% for Plasma Cell Neoplasm (PCN). RS was similar for Chronic Lymphocytic Leukaemia (CLL) (57%) and Non-Hodgkin Lymphoma (NHL) (55%). Countries with highest TNHE quartile showed a lower RER than the European mean and the RER increased with decreasing quartile of TNHE. Ten-year RER for NHL varied from 0.81, 0.93, 0.95, 1.39 in the group of countries classified as High, Middle-High, Middle-Low and Low expenses quartile, respectively. The corresponding figures for CLL were 0.68, 0.97, 0.93, 1.64; for HL 0.81, 0.91, 1.07, 1.37; for PCN 0.85, 0.94, 1.00, 1.26.

## Discussion and Conclusions

Survival differences by LM subtype, age, sex, country persisted after 10 years from diagnosis. Geographical inequalities are correlated to the country specific TNHE. Policy decisions on health resources allocation can improve access to prompt diagnosis, appropriate treatments, long-term surveillance.
A reduction in treatment prices could improve the disease outcomes, particularly in countries at low TNHE.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Relationship between standard treatment and residence for gastric cancer

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There are disparities in cancer treatment resources, such as specialty physician, radiation therapy machines, and hospitals in Aomori prefecture, Japan. Hirosaki University Hospital (HUH) is one of the cancer treatment hospitals, and it serves a large number of cancer patients from both inside and outside Aomori. Therefore, optimizing the adjustment of the number of cancer patients undergoing treatment is a pressing issue for HUH. This study aimed to evaluate cancer treatment in HUH by examining the rate of standard treatment for patients who was diagnosed with gastric cancer.

The subjects of the study were 701 gastric cancer patients registered by the hospital-based cancer registry at HUH between 2017 and 2019. The patients were divided into two groups: those living in Hirosaki City and those not living in Hirosaki City. Whether standard treatment was performed for each patient was determined based on the clinical guidelines for gastric cancer. Each patient's comorbidity was evaluated using the Charlson comorbidity index (CCI). Logistic regression analysis was performed to analyze the association between the performance of standard treatment and patient characteristics.

There were no significant differences in characteristics between the two patient groups. The factors related to the performance of standard treatment included sex, stage at diagnosis, and CCI. Male patients, advanced stage at diagnosis, and higher CCI scores showed a negative correlation with the performance of standard treatment.

Standard treatment was less commonly performed as the cancer stage progressed or when patients had multiple comorbidities. The result of this study may be attributed to a system in which patients undergo surgical treatment in a hospital with advanced medical techniques and receive postoperative chemotherapy in a hospital close to their home to reduce the burden on patients.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Data completeness of Polish National Cancer Registry

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### Background

The completeness of a cancer registry data is particularly crucial for monitoring of cancer burden within population. Complete cancer registry data serves as a valuable resource for research and provide reliable information for society.

### Methods

The completeness was measured by semi-quantitative method using Mortality:Incidence ratio (M:I). The M:I ratio reflects the relationship between deaths and new cases, giving an idea of the disease's severity relative to its incidence. The study was conducted for 19 cancer sites (years 2010-2014 in cancer specific analysis and years 1999-2020 for total cancer incidence). Additional we introduced 1-(age-standardized 5-year net survival) for chosen sites. Calculation of survival rate was carried out with the Pohar-Perme estimator using the International Cancer Survival Standard weights. All data came from Polish National Cancer Registry (PNCR).

### Results

Data shows high completeness when M:I is close to 1-(survival rate). The acceptable difference between them is 15%. The number of deaths surpasses the number of new cases in lung cancer among males, while in brain cancer, this trend is observed across both sexes. The majority of the analyzed data exhibits a high level of completeness. However, the M:I ratio does not approximate the 1-(5-year survival) rate in several tumor sites. These locations, applicable to both sexes, include lung and brain. Among women disparities arise in stomach cancer. For all cancers, the M:I ratio over 20 years (2001-2019) showed a downward trend for both sexes. The surge occurred in 2020 due to COVID-19 pandemic.

### Discussion and Conclusions

Underreporting is evident in lung and brain tumors, potentially attributed to their nature as metastatic sites. It can cause misclassification due to registration them as primary cause. The conducted analyzes showed the high quality of data provided by PNCR, and confirms the credibility of the institution.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

# Stages and survival based on histology of lung cancer: a 10-year retrospective population cohort

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## Background

Lung cancer (LC) is a major health problem in our population, leading the ranking of cancer-related mortality. Our aim is to describe the survival of LC according to, histologic groups and stage at diagnosis.

## Methods

LC cases diagnosed between 2010 and 2019, collected in the Girona Population Cancer Registry, were included. Follow-up was performed until December 31, 2022. Histologies were grouped into 6 categories: small cell (SCLC), adenocarcinoma (ADLC), large cell carcinoma (LCLC), squamous cell carcinoma (SQLC), other non-small cell carcinoma (NSCLCNOS), and LC not specified (LCNOS). Observed survival (OS) was estimated using the Kaplan-Meier method; differences were determined using the log-rank test. Net survival (NS) was estimated with Pohar Perme.

## Results

4,113 new cases of LC were registered; 79.3% were men and 64.7% were ≥65 years of age. The most common histology was ADLC (36.2%). Stage IV represented 52.6% with differences by histology ranging from 36.7% in SQLC to 69.1% in SCLC.

Survival varied significantly. In stage I, the median of OS was 65.5 months (95% CI: 59.3-78.4), with 68.3% alive at 3 years (95% CI: 64.2-72.6). The worst prognosis was seen in stage IV with a median of 3.6 months (95%CI: 2.9-4.5) and 5.7% survival at 3 years (95%CI: 4.8-6.8). Within the same stage, differences were observed based on histology; in stage IV, the highest median survival (ADLC) was twice that of the lowest (LCLC) with 6.2 months (95%CI: 5.5-6.8) and 3.0 months (95%CI: 1.8-4.2), respectively.

Overall, 3-year NS was 21.5% (95%CI: 20.2-22.9), while OS was 19.8% (95%CI: 18.6-21.1). The largest difference (6.7%) between NS and OS was seen in stage I.

## Conclusion

Indicators of cancer cure, in particular by stage, may be relevant for patients and clinical practice, reducing the gap between the currently available data and individual needs.

## World-wide availability of high-resolution data for breast cancer – the VENUSCANCER project

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### Background

The CONCORD programme documented wide global differences in survival trends for women diagnosed with breast cancer (66% in India; over 90% in the US and Australia).

The VENUSCANCER project, embedded in the CONCORD programme, examines whether global differences in survival are attributable to differences in disease biology between populations, or patterns of care, or socio-economic status.

### Methods

Cancer registries were invited to submit data for a single year of complete incidence during 2015-2018, for which availability and completeness of high-resolution variables (*e.g.*, stage, staging procedures, biomarkers, treatment) were highest. VENUSCANCER offered financial support to 10 registries in low- and middle-income countries to enable collection of these data.

We examined the distribution of the main prognostic factors and some key indicators of adherence to international clinical guidelines.

### Results

We received data on 148,259 women diagnosed with breast cancer from 68 registries in 29 countries. Early (T1N0M0) tumours ranged from 12% in Romania to 50% in the US. Breast-conserving surgery plus radiotherapy was offered to over 70% of women with an early breast cancer in Belgium and Norway, but only to 19% in Thailand.

Node-positive tumours (N+) ranged from 22% in the US to 34% in Ecuador and Romania. Chemotherapy for node-positive tumours was received by 28% of women in Norway, ranging up to 88% in Thailand.

Triple-negative tumours were below 10% in most countries, and highest in Martinique (17%) and Brazil (25%).

### Conclusions

These analyses offer a good picture of the global distribution of breast cancer subtypes. Availability and completeness of data on stage and treatment still varies world-wide. Information on the type of treatment for breast cancer is crucial for assessing adherence to clinical guidelines. Similar analyses will be conducted for women diagnosed with cervical or ovarian cancer. The IACR-ENCR conference will offer an opportunity for further discussion.

## Improving capture of stage at diagnosis by the Victorian Cancer Registry

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### Background

Stage at diagnosis is a mandated data field to be reported by health services to the Victorian Cancer Registry (VCR). Stage is captured by Health Information Managers/clinical coders (HIMs) from clinical notes and by multidisciplinary team meeting (MDM) members into MDM software. However, <10% of registrations contain complete and correctly formatted stage data. This project aims to work with HIMS/MDM participants (Chair, scribe, Intern) to improve documentation of stage information available to the VCR.

### Methods

This work focuses on improving stage documentation for melanoma and cancers of the breast, prostate, lung and bowel. Phase 1 will demonstrate baseline completeness of stage data to HIMs and MDM participants. Benchmark reports for HIMS and MDM teams were developed containing funnel plots for each tumour group, comparing completeness of stage information reported by HIMs and captured in MDM software across all Victorian health services. Phase 2 will determine barriers and enablers of capturing stage information. Surveys were developed using the Theoretical Domains Framework. Phase 3 will determine the process of capturing stage data in MDMs. An ethnographic approach will document the processes of capturing stage at three consecutive breast tumour MDMs.

### Results

Phase 1 reports were distributed to HIMs across health services in May 2023. MDM data are being acquired from the four MDM software systems used in Victoria to generate the ‘stage completed in MDM software’ report. Phase 2 survey development is completed in Qualtrics and will be distributed to HIMs in June 2023, followed by survey distribution to MDM key participants. Phase 3 ethnography study will occur concurrently with survey distribution. We will report findings from Phase 1 and 2.

### Conclusion

Comprehensive stage at diagnosis data is critical to informing health service planning and funding to effectively address patient treatment needs. This project provides the foundation for improving its availability in VCR.

## Racial/ethnic disparities in the cause of death among prostate cancer patients in the US, 1995-2019

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### Background

Racial/ethnic disparities in prostate cancer are reported in the United States (US). However, long-term trends and contributors of racial/ethnic disparities in all-cause and cause-specific death among patients with prostate cancer remain unclear. We analysed the trends and contributors of racial/ethnic disparities in prostate cancer survivors according to the cause of death in the US over 25 years.

### Methods

In this retrospective, population-based longitudinal cohort study, we identified patients diagnosed with first primary prostate cancer between 1995 and 2019, with follow-up through Dec 2019, using population-based cancer registries' data from the Surveillance, Epidemiology, and End Results Program. We calculated the cumulative incidence of death for each racial/ethnic group (Black, White, Hispanic, Asian or Pacific Islander, and American Indian or Alaska Native [AI/AN] people), by diagnostic period and cause of death. We quantified absolute disparities using rate changes for the 5-year cumulative incidence of death between racial/ethnic groups and diagnostic periods. We estimated relative (Hazard ratios [HR]) racial/ethnic disparities and the percentage of potential factors contributed to racial/ethnic disparities using Cox regression models.

### Results

Despite a decreasing trend in the cumulative risk of death across five racial/ethnic groups, AI/AN and Black patients consistently had the highest rate of death in 1995-2019 with an adjusted HR of 1.71 (95% CI 1.54-1.89) and 1.59 (95% CI 1.55-1.63) respectively. The AI/AN-White disparities in all-cause mortality increased over time, with adjusted HR 1.33 (1.18-1.50) in 1995-99 and 1.96 (1.54-2.49) in 2015-19. Adjustment of stage at diagnosis, initial treatment, tumor grade, and household income explained 33% and 24% of the AI/AN-White and Black-White disparities in all-cause death among patients with prostate cancer.

### Discussion and Conclusion

The enduring racial/ethnic disparities in patients with prostate cancer, call for new interventions to eliminate health disparities. Our study provides important evidence and ways to address racial/ethnic inequality.

## Feasibility of passive follow-up in retrieving vital status of cancer patients in Dalian, China

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### Background

China has established the Vital Statistic System and the Civil Registration System nationally. These two systems could be linked to obtaining the vital status of cancer patients as a passive follow-up method. The study aimed to examine the feasibility of using passive follow-up methods to track the vital status of cancer patients in Dalian, China.

### Methods

All cancer patients from the Dalian cancer registry who were newly diagnosed in 2015 were included and followed until June 2021. We conducted single-source passive follow-up by linking cancer patients to the Dalian Vital Statistic System, multi-source passive follow-up by linking cancer patients to the Dalian Vital Statistic System, the Dalian Civil Registry System, the Health Insurance System, outpatient information and medical records from hospitals, and active follow-up through telephone interviews. Mixed follow-up was defined as using both multi-source passive follow-up and active follow-up. Age-standardized 5-year relative survivals were calculated for all cancers combined and 20 different cancers. The absolute differences in survival were compared between single-source and multi-source passive follow-up methods to the mixed follow-up method respectively.

### Results

The study included 11 046 eligible cancer patients. Age-standardized 5-year relative survival for all patients in Dalian was 54.5% (95% CI: 53.4%, 55.5%), 50.3% (95% CI: 49.2%, 51.3%), and 49.9% (95% CI: 48.9%, 51.0%) based on single-source passive follow-up, multi-source passive follow-up, and mixed follow-up, respectively. The absolute differences in survival ranged from 1.1%-9.9% and 0.0%-1.9% when comparing survivals between single-source and multi-source passive follow-up methods to the mixed follow-up methods respectively.

### Discussion and Conclusion

Multi-source passive follow-up methods by linking cancer patients' information with the Vital Statistic System, Civil Registration System, and electronic medical records are valuable tools to catch the vital status of cancer patients in China.

## Impact of changes in malignant tumor death spectrum on life expectancy in Tianjin from 1999-2019

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### Background

To analyze the effects of changes in the spectrum of malignant tumor deaths on different ages, genders, and urban and rural life expectancy among Tianjin residents from 1999 to 2019.

### Methods

Abridged Life Table and Arriaga's decomposition method were used to calculate the effects of different ages, genders, and changes in urban and rural malignancy mortality profiles on life expectancy.

### Results

Life expectancy in Tianjin increased by 4.96 and 5.69 years for males and females, respectively, from 1999-2019. Among them, the contribution of the decrease in mortality from malignant neoplasm to the increment of life expectancy in 1999-2007 was 0.12 years (3.30%) and 0.03 years (0.77%) for males and females, respectively, and the contribution to the increment of life expectancy in 2007-2019 was 0.05 years (3.13%) and 0.12 years (6.08%) for males and females, respectively. The decrease in mortality from malignant tumors contributed most to the increase in life expectancy among residents in the 60-69 age group, and the decrease in mortality from lung, gastric, esophageal, and liver cancers contributed more to the increase in life expectancy, with lung cancer having a negative effect among men and rural residents, and a positive effect among women and urban residents. The significant increase in mortality rates for lung, colorectal, and pancreatic cancers in the ≥85-year-old group of residents had a large negative effect on life expectancy. Breast and ovarian cancers had a negative contribution among females.

### Discussion and Conclusion

The increase in life expectancy in Tianjin from 1999 to 2019 is mainly attributed to the elderly and the decrease in mortality rates of gastric, esophageal, and liver cancers among malignancies, while the increase in mortality rates of lung, colorectal, gallbladder, pancreatic, and breast cancers among malignancies are the most significant disease hindering the increase in life expectancy in Tianjin.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Factors impacted net survival among Non-Hodgkin Lymphoma Patients in France: A population based study

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### Background

Diffuse large B-cell (DLBCL) and follicular lymphoma (FL) account for most non-Hodgkin lymphoma diagnoses: around 18% and 11% in France, respectively. The prognostic roles of clinical factors in DLBCL or FL patients after diagnosis in real life were less evaluated. The aim of our study was to describe net survival of patients with DLBCL or FL and to identify the prognostic factors in this population.

### Methods

We included DLBCL and FL patients from the three specialized Register of Haematological Malignancies in Normandy, Gironde, and Côte d'Or. Treated patients were matched (4:1) to non-treated on age at diagnosis, sex, and department. Net survival was estimated with a non-parametric Pohar-Perme method, and We used a flexible excess mortality hazard model to identify prognostic clinical factors.

### Results

Overall, 2,336 and 1,320 patients were diagnosed with DLBCL and FL during the period 2010-2018. The 5 years net survival in DLBCL was 63% (95% confidence interval (CI): 59–66) and 85% (95% CI:82–89) in FL. Multivariate analysis amongst DLBCL and FL patients, respectively, those in the Ann Arbor Stage 3 and 4 showed 1.94 (95% CI: 1.73–2.14) and 2.12 (95% CI:1.68–2.55) higher risk of excess mortality hazard compared to those in the Ann Arbor Stage 1 and 2. DLBCL patients who were treated showed 0.17 (95% CI:0.03–0.30) lower risk of excess mortality hazard compared to those who were not treated. Treatment was not associated with excess mortality in FL patients 1.45 (95% CI:0.94–1.95).

### Conclusions

Advanced Ann Arbor Stage is consistently associated with poorer survival among patients diagnosed with DLBCL or FL. In FL patients, treatment was not a prognostic factor, 'wait and see approach' seems to be the right option for the cases concerned.

***Keywords:***
*Cancer; Diffuse large B-cell lymphoma; Follicular lymphoma; Risk factors; Net survival.*

## Description of prevalent cancer cases' health status based on the dynamics of probability of death from cancer and other causes

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### Background

Cancer prevalence is heterogeneous regarding health status. We propose to describe it by estimating the crude probabilities of death among prevalent cases.

### Methods

The French cancer registry network FRANCIM provided national incidence estimates and individual follow-up up to 31/12/2017 for colorectal, lung, breast, prostate and melanoma cancers diagnosed between 1990 and 2017, which were used to estimate prevalence at 1/1/2017. Excess mortality was used to estimate the probabilities of death from cancer and other causes during the year 2017.

### Results

For the studied cancer sites, most cancer deaths in 2017 occurred within 5 years of diagnosis. The probability of dying from cancer decreased with time since diagnosis and increased with age, but the magnitude of these changes depended on the site of the cancer and reflected its overall prognosis. For breast cancer, this probability was always <5%, but remained at medium levels (0.5 to 2%). It became <1% for all sites except for women under 55 with breast cancer and people over 65 with lung cancer. The time beyond which the probability of dying from cancer became lower than that from other causes depended on the site and decreased with increasing age: for example, for women with colorectal cancer, it decreased from 20 years for those aged 45-54 to 6 years for those aged 75-84. For those under 75 with lung or breast cancer, cancer remained the main cause of death regardless of the time since diagnosis. Conversely, beyond the age of 75, deaths due to other causes became the most frequent in all sites and over different times.

### Conclusions

The proposed indicators allow a better description of the burden of cancer by estimating outcomes in prevalent cases according to time since diagnosis.

# Esophageal and gastric cancer incidence trends in Golestan, Northern Iran 2004-2018: an age-period-cohort analysis

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## Background

Golestan province in the northeast of Iran is part of the Asian esophageal cancer belt and is known as a high-risk area for esophageal (EC) and gastric cancers (GC).

## Methods

Data on incident cases of EC and GC between 2004 and 2018 were obtained from the Golestan Population-based Cancer Registry (GPCR). The age standard incidence rates (ASR) were calculated using the World standard population and presented per 100,000 person-years. In addition to analyzing the incidence trends using estimated annual percentage change (EAPC), we fitted age-period-cohort (APC) models to assess non-linear period and cohort effects as incidence rate ratios (IRRs).

## Results

Overall, 3004 new cases of EC (ASR = 15.7) and 3553 cases of GC (ASR = 18.3) were registered in the GPCR. We found significant decreasing trends in incidence rates of EC (EAPC = -5.0; 95%CI: -7.8, -2.2), and less marked non-significant trends for GC (EAPC = -1.4; 95%CI: -4.0, 1.4). There was a strong and consistent cohort effect for EC, with decreasing IRRs across successive birth cohorts (IRR = 1.9 and IRR = 0.1 for the oldest and the youngest birth cohorts vs. the reference birth cohort, respectively), particularly among men (IRR = 2.2 and IRR = 0.1 for the oldest and the youngest birth cohorts vs. the reference birth cohort, respectively).

## Conclusion

The marked declines in EC incidence rates in Golestan relate to the cohort effect and possibly to generational changes in underlying risk factors. Despite this trend, this population remains at high risk for both EC and GC.

*Keywords:*
*Esophageal Cancer, Gastric Cancer, Incidence trends, Age-Period-Cohort model, Golestan*

## Theme: Stage, comorbidities, and other prognostic information in cancer registration

### Overall survival of patients with Thyroid cancer in Martinique (2008-2018)

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#### Background

Thyroid cancer (TC) overall survival at 5 years was estimated at 97% in hexagonal France over 2010-2015. Its prognosis is known to be affected by patient age, tumor histology, size, and extension. This study aims to describe overall survival of thyroid cancer patients diagnosed between 2008 and 2018 in Martinique.

#### Methods

We included in this retrospective analytical study all patients who were diagnosed with thyroid cancer. An overall survival analysis at 1, 3 and 5 years of thyroid cancer patients diagnosed in Martinique from 2008 to 2018 was conducted. Prognostic factors associated with survival have been identified. Stage at diagnosis and patterns of care among thyroid cancer patients were analyzed.

#### Results

A total of 323 thyroid cancer patients were registered between 2008 and 2018. Papillary carcinomas represented 83% of diagnoses. Local stage or locally advanced invasion was found in 264 (88%) patients. 221 Multidisciplinary Teams reports files were reviewed. The overall survival observed in this population is 97% [93-99] at 1 year, 93% [88-97] at 3 years and 91% [85-95] at 5 years. Anaplastic, poorly differentiated and medullar tumors had lower survival rates at 5 years (39% [13-65]) compared to papillary tumors (93% [89-96]). We found that metastatic stage at diagnosis (HR = 3.1[1.3–7.6]; $p = 0.01$) and tumor size > 3cm (HR = 2.7 [1.1-6.3]) were independent prognostic factors for OS in our population.

#### Discussion and Conclusion

This study is consistent with national data and provides additional information on demographic, clinical and therapeutic characteristics that we can observe in mainland France, denoting similar disease expression in our population and proper medical care. Main prognostic factors were stage at diagnosis and tumor size.

## Predicting second breast cancer using patient-level data from two population-based Swiss Cancer Registries

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### Background

Breast cancer is one of the most common cancer diagnoses among women worldwide. In 2020, 2.3 million women were diagnosed with breast cancer, while breast cancer survivors often experience breast cancer recurrence or second primary breast cancer. This study aimed to build a prediction model to classify women with second breast cancer, already diagnosed with primary breast cancer, and test the model's generalizability using an external data source.

### Methods

Data from the Cancer Registry of the cantons Zurich and Zug (2010-2018) were used employing machine learning methods for classification to train the model; logistic regression, extreme gradient boosting, and artificial neural network algorithms. The best-performing prediction model was selected based on the area under the receiver operator curve, and the key characteristics contributing to a high risk for second breast cancer were identified based on the prediction model. Data from the Ticino Cancer Registry were used for external validation of the model.

### Results

The artificial neural network model produced the highest area under the receiver operator curve of 0.78 (0.75 - 0.82) on the training data from the Cancer Registry of Zurich and Zug and 0.70 (0.61 - 0.79) on the testing data from the Cancer Registry of Ticino. Among the most important features for prediction was the age at incidence, the year of birth, the stage and extent of the primary pathological tumor.

### Discussion and Conclusion

Our model contributed towards the development of an automated tool to assist doctors in classifying women with risk for second breast cancer, which can influence their follow-up or inform their course of treatment based on routinely collected tumor characteristics. Our results provide an example of how well a prediction model trained on one dataset from one cancer registry can generalize on completely external testing data from another cancer registry.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Surveillance of Cancer net survival rate using an Algerian Registries data: Tlemcen (2005-2014)

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### Purpose

It is crucial to estimate the net survival rate of cancer in the framework of population, for public health, clinical and other uses.

### Methods

To achieve this purpose a survival study was conducted in the province of Tlemcen, where the cohort of adults' cancer and childhood was included. The data set of the Cancer Registry of Tlemcen was used.

The study includes 18 cancers or groups of cancers: esophagus, stomach, colon, rectum, liver, pancreas, lung, breast (women), cervix, ovary, prostate, and melanoma of the skin in adults, and brain tumors, leukemia's, and lymphomas in both adults and children. Standardized quality control procedures were applied; we estimated 5-year net survival. Estimates were age-standardized with the International Cancer Survival Standard weights (ICSS), by sites and periods.

### Results

The 5–year standardized net survival by sites and period (2005–2009 versus 2010–2014) were the Breast (80.0, 67.5–92.5 VS 95.3, 88.1–100), Lung (51.2, 42.5–59.9 VS 61.7, 51.4–71.9), Colon, (72.2, 62.6–81.9 VS 65.2, 52.5–78.7), Rectum (70.0, 58.5–81.5 VS 84.2, 71.0–97.3), Stomach (59.5, 51.1–68.0 VS 62.3, 53.3–71.3), Esophageal (64.2, 43.7–84.8 vs 55.5, 27.2–83.8), Pancreatic (62.0, 45.5–78.6 vs 22.5, 0.0–46.8), Cervix (79.1, 71.6–86.6 VS 76.7, 67.6–85.7), Ovary (78.2, 67.5–88.8 vs 78.3, 62.3–94.3), Liver (38.0, 18.9–57.2 vs 44.3,19.2–69.5), Prostate(79.4, 62.7–96.2 vs 54.5, 95% IC: 26.2–83.3), Brain (Adult) (68.5, 59.4–77.5 vs 65.4, 53.9–76.9 ), Lymphoid (Adult) (71.7, 61.3–82.1 vs 79.1, 66.0 – 92.2), Brain (children) (79.0, 61.2–96.8 vs 69.9, 53.2–86.7), Lymphoma (children) (79.1, 61.2–96.9 vs 77.6, 64.1–91.2).

### Conclusion

The installation of the national surveillance program of cancer-based on the estimation of incidence, mortality, and survival is crucial for fighting cancer.

## Breast cancer survival at 5 and 10 years according to essential TNM stage. 2008-2012

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### Background

Breast Cancer is a mayor public health problem and is the most common type of cancer in women. Survival is a key indicator of the overall effectiveness of health services. Variations in breast cancer (BC) survival depend largely on the stage at which it is found at the time of diagnosis. The aim of this study is to implement the essential TNM system for determining the stage of BC in women in the Entre Rios province during the period 2008-2012 and to evaluate the breast cancer (BC) survival by Essential TNM classification system stages.

### Methods

The study was conducted on 2607 women diagnosed with invasive BC in Entre Rios Province, Argentina during the period 2008-2012. The cohort method with and the Ederer II estimator was used for the survival analysis. Patients and tumor characteristics were collected from medical records of the patients, pathological reports, imaging, and radiotherapy centers records. The implementation of essential TNM facilitated the search for information on the stage of the disease. The registers were trained through theoretical-practical meetings.

### Results

The average age was 60.7 years (22-99 years), the 86% of the cases were women older than 45 years. The 1-year overall survival was 88.4%, 3-year overall survival was 80.1%, 5-year overall survival was 75.7%, and 10-year overall survival 73.2%. Patients diagnosed with BC at stages I and II have a 20% higher survival rate than patients diagnosed at advanced stages III and IV.

### Conclusions

The disparities in the BC survival among TNM essential stages persist. Therefore, strategies aimed at reducing them must involve advocacy, research, education, and healthcare services. A key component to the success of the strategies is the education of the health workers, on the federal and state levels, with the aim to improve the access to an early detection.

## Investigating disparities in breast cancer survival by stage at diagnosis in transitioning countries

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### Background

Breast cancer is the most common cancer worldwide. Stage at diagnosis is an important prognostic factor for cancer survival, however, little evidence exists about breast cancer survival by stage at diagnosis in transitioning countries. This study aims to explore variations in stage-specific survival in women diagnosed with breast cancer in transitioning countries.

### Methods

This study used patient-level data from the SURVCAN-3 project that included cases from population-based cancer registries in 65 jurisdictions from 31 countries. Age-standardized 1-, 3- and 5-year net survival by stage at diagnosis (non-metastatic; metastatic; missing) were calculated for each registry. Following data quality assessment and if the registry had more than 30 cases in each stage category, multiple imputation was used to reassign missing stage data and stage-specific 1-,3- and 5-year survival estimates were calculated.

### Results

Proportions for metastatic disease ranged from 4% (Algeria, Batna and India, Trivandrum) to 22% (Zimbabwe, Bulawayo). 1-year survival for non-metastatic stage ranged from 96% (India, Trivandrum) to 99.5% (Colombia, Pasto) and from 36.6% (Zimbabwe, Bulawayo) to 86.3% (Bahrain) for metastatic stage. After imputing missing stage for 6 registries, survival differences became more apparent with increasing stage at diagnosis. 1-year survival for stage I ranged from 97.5% (Thailand, Khon Kaen) to 100% (Ecuador, Quito and India, Trivandrum) while stage IV survival ranged from 44.8% (India, Trivandrum) to 69.9% (Ecuador, Quito). Similar patterns were observed at 3- and 5-year survival with larger variation in more advanced stage at diagnosis, and consistently lower survival in India (Trivandrum) and higher survival in Ecuador (Quito).

### Discussion and Conclusion

Survival disparities for breast cancer could be due to earlier diagnosis in some regions or differences in treatment across transitioning countries. Stage at diagnosis is an important indicator for survival that should be collected by cancer registries.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Cancer incidence in the vicinity of open landfills in Guadeloupe, French West Indies

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### Background

People living in the vicinity of a landfill may be exposed to a wide range of pollutants, with possible subsequent health effects, including increased risks of cancer. The aim of the present study was to assess in Guadeloupe, the association between cancer incidence and proximity to the main open landfills.

### Methods

We have carried out a spatial analysis of cancer incidence at a small geographical level: the IRIS. We used the Besag York and Mollié model. For each IRIS, we calculated the distance between the landfill and the IRIS centroid. To study the association between cancer incidence and distance from a landfill, distance categories were introduced into the model in the form of three dichotomous variables for categories $< 2$ km, [2-4[ km, [4-6[ km, with the category $\geq 6$ km set as the reference group. The population living near a landfill is often more socially disadvantaged. To adjust for social disadvantage, we introduced into the model the social disadvantage index previously developed at IRIS level. Relative risks and their 80% credibility intervals were estimated.

### Results

People who lived less than 2 km from a landfill had increased risks of ovarian and head and neck cancer. Elevated risks of pancreatic, prostate, lung cancer and melanoma in men, as well colon cancer and hormone receptor negative breast cancer in women were also observed.

### Discussion and Conclusion

A link be-tween exposure to pollutants generated by a landfill and the risk of developing certain cancers was suggested but should be confirmed by additional studies involving a better characterization of exposure and control of potential confounders.

## Cancer registry based survival outcomes of breast cancer from South India: 2006-17

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### Background

Breast cancer is one of the leading cancer among females in India. Consecutive breast cancer cases treated at Cancer Institute (WIA), a seat of demographic and hospital cancer registries in Tamilnadu state, South India identified the prognostic factors, treatment protocols and survival.

### Methods

High resolution data on socio-demography, diagnosis, treatment and its outcome of 7,306 breast cancer patients treated during the years 2006-17 were studied. These cases were actively followed-up by time tested methods integrated in regular registry practice for their vital status. The disease-free (DFS) and overall (OS) survival were estimated using actuarial method.

### Results

The median age at diagnosis was 50 years (range: 20-95). 98% of patients were ever married. Hindu religion was followed by 85% of patients. 74% of cases had formal education. 69% resided in urban areas. 93% had ductal carcinoma histology. 42% and 44% were at stage II and III respectively. Majority of cases received neo-adjuvant treatment (45%). Treatment was started within one month of registration for 69% of the patients.

Estimates at 5 and 10 years were 66% and 56% for DFS, 71% and 60% for OS, 1.7% and 2.3% for risk of second cancers. Survival by period of diagnosis 2006-09, 2010-13, 2014-17 showed an increasing significant trend ($p < 0.001$). Decreased survival was observed with increasing stages ($p < .0001$). DFS (5years, 10 years) by age $<= 50$ (67%, 60%) versus age $> 50$ (65%, 52%), no formal education (62%, 55%) versus formal education (67%, 58%), residential area urban (67%, 58%) versus rural (63%, 55%) were statistically significant ($p < 0.05$). Patients who received neo-adjuvant chemotherapy only had better survival (73%, 68%) as compared to those who received Neo-adjuvant chemoradiation before surgery (67%, 57%).

### Conclusion

Cancer registry inherent with active follow-up facilitates survival outcomes as a routine leading to generating evidence for treatment innovation and risk ascertainment for future patients.

Theme: **Stage, comorbidities, and other prognostic information in cancer registration**

## Causes of death among cancer patients in Israel

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### Introduction

The Israel National Cancer Registry (INCR) collects data on reportable diseases among citizens and permanent residents of Israel (population 9 million). The Israel Central Bureau of Statistics' (CBS) death certification database provides vital status and cause of death. We used INCR data to study causes of death among Israeli cancer patients.

### Methods

We identified all invasive or in situ cancers diagnosed from 2000-2020 and calculated annual age-standardized mortality rate (ASMR), defining the at-risk population each year as persons who were:

*a.* Alive on 1 January

*b.* Diagnosed with cancer at any time from 1 January 2000 to 31 December

For selected years and cancer types, we analyzed cause of death, stratified by time elapsed since first cancer diagnosis and proportion of deaths due to initial cancer vs. other causes.

### Results

We identified 535,997 persons diagnosed from 2000-2020. ASMR was 50/1,000 in 2004, 28/1,000 in 2013 ($APC = -6.6$, $p < .05$), and 22/1,000 in 2020 ($APC = -3.5$, $p < 0.05$).

Cancer was the underlying cause for 67-84% of deaths. For 84-85% of deaths within one year of the first cancer diagnosis, the cause of death was in the same diagnosis group as the initial diagnosis, compared to only 67-76% of deaths > 5 years after diagnosis. Most persons with cancers of the lung or pancreas died of those diseases. For a considerable proportion of persons diagnosed with other common cancers, the cause of death was another chronic illness (cardiovascular or respiratory disease, diabetes, dementia/Alzheimer, etc.).

### Discussion and Conclusions

A diagnosis of cancer was once a death sentence, however early diagnosis and improved treatments have resulted in improved survival for certain cancers. Cancer risk increases with age, therefore many persons with cancer suffer from other life-limiting diseases as well. Information on cause of death in persons with cancer sheds light on the complex clinical needs of these patients.

## Impact of health insurance affiliation and socio-economic status on cervical cancer survival in Bucaramanga, Colombia

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### Background

Cervical cancer is still an important cause of death in countries like Colombia. We aimed to determine whether socioeconomic status of residential address (SES) and type of health insurance affiliation (HIA) might be associated with cervical cancer survival among women in Bucaramanga, Colombia.

### Methods and Results

All patients residing in the Bucaramanga Metropolitan Area diagnosed with invasive cervical cancer (ICD-O-3 codes C53.X) between 2008 and 2016 (n = 725) were identified through the population-based cancer registry, with 700 women having follow-up data for > 5 years (date of study closure: Dec 31, 2021), yielding an overall 5-year survival estimate (95% Cl) of 56.4 % (52.7 – 60.0%) KM estimates of 5-year overall survival were obtained to assess differences in cervical cancer survival by SES and HIA. Multivariable Cox-proportional hazards modeling was also conducted, including interaction effects between SES and HIA. Five-year overall survival was lower when comparing low vs. high SES (41.9 % vs 57.9 %, $p < 0.0001$) and subsidized vs. contributive HIA (45.1 % vs 63.0 %, $p < 0.0001$). Multivariable Cox modeling showed increased hazard ratios (HR) of death for low vs. high SES (HR = 1.78; 95 % Cl = 1.18 – 2.70) and subsidized vs. contributive HIA (HR – 1.44; 95 % Cl – 1.13 – 1.83).

### Discussion and Conclusion

The greatest disparity in HR was among women of low SES affiliated to subsidized HIA (vs. contributive HIA and high SES) (HR = 2.53; 95 % CI 1.62 – 3.97). Despite Colombia's universal health-care system, important disparities in cervical cancer survival bv health insurance affiliation and socio-economic status remain.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

# Filling the information gap: estimating distant cancer recurrence at population-level from administrative data

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## Background

As cancer survival is improving, there is a growing need for knowledge on cancer recurrence and disease progression, yet cancer registries typically do not collect information on this outcome. Using existing administrative health data to estimate cancer recurrence at population-level comes to the forefront as a promising alternative.

## Methods

In a pilot study on breast cancer recurrence, a multi-centric dataset of patients diagnosed with non-metastatic breast cancer during 2009-2014 in Belgium was used as the gold standard to train, test, and validate a machine-learning algorithm. Distant cancer recurrence, was defined as distant metastases from 120 days after diagnosis and within 10 years of follow-up. Data-features classifying the occurrence of a distant recurrence were identified in population-based administrative health datasets and selected using bootstrap aggregation. Classification And Regression Tree (CART) analysis was used to construct the algorithm.

## Results

A total of 2,507 breast cancer patients were included of whom 8.6% had a distant recurrence during follow-up. The constructed algorithm had a sensitivity of 79.5% (95% confidence interval [CI]: 68.8-87.8%), specificity of 98.2% (95% CI: 97.1-99.0%) and positive predictive value of 79.5% (95% CI: 68.8-87.8%). External validation performed in independent centers showed similar results. The algorithm will be applied to a nationwide dataset of non-metastatic breast cancer patients in Belgium, stratified by risk groups.

## Discussion and Conclusion

In the absence of active registration of cancer recurrence, methods making use of available real-world data have the capacity to inform about the occurrence of distant recurrence on population-level.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Social disparities in lung cancer treatment in Estonia: a register-based study

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### Background

Despite its dismal prognosis, lung cancer patients can benefit from cancer-directed surgical, radiation or systemic therapy. The aim was to examine the association of sociodemographic factors and the use of treatment in lung cancer patients in Estonia, using linkage of cancer registry data to administrative databases.

### Methods

Estonian Cancer Registry provided data on men and women diagnosed with lung cancer in Estonia in 2004-2018. Surgical treatment, radiation and systemic therapy performed within 12 months of diagnosis were identified from cancer registry and Estonian Health Insurance Fund claims; sociodemographic characteristics from population registry. Poisson regression with robust variance was used to calculate univariate and multivariate prevalence rate ratios (PRR) with 95% confidence intervals (CI) for receipt of any cancer-directed treatment with age, sex, period of diagnosis, region of residence, tumour histology, and sociodemographic factors as covariates among lung cancer patients stratified by stage.

### Results

Overall, out of 11330 patients included in the study, 6539 (58%) received cancer-directed treatment. Multivariate regression analysis showed that in stage I-II lung cancer, receipt of treatment increased 10% over the study period. Patients who were older, non-Estonians, single or had lower educational level were significantly less likely to receive treatment. In stages III-IV, receipt of treatment was 35% higher in 2014-2018 than in 2004-2008. Use of treatment decreased significantly with age, was significantly lower for men, patients with lower level of education or who were not married/cohabiting. Regional differences were also observed for stages III-IV as patients living in the region around university hospital were more likely to receive treatment.

### Discussion and Conclusions

The study showed considerable increase in the use of cancer-directed treatment in Estonia over the study period for both early and late lung cancer. However, observed sociodemographic differences suggest social barriers in access to care.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Long-term outcomes in cancer patients: Recurrence of metastatic breast cancer in the population-based setting

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### Background

Cancer recurrence is an important long-term outcome of cancer survivors that is often not collected and recorded by population-based registries. This systematic review examines studies reporting metastatic recurrence proportions in women initially diagnosed with non-metastatic breast cancer. We focus on population-based studies and review the current availability, landscape and infrastructure.

### Methods

Studies that reported proportions of metastatic recurrence in women with non-metastatic breast cancer were identified from a systematic search. Random-effects meta-analyses were used to estimate pooled proportions by clinical and demographic characteristics. We extracted a subset of population-based registry studies and examined outcomes, methods of ascertainment and definitions of recurrence from each study.

### Results

194 studies on almost 280,000 patients were included in the meta-analysis. Proportions of patients diagnosed with metastatic recurrences increased with longer follow-up time from 12.5% (95% CI 10.7-14.3%) at <5 years after diagnosis to 20.4% (95% CI 17.6-23.2%) at 10 years or more from initial diagnosis. Proportions of metastatic recurrence were higher in hormone receptor negative compared with receptor positive patients (15.2% vs. 9.9%) and locally advanced compared with early stage at initial diagnosis (33.2% vs. 4.8%), and in younger (<50 years) compared with older (70+ years) age groups (18.4% vs. 13.3%). Detailed data extraction from 23 cancer registry studies found that most were retrospective and collected recurrence data for ad-hoc studies. Definitions of recurrence and sources varied: minimum cancer-free interval between the start of follow-up and risk window ranged from none to 6 months; start of follow-up ranged from initial date of diagnosis to date of treatment.

### Discussion

Higher proportions of metastatic recurrences at more advanced stage emphasises the importance of follow-up and early detection. International standards and local support for cancer registries to routinely collect recurrence data are needed to evaluate long-term outcomes and provide information of the impact on cancer patients.

# Post-colonoscopy colorectal cancer: a population-based cohort study of fecal occult blood test-positive colonoscopies

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## Background

Most post-colonoscopy colorectal cancers (PCCRCs) arise from missed or incompletely resected lesions. The PCCRC prevalence is associated with patient-, tumor- and endoscopist-related factors. Data on PCCRCs after guaiac-based fecal occult blood test (gFOBT)-positive colonoscopies is scarce.

## Methods

Retrospective population-based cohort study of all gFOBT-positive colonoscopies performed among individuals aged 50-74 between 2003 and 2014 within the colorectal cancer (CRC) screening program organized in the Haut-Rhin department, France. The occurrence of PCCRCs was identified from the Haut-Rhin cancer registry database (5-year follow-up). The main outcome was PCCRC-3y rate (World Endoscopy Organization consensus statement:the number of PCCRCs diagnosed 6-36 months after baseline gFOBT-positive colonoscopy divided by the total of the number of PCCRCs plus the number of CRCs detected within the screening program). Risk factors for PCCRCs were analyzed by a Cox proportional hazards survival model.

## Results

Overall, 9106 gFOBT-positive colonoscopies performed by 36 gastroenterologists were included. Sixteen PCCRC-3y and 31 PCCRC-5y were diagnosed (68.8% and 58.1% were true interval PCCRCs respectively). The PCCRC-3y rate was 2.4% [95% confidence interval 1.4%-3.9%]. The highest multivariate hazard ratios (HRs) for PCCRC-5y were observed in patients aged over 68 (HR = 5.58), in those having their colonoscopy performed by a gastroenterologist with a cecal intubation rate < 90% (HR = 5.81) and in those with low and high-risk polyps (HR = 2.90 and 3.62 respectively, reference: negative colonoscopy). The risk for PCCRC-5y was significantly higher when the gastroenterologist's adenoma detection rate (ADR) was < 35% compared to ≥ 35% (HR 2.17).

## Discussion and Conclusions

PCCRC-3y prevalence was low, estimated at 2.4%. Half of the PCCRCs followed a colonoscopy performed by a gastroenterologist with a cecal intubation rate and/or an ADR below standards. The minimum standard for ADR in gFOBT-positive colonoscopies should be set at 35% in the French screening program.

## Explainability of machine learning in progression-free ovarian cancer survival

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### Background

Epithelial ovarian cancer has a high risk of recurrence after initial treatment. Finding predictive factors of recurrent disease has been an active area of research in ovarian cancer. Recent advances in machine learning (ML) have made it possible to better predict the recurrence-free interval. However, often, the conclusions of ML models remain difficult to interpret. The goal of this contribution is twofold: first, to compare ML models to classic Cox regression for ovarian cancer recurrence, and, second, to use Shapley values as a way to explain predictions of ML models.

### Methods

A cohort of 2825 patients, diagnosed between 2015 and 2017 with late-stage ovarian carcinoma (FIGO: IIB - IV), was extracted from the Netherlands Cancer Registry (NCR). The popular missForest algorithm was used to impute missing values for variables with a missing rate of less than 50%. The data were split in a 20% test set and a 80% train set. Four models were tested: *(i)* Cox's proportional hazards model, *(ii)* Random Forests, (iii) Support Vector Machines and *(iv)* eXtreme Gradient Boosting (XGB) Trees. Hyperparameter tuning was executed based on a randomized search through cross-validation on the training set. Predictor selection is confirmatory (Delphi consensus) and exploratory.

### Results

Predictive power will be measured with the concordance (or C-)index. Based on preliminary results, ML models reached performance above 0.70 C-index, in line with previous publications. Shapley values will be presented, firstly, to rank the contribution of prediction factors in ovarian cancer recurrence, and secondly, dependency plots will be used to uncover differences between traditional and ML model predictions.

### Discussion and Conclusion

Although ML models can be difficult to explain, explainability measures can shed light on the differences in their predictive power and, therefore, be more readily understood by experts.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Image guided localization of non-palpable breast lesions in The Netherlands: a retrospective population-based cohort study

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### Background

In 2020, in primary breast cancer 67% of all patients in the Netherlands received breast conserving surgery (BCS). Current standard-of-care for image-guided localization (IGL) of non-palpable breast cancer involves iodine seed, wire guidance, radio guided localization, ultra sound guidance, magnetic-marker and radiofrequency identification. However, comparative data regarding oncological safety, clear margins after surgery, is limited. Therefore, the aim of this retrospective population-based study is to compare IGL techniques with respect to oncological safety in resection of non-palpable breast lesions.

### Methods

All patients recorded by the Netherlands Cancer Registry, undergoing BCS with IGL between 2013 and 2022, were included in this study (n = 60.101). The status of resection margins (clear, focally positive, or more than focally positive) was assessed according to the Dutch indications for re-excision. The correlation between image-guided localization and the status of resection margins was assessed by a multinominal logistic regression analysis for invasive cancer and ductal carcinoma in situ (DCIS) separately. Iodine seed was taken as reference.

### Results

There was a steady increase in the use of the iodine seed, magnetic-marker and radiofrequency identification (the latter two introduced in 2018), while wire-guided localization was decreasing. Large variation in methods used between hospitals was seen over the years. For patients with invasive carcinoma, there were no significant differences between the localization techniques. For patients with DCIS, the highest significant difference in the odds of a focally positive margin status was found between patients treated with magnetic-marker and iodine seed (OR = 2.05;1.18 – 3.56), while wire guidance had a significant difference in the odds of a more than focally positive margin status compared to iodine seed (OR = 1.38;1.08 – 1.77).

### Conclusion

With respect to oncological safety of image-guided localization, wire guidance and magnetic-marker performed inferior to iodine seed for DCIS. For invasive carcinoma, no significant differences were revealed.

## Nationwide radiotherapy trends & variation in non-metastatic breast cancer treatment in The Netherlands

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### Background

Radiotherapy is a key modality in invasive non-metastatic breast cancer treatment. As a result of personalized treatment, radiotherapy use likely de-escalated over time. We described nationwide trends and variation in radiotherapy use in non-metastatic breast cancer treatment in the Netherlands from 2008 until 2019.

### Methods

Women diagnosed with non-metastatic breast cancer in 2008-2019 were selected from the population-based Netherlands Cancer Registry. Primary treatment was presented over time. Non-specified radiotherapy use was available in all study years. Radiotherapy details were available from 2011: use of whole breast irradiation (WBI) with boost/WBI without boost/partial breast irradiation (PBI) were presented in women undergoing breast conserving surgery (BCS). Multilevel logistic regression analyses were applied to identify variables associated with post-BCS WBI with boost versus without.

### Results

During 2008-2019, 176,292 women were diagnosed with M0 breast cancer in the Netherlands. An increasing percentage received radiotherapy in 2008 (61%) – 2016 (70%), as treatment shifted from mastectomy to breast conserving therapy and post-mastectomy radiotherapy use increased. After 2016, radiotherapy use slightly decreased to 67%, as women aged ≥ 70yrs more frequently received BCS without radiotherapy. Radiotherapy de-escalation was also observed by increased PBI use and decreased boost radiation use following WBI. Older women (> 75vs < 50yrs OR:0.04, 95%CI:0.03-0.05) less likely received boost radiotherapy, while women with N+ or higher grade disease (pN+ vs pN0 OR:1.46 95%CI:1.32-1.60 / grade III vs I OR:11.46, 95%CI:9.90-13.26) or residual tumor (focal R1 vs R0 resection OR:28.08, 95%CI:23.07-34.17) had an increased probability of receiving boost radiation. Boost radiation varied between regions of residence, which could not be explained by hospital characteristics.

### Discussion and Conclusion

Radiotherapy use in primary non-metastatic breast cancer treatment increased until 2016 and slightly decreased afterwards. Clinical practice de-escalated radiotherapy use in breast cancer treatment as radiotherapy following BCS was more often omitted in older women, PBI use increased, and boost radiation strongly decreased.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Integrating cancer registration data with treatment data to audit pancreatic cancer health care services

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### Background

The Northern Ireland Cancer Registry (NICR) published a novel audit of secondary care management of pancreatic cancer patients diagnosed 2019-2020. This audit also compared pancreatic cancer services prior to the COVID-19 pandemic and during the initial phase of the pandemic.

### Methods

Patients with ICD-0-3 code C25 with an incident date of diagnosis between 01/01/2019 - 31/12/2020 were extracted from NICR. Treatment datasets from the Regional Information System for Oncology and Haematology (RISOH), Patient Administrative System (PAS) and Radiotherapy were merged to NICR data. The NI Cancer Clinical Trial Dataset were merged. NICR Cancer Intelligence Officers supplemented this dataset following manual review of; Cancer Patient Pathway System (Regional MDT system): NI database of pathology reports, RISOH and NI-wide Imaging systems. Clinical data were reviewed and further supplemented by Hepato-Pancreato-Biliary (HPB) staff. Comparisons were made using chi-squared tests.

### Results

540 pancreatic cancer patients were included, of which 257 were diagnosed in 2019 and 283 in 2020. 36% had an emergency admission in the 30 days prior to diagnosis. A higher proportion of patients were diagnosed as Stage IV in 2020 (50% v 56%), although not statistically significant $p = 0.36$. Patients diagnosed in 2020 were more likely to be treated with palliative intent (75% vs. 86%, $p = 0.001$) and less likely to undergo surgery (12% vs. 21%, $p = 0.003$) than patients diagnosed in 2019. 28% of surgical patients had clear-margin (R0) status. Patients who had tumour resection have significantly better 1-year survival compared to patients who did not (76% vs. 17% at 1 year, $p = < 0.0001$). Only 1% of patients were enrolled on a clinical trial.

### Discussion and Conclusion

Integration of NICR data with clinical care data facilitated a novel audit of pancreatic cancer services in NI. This audit revealed how treatment changed during the COVID-19 pandemic. This methodology can be extended to other cancer sites.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Self-reported fatigue before and after treatment in prostate cancer patients and in a control group

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### Background

Fatigue can be caused by cancer treatment but can also be due to other conditions. It is a well-known adverse effect from *e.g.*, breast cancer treatment, but less is communicated about fatigue in prostate cancer (PCa) patients. We examined differences in self-reported fatigue among Norwegian PCa patients treated with radical prostatectomy (RP), radical radiotherapy (RAD), or followed by active surveillance (AS), and a control group, before treatment (baseline) and after one year (1yr).

### Methods

Norwegian PCa patients diagnosed between 01.09.2020–31.03.2022 and men without PCa, matching in age and residence region, were invited to a population-based survey on health and quality of life. The fatigue scale from the EORTC (European Organisation for Research and Treatment of Cancer) QLQ-C30 was used to measure fatigue. The analysis was done according to scoring instructions and adjusted for age at baseline. Patients treated with RP/RAD, responding both before treatment and 1yr after diagnosis, and patients and controls responding at both time points were included in the analysis.

### Results

The average fatigue score (0–100, 100 being the highest degree of fatigue) in the control group (N = 2856) was 23.6 (22.6-24.6) at baseline and 25.3 at 1yr (24.3-26.3). Similarly, the fatigue score among the men on AS (N = 568) was 23.3 (21.6-25.0) at baseline and 24.7 (23.1-26.4) at 1yr. The difference was larger for the men treated with RP (N = 578) (baseline: 21.6 (19.9-23.2), 1yr: 25.4 (23.7-27.1)), but the RAD patients (N = 462) reported most fatigue at baseline, 27.4 (25.5-29.3), and had the biggest change, with a score of 36.2 (34.3-38.1) at 1yr.

### Discussion and Conclusion

RAD patients reported more fatigue at both baseline and 1yr than the other survey participants and their fatigue worsened more. Comorbidities and neo-adjuvant hormone treatment may have affected the results. RAD patients should be informed of fatigue as a potential adverse effect.

## Cumulative incidence of first recurrence after curative treatment of stage I-III colorectal cancer

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### Background

Updated knowledge about rate of first recurrence, anatomic site, and time to first recurrence following curative treatment of colorectal cancer is essential to improve the basis for guidelines and individual treatment strategies.

### Methods

Population-based study on first recurrence following radical treatment of clinical stages I-III colorectal cancer in Central-Norway, 2001-2015. To reveal any time-trends, data were stratified on the periods 2001-2005, 2006-2010 and 2011-2015. Competing risk analyses were used to estimate cumulative incidence functions depicting site of and time to first recurrence. Multivariable Cox regressions were used to estimate cause specific hazard ratios (HR).

### Results

Overall, 5556 cases were identified at risk of recurrence. At a minimum follow-up of six years, a first recurrence was detected in 1113 patients (20.0%), reduced from 23.6% in the early time period to 17.2% in the last, $p < 0.001$. This was a sustained finding across gender, age, tumour location, disease stage, and for both elective and emergency surgery. The reduction was primarily driven by a reduced number of first recurrence involving the liver. In multivariable analyses cause specific hazard ratios proved gender, disease stage, and tumour differentiation to have a significant impact on risk of recurrence.

### Conclusions

The rate of first recurrence after curative surgery for colorectal cancer was significantly reduced during the time period 2001-2015, a sustained finding across all tumour locations and disease stages. The reason for the observed reduction could not be attributed to any particular demographic, tumour, or treatment factor alone. A combined effect of several incremental improvements for individual variables is suggested.

Theme: Clinical applications – treatment, recurrence, and other outcomes

## Advancements in the e-KRN+: Insights into Cancer Recurrence, Progression, and Transformation in Polish Cancer Registries

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### Background

New regulations for the Polish National Cancer Registry introduced in March 2023 have changed the scope of the collected medical data. The population-based registry has been divided into a registry for solid tumours and a registry for haematological malignancies (PROH). Registration is now via a new IT platform, 'e-KRN+'. The scope of the collected data was expanded to include information on relapse, distant metastases, and transformation. The new variables will be collected for cases diagnosed from 2022 onwards for solid tumours and from 2023 onwards for haematological malignancies. Our study aims to show changes in data collection on patient follow-up from the perspective of the Greater Poland Cancer Registry.

### Methods

Review of malignant tumour registration principles in Poland: analysis of legislation regulating the sources and methods of acquiring medical data for Cancer Registries (CRs).

### Results

According to new regulations CRs will collect data on recurrence, progression, and transformation for solid tumours, with the date of local recurrence, date and site of distant recurrence by ICD-O-3. The PROH will collect the recurrence date, transformation date and morphology by ICD-O-3.2, treatment of progression and/or recurrence.

### Discussion and Conclusion

The obligation for reporting follow-up data on recurrence, progression, and transformation entails additional work for registrars, which is related to training and extracting additional information from patient medical records. Collecting data on tumour progression, rTNM, or treatment response in solid tumours and haematological malignancies requires access to the patients' medical records. Integration with IT systems of a wide network of hospitals, leading to their linkage with e-KRN+, will ensure the necessary data completeness and will increase the volume of collected information in the future. These changes will enhance the analytical capacities regarding the quality of oncological treatment in Poland.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Prostate cancer overdiagnosis and overtreatment: the role of cancer registries

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Screening for prostate cancer (PCa), whether through PSA or MRI, is associated with a significant rate of overdiagnosis and subsequent overtreament in high-income countries, resulting in increased health care costs and a decrease in quality of life. Current classification of PCa grade groups developed by pathologists provides a better classification of most indolent cases within grade group 1, which are predominantly monitored according to widely accepted international guidelines. In this scenario, some clinicians have proposed to rename Gleason score 6 (GS6) cancer, currently grade group 1, as 'no cancer' to reduce overdiagnosis and overtreatment. This is a controversial idea that is being debated but has received limited support thus far.

Cancer registries play a crucial role in managing patients with PCa and have the potential to collect additional data on risk factors, screening, recurrence, and therapy. This data collection can help understand the natural history of the disease and stratifying risk using clinical parameters could significantly reduce overdiagnosis and overtreament of PCa.

While recurrence and local extension of PCa have been described in GS6 cases, there have been few cases of GS6 biopsy with metastasis documented in large population-based cancer registries. The challenge with these cases is that they are not typically treated with radical prostatectomy, and therefore, it cannot be ruled out that nonbiopsied areas may harbor higher Gleason grade areas.

Cancer registries are critical for generating data on burden of cancer. These data should be used in effective cancer control programs and research. However, there is a need to focus on improving data quality, collecting tissue samples, and facilitating data feedback with health care providers to ensure that studies based on cancer registry data are relevant to adressing issues of overdiagnosis and overtreatment

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Five-year recurrence for stage I-III colorectal cancer: a population-based study in southern Switzerland

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### Background

Colorectal cancer (CRC) is one of the most common cancer. The survival and number of people at risk of recurrence increased due to the improvements in treatment techniques. Aim of the study is to calculate the 5-year cumulative incidence (CI) of recurrence for invasive CRC.

### Methods

The study includes all patients with invasive CRC diagnosed during 2008-2017 in canton Ticino, southern Switzerland. Morphology ICD-O-3 codes 85603, 87203, 88513, 89363, 96503-97693, cases with distant metastasis at diagnosis, patients not receiving surgical treatment or with unknown stage are excluded from the analysis. Recurrence is defined as a new invasive cancer occurring after a previous cancer in the same 4th digit ICD-O-3 localisation, in the lymph nodes or in distant sites. 5 years CI of recurrence is calculated. Cause-specific and independent adjusted hazard ratios for recurrence are calculated using multivariable Cox competing risk regression models. We consider the following risk factors: stage, age at diagnosis, sex, tumour localisation, grade, type of treatment, lymphatic, venous and perineural invasion. The follow-up is at 31.12.2022.

### Results

1745 CRC are included in the study (1261 for colon and 484 for rectum). Of the 276 patients experiencing a recurrence, about 32.2% had loco-regional recurrence and 67.8% developed distant metastasis. The median time to recurrence is 16.8 months (IQR: 10.2-29.1 months). The 5-yr CI is 0.16 for all CRC, 0.14 and 0.20 for colon and rectal cancer respectively. For ascending, transverse and descending colon the 5yr CI is 0.13, 0.18 and 0.13, while for rectum it is 0.20.

### Discussion and Conclusion

In the literature we find few recent population-based study on CRC recurrence and we will compare our results with the available data. The evaluation of cancer recurrence is important in order to assess prognosis and individualized follow-up strategies.

## Non-biological factors affect access to optimal treatment in AML patients: analysis using machine learning algorithm

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### Background

AML patients not admitted to Specialised Haematology Units(SHU) during their care pathway have less access to curative treatment. Our aim is to determine whether access to optimal curative treatment is affected by non-biological factors.

### Methods

We included 1,033 patients from 3 French departments. We assumed that patients managed in academic hospitals by haematologists within 5 days of their diagnosis (n = 297) received best treatment (Gold-Standard patients). Patients were categorised by their treatment modality ('curative treatment' if intensive chemotherapy and 'non-curative treatment' if other). Firstly, we used 80% (n = 238) of the gold-standard patients to train a Gradian Boosting Machine (GBM) algorithm in order to learn how clinical-biological characteristics are associated with receiving each treatment modality. The model was validated on the remaining 20% (n = 59). Next, GBM was used to predict the treatment modality for all patients given their clinical-biological characteristics and contrasted it with the actual treatment. Using multivariable logistic regression, we then examined how non-optimal treatment(discrepancy between predicted curative and observed non-curative treatment) was associated with any non-biological factors (sex, diagnostic department, EDI-quintile, city of residence, distance/travel time between city of residence and academic hospital). We repeated the analyses for 1,000 bootstrap samples to account for uncertainty in the predicted treatment outcome. Patients with predicted non-curative treatment were excluded in this analysis as uninformative(n = 471).

### Results

Access to 'curative treatment' was 84.8%(252/297) for gold-standard patients compared to 33.5% (247/736) for the others patients. The three most influential factors related to treatment modality among gold-standard patients were age (68.3%-influence), secondary aspect of AML/MDS(15.8%) and presence of the AML-others subtypes(5.4%). In total, we identified n = 460(44.5%) and n = 102(9.9%) patients in respectively, optimal and non-optimal treatments. Living in Basse-Normandie(0.65-times;95%CI[0.5,0.8]) and living in a municipality more than 10 km from an academic hospital were strongly associated with a non-optimal treatment.

### Conclusion

There are geographical disparities in access to optimal treatment. This could be related to the medical desert situation, or to disparities in medical organisation.

## Strenghthening the role of German cancer registries in quality assurance and research

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### Introduction

Following a national law, between 2014 and 2018 the cancer registries of all 16 federal states in Germany started to include detailed data on treatment and disease course, using a mandatory common data set. Main aim of the German cancer registries is now to provide quality assurance of cancer care, which is done by organizing regional quality conferences and giving detailed feedback to care suppliers.

To strengthen research with cancer registry data, the national population-based cancer registry dataset has recently been extended by core elements of the common data set. It  is hosted at the national centre for cancer registry data at the Robert Koch Institute, where data can be accessed for scientific purpose on application.

### Methods

This contribution summarizes the experiences of first ten years of clinically expanded cancer registration in Germany, and touches on main achievements and challenges. It also provides some insight on the expanded nationwide data set, including a first and preliminary assessment on data quality and completeness. We also describe the process of application and data access for research purposes.

### Results

Collecting continuous diagnostic and treatment data from primary diagnosis to death is a complex task in a health care system previously not known for centraliziation or interoperability of data, but by and large the German registries have been successful on their way to achieve this. One of the remaining challenges is to fully implement the collection of outpatient data.

### Perspectives

Ongoing National and European legislation is likely to further expand the potential of cancer registry and other health care data for research, by enabling record linkage between different data sources, *e.g.* registry and claims data. Nevertheless, the usability of the cancer registry data will largely depend on its quality, which is still due to be thoroughly assessed.

## Establishing cancer screening clinic at tertiary cancer care centre in Western India

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### Background

As per GLOBOCON, by 2020, the world will witness more than 19.3 million new cancer cases, and by 2040, this number will increase to more than 3 million. Apart from this, mortality in 2020 was 10 million, which will increase to 16.3 million in 2040. Today, more than 50% of cancer cases are diagnosed at an advanced stage. There is a strong need for identifying and filling gaps in the early detection of cancer.

### Methods

A no-cost walk-in cancer screening clinic was established at a leading tertiary cancer care centre in western India. The objective of this project was to test the efficiency of cancer screening services for asymptomatic beneficiaries and to establish a model for accessible and affordable cancer screening services that can be scaled and easily replicated in the rest of the world.

### Results

A total of 19,534 asymptomatic beneficiaries have visited the cancer screening OPD since October 2021. Oral examination was done for 10,234 beneficiaries; self-breast examination was taught to 6,533 females; 600 mammograms were done; and 991 cervical smears were examined. Out of all beneficiaries, 32 confirmed cancer cases were identified and put on treatment.

### Conclusion

Currently, we are on the verge of a cancer pandemic due to the rise in cancer cases at the global level. Prevention of cancer, early detection, and increasing screening for cancer are the only solutions for cancer control and a better prognosis for cancer patients. There is a strong need to shift from patient-centric solutions to community-centric care in oncology. Cancer screening clinics are low-cost, proven models for effective cancer screening and early detection activities. Such cancer screening clinics can be established at every primary health care point to scale cancer awareness, cancer screening, and early detection of cancer cases.

***Keywords:***
*Cancer screening, early detection, cancer screening clinic*

# Modulating vitamin C doses for colon cancer stem cell targeting – Apoptosis vs EMT mitigation

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## Background

The therapeutic failure and tumor relapse results from the existence of extremely resilient intratumoral subpopulation termed as the cancer stem cells (CSCs). The CSCs are known to be endowed with the abilities of self-renewal, proliferative potential, and drug resistance. Targeting of CSCs via novel approaches can limit the CSC survival and proliferation thereby reducing the hurdles associated with tumor relapse.

## Methods

The colorectal CSCs are sorted via FACS (Fluorescent activated cell sorting), based on the expression of CSC marker CD44. The cytotoxic effects of Vitamin C doses are evaluated on sorted CSC population. The cells were further assessed for mitochondrial dysfunction, DNA damage, cell cycle arrest and apoptotic induction. The low dose effects of Vitamin C is validated by nuclear localization study for beta catenin, western blotting and qRT-PCR.

## Results

Vitamin C treatment significantly reduced the CD44+ colon CSC population in a dose dependent manner. Furthermore, Vitamin C treatment of colorectal CSCs resulted in a diminution of the mitochondrial membrane potential leading to mitochondrial dysfunction. Interestingly, ascorbate induced DNA double stranded breaks and consequent histone phosphorylation ( -H2AX) in HT-29 colon CSCs. The resultant DNA damage facilitated the G2/M phase cell cycle arrest and apoptosis in the colorectal CSCs. Alternatively, the low dose Vitamin C arbitrated EMT reversal and conversion of CSCs to conventionally targetable differentiated counterpart.

## Discussion and Conclusions

Pharmacological doses of Vitamin C in millimolar doses exhibited significant cytotoxicity, cell cycle arrest, and DNA damage leading to apoptosis. Vitamin C high dose can be further explored as a CSC targeting strategy for the treatment of advanced colorectal cancer. Conversely, Vitamin C low dose induced cell proliferation and differentiation of CSCs and significant EMT mitigation.

## Modelling time to treatment initiation among women with breast cancer in Nairobi, Kenya

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### Background

Duration between diagnosis to the time of initiating treatment is known to affect patient's outcomes. The impact of delays on the patient's survival has not been studied conclusively. Previous studies have given contradicting findings. This study sought to calculate the survival probabilities of breast cancer patients and assess the impact of increased time to treatment initiation on the overall patient survival.

### Methods

We used data from the Nairobi Population-based Cancer Registry. The registry adopts active case finding method of data collection. Time to treatment initiation was estimated as the time from diagnosis to initiation of cancer treatment. Kaplan Meier was used to estimate the Survival probabilities, Log rank test to compare the survival among the categories and Cox regression to estimate the effect of the covariates on the overall survival.

### Results

A total of 2,449 breast cancer cases were considered in this analysis. Majority of the patients were aged 45-69 years, 1,304 (53.3%) and few aged below 30 years, 96 (3.9%). The mean (IQR) of the time to treatment initiation for different treatment modalities were; 18.1(IQR: 2-20.04), 37.9 (IQR: 16.75-42.93) and 26.3 (IQR: 5.29-23.86) weeks for Surgery, Radiotherapy and Chemotherapy respectively. Patients who received radiotherapy after 16 weeks (HR = 0.032, 95% CI = 0.006-0.166, $P < 0.05$) was associated with worse survival. Increasing time to initiation of chemotherapy (HR=1.279, 95% CI = 0.373-4.385, P = 0.695) and surgery (HR = 0.847, 95% CI = 0.223-3.221, P = 0.807) was not associated with worse survival of breast cancer patients. Age at diagnosis did not have impact on the survival among the patients.

### Discussion and Conclusion

Findings from this study support timely treatment of breast cancer more specifically for those scheduled for radiotherapy. Keen focus on systemic delays in accessing treatment will ultimately improve patient's survival outcomes. There is need to correlate these findings with data from the prospective cohort, with more complete information.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Breast cancer Time to treatment in Martinique: predictive factors and effect on survival

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### Background

Martinique is the second French region where medical under-density is the most important. This issue impacts times to treatment. The aim of this study were to describe Time to treatment for women with breast cancer in Martinique, to highlight factors influencing waiting times and to evaluate the impact of waiting times on patient's survival.

### Methods

Women from the population-based registry of Martinique, diagnosed with invasive breast cancer between January 1, 2013 and December 31, 2017 for whom the treatment was initiated by a surgery, have been included in this retrospective observational study. A cox model has been performed to find predictive factors for waiting times. A log rank test has been used to compare survival according to time to treatment.

### Results

A total of 713 patients have been included with a mean age of 58 years (± 13). The median time to treatment from diagnosis to surgery was 40 [25-60] days. Age at diagnosis has been shown to be a predictive factor of the variation of the waiting times. Patients under 40 years and [40-50[ years got the surgery sooner than patients over 75 years with respectively $HR = 1.70$ ($p = 0.016$), $HR = 1.63$ ($p < 0.001$). The survival analysis by times to treatment found a significant difference (log rank: $p < 0.01$) on survival time for patients with a time to treatment equal to 4 months and more.

### Discussion and Conclusion

Time to diagnosis and time to surgery stand out higher than recommendation. It is essential to pay attention to time to treatment because it influences on survival time.

Theme: **Clinical applications – treatment, recurrence, and other outcomes**

## Cancer resistance against therapeutics in African population: a comprehensive review

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### Objective

In 2020, there are over 1.1 million cases recorded in Africa with over 711, 500 deaths according to GLOBACAN. These statistics is quite shocking despite the availability of therapeutic and treatment options. The existence of a wide disparity in the rate for the global cancer care and control, as the rate of death case to the number of new cases is reducing rapidly amongst European and Americans, this study aims to examine the contributing to cancer resistance against therapeutics especially in the African population, and deducing a possible solution to reduce the health disparity amongst the African population.

### Methods

To achieve the objective, this study utilizes a comprehensive review approach. By integrating findings from existing literature and research papers, that highlights the importance of integrating preclinical resistance analyses and new chemical approaches to address therapeutic resistance. Additionally, insights from studies investigating the molecular determinants of acquired treatment resistance are considered. The research also draws parallels with the broader field of drug resistance in cancer, especially studies in the African population.

### Results

The study analysis reveals that cancer resistance against therapeutics remains a significant obstacle in achieving curative treatment outcomes for patients in the African population. Genetic evolution and non-genetic adaptive mechanisms contribute to the development of resistance. Moreover, socio-economic factors, limited access to healthcare, and environmental influences play critical roles in the resistance phenomenon. The study also indicates the importance of exploring new therapeutic strategies and approaches to combat resistance in this specific population.

### Conclusion

In conclusion, this study highlights the complex nature of cancer resistance against therapeutics in the African population. The findings underscore the need for a multidimensional approach that encompasses genetic, non-genetic, and socio-economic factors to address resistance effectively. Ultimately, this research aims to contribute to improved outcomes and tailored interventions for cancer patients in Africa.

## Trends in incidence and mortality of cervical cancer in a Northeastern Brazilian State

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Cervical cancer is the most common gynecologic cancer. While considered preventable and treatable, it ranks the fourth most commonly diagnosed cancer and the fourth leading cause of cancer-related deaths among women worldwide. Most new cases and deaths occur in low-income countries. Methods: This study utilized incidence (Aracaju Cancer Registry) and mortality (Mortality Information System) data for the state of Sergipe, Northestern Brazil, 1996-2017. We used the Joinpoint Software to calculate trends. Age-standardized incidence (ASIR) and mortality (ASMR) rates, and age-specific rates were used for analyses. The Program calculated Annual Percentage Change (APC), and Average Annual Percent Change (AAPC) to assess trends. The Monte Carlo Permutation method determined the statistical significance levels. Results: 4,214 incident cases showed ASIR decreasing from 33.7/100,000 in 1996 to 13.3/100,000 in 2017, with AAPC of -5.2 (CI: -6.1; -4.3); 1,358 deaths with ASMR decreasing from 1996 to 2003 with APC: 6.9, CI: 0.4; 13.7, then decreasing until 2017 (APC: -1.9, CI: -3.5; -0.2), to AAPC of 1.0, CI: -1.2; 3.2. Women aged 20-44, portrayed a decline in incidence between 1996 and 2009 (APC: -6.2, CI: -8.2; -4.1), and then stabilized thereafter (APC: 0.2, IC: -4.4; 5.1; ), to AAPC of -3.8 (CI: -5.8; -1.7). The mortality trend in this age group remained stable (AAPC: 0.3, CI: -1.4; 2.1). In women aged 45-64 and 65 and older, incidence and mortality trends decreased (AAPC: -6.1, CI: -7.2; -4.9, and AAPC: -4.6, CI: -6.1; -3.1, respectively). Additional increase in mortality was observed in women aged 65 and older (AAPC: 1.8, CI: 0.2; 3.3). Conclusion: Cervical cancer incidence declined across age groups over time. Despite an initial increase in mortality until 2003, it subsequently decreased. This decline in both incidence and mortality can be attributed to screening and treatment policies targeting precancerous lesions, likely preventing the progression to invasive cancer.

Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

## Epidemiological characteristics of multiple myeloma in Brazil: 20 years of hospital cancer registry

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### Background

Data on Multiple Myeloma (MM) in Latin America is limited, and the aging population in Brazil faces a significant risk of developing the disease.

### Methods

We analyzed publicly available data from the Cancer Hospital Registries of the INCA (National Cancer Institute) and FOSP (Oncocenter Foundation of São Paulo) platforms. The data included information such as sex, age at diagnosis, and year of diagnosis for individuals with MM. We divided the data into 5-year intervals from 2000 to 2019 and categorized it based on the region of diagnosis. Cases involving individuals under 20 years old were excluded. The statistical analysis was conducted by the Data Management Department of the AC Camargo Cancer Center, using the Chi-square test and pairwise comparisons.

### Results

Among the 29,401 valid records, males slightly outnumbered females (52.2%). The median age at diagnosis was 63 years for both sexes (ranging from 20 to 101 years), which is lower than what has been previously reported internationally. The population below 65 years of age accounted for 56.1% (n = 16,517) of the cases, indicating a significant number of potential candidates for bone marrow transplantation. Over the years, there has been a progressive increase in MM registrations, with the northern region contributing the least at 3.4% (n = 1,011). No significant differences in age at diagnosis were observed among the regions or within the five-year intervals, regardless of sex.

### Discussion

In light of these findings, it is crucial for Brazil and Latin America to prepare for the reallocation of both public and private resources to address the growing needs for multiple myeloma treatment in the coming years.

## Annual Percent Change (APC) of cancer incidence and mortality in Brunei Darussalam, 2011 to 2020

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### Background

This study presents the annual percent change (APC) of age-standardised incidence and mortality rates of common cancers in Brunei from 2011 to 2020.

### Methods

All cancer cases diagnosed among Brunei Darussalam citizens and permanent residents in the period 2011 to 2020 were included in the study. De-identified data were provided by the population-based cancer registry using CanReg5. The annual age-standardised incidence and mortality rates per 100,000 persons were standardised by the direct method using the World Health Organization (WHO) world standard population. Joinpoint regression analyses were used to study the incidence and mortality trends of cancer in Brunei Darussalam over the 10-years period.

### Results

There were a total of 6,495 new cancer cases diagnosed and 3,359 death cases recorded over the 10-years period. There was a significant increase in the incidence trend of corpus uteri (AAPC:13.3:13.3) and a significant decline in the incidence trend for cervical cancer (AAPC: − 4.5: − 4.5) from 2011 to 2020. There was a significant increase in the mortality trend of female breast cancer from 2011 to 2015 (APC:16.3:16.3), but the trend significantly declined from 2015 to 2020 (APC: − 12.5: − 12.5). We also found a significant decrease in mortality trends for stomach cancer (AAPC: − 4.7: − 4.7) from 2011 to 2020 for both genders combined.

### Discussion

The implementation of national cervical cancer screening and free HPV vaccination to all girls in 2012 have contributed to the decline in the incidence and mortality of cervical cancer. Brunei has reported significant smoking (20% of adults) and obesity rate (28% of adults) and ageing population.

### Conclusion

The burden of common cancers is expected to continue to grow with ageing population and high prevalence of cancer risk factors in the population. Effective public health interventions and control of modifiable risk factors will continue to be the essential approaches in reducing cancer burden.

## Adolescent and Young Adult Cancer Survival in Estonia

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### Background

Adolescent and young adults (AYAs) are recognized as a distinct population facing many challenges throughout the course of their disease, from symptom recognition, diagnosis and treatment to follow-up care. With increasing incidence and improved treatment options more and more AYAs survive. The aim of this study is to evaluate the survival of AYA cancer patients to inform the survivorship care of this growing unique population.

### Methods

To investigate the relative survival rates for AYAs, we selected patients aged 15 to 39 diagnosed with primary malignant cancer between 1990 to 2019 from the Estonian Cancer Registry. We used SEER AYA Site Recode to identify the first primary cancer site. Relative survival was estimated as the ratio of all-causes survival and the expected survival from comparable Estonian life tables of the same age, gender and year.

### Results

Among AYAs 7664 new cancer cases were diagnosed of which more than 60% were diagnosed in women. Main sites were carcinomas and melanomas and skin carcinomas. Nearly 40% of all cases diagnosed in women were carcinomas of the cervix and breast. Overall 5-year survival increased from 59% in the 1990s to 84% in the latest period of 2010-2019. Change in survival was substantial for leukemias and lung cancer, whereas for CNS, soft tissue sarcomas and bone cancers the change has been more subtle.

### Discussion and Conclusion

There are many possible explanations for cancer survival differences in the AYA age group, including issues such as treatment harmonisation, unawareness of early cancer symptoms, biological differences of the age group, insufficient participation in clinical trials. There is a critical need for research efforts to identify areas where cancer survival differs for AYAs. Estonian National Cancer Control Plan of 2021-2030 prioritises all of the aforementioned topics to offer pathways to reduce the disparities in the future.

## Incidence of cancer among Nordic police officers

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### Background

Police work may expose officers to various circumstances that have potential for increasing their risk of cancer, including traffic-related air pollution, night shift work and radiation from radars. In this study, we examined the incidence of cancer among Nordic male and female police officers.

### Methods

We utilize data from the Nordic Occupational Cancer (NOCCA) project, which linked census data on occupations from Finland, Iceland, Norway and Sweden to national cancer registries for the period 1961 to 2005. We report standardized incidence ratios (SIR) and 95% confidence intervals (CI) of selected cancers for each country by sex, age and calendar period. The cohort included 38,523 male and 1,998 female police officers.

### Results

As compared with the general population, male police officers had a 7% (95% CI: 4-9%) excess cancer risk, with elevated SIRs for various cancer sites, including prostate (SIR 1.19, 1.14-1.25), breast (SIR 1.77, 1.05-2.80), colon (SIR 1.22, 1.12-1.32) and skin melanoma (SIR 1.44, 1.28-1.60). Conversely, male police officers had a lower risk of lung cancer than the general population (SIR 0.72, 0.66-0.77). In female police officers, the SIR for cancer overall was 1.15 (0.98-1.34), and there was a slight excess of cancers of the breast (SIR 1.25, 0.97-1.59) and colon (SIR 1.21, 0.55-2.30).

### Discussion and Conclusion

In conclusion, cancer incidence among the police officers was slightly higher than in the general population. Notably, SIRs were elevated for cancer sites potentially related to night shift work, namely colon, breast and prostate cancer.

## Global patterns of leukemia incidence by subtype in 185 countries

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### Background

Leukemia was the second most common hematological malignancy after non-Hodgkin lymphoma, with more than 470,000 new cases worldwide in 2020. The incidence varied across countries, with higher incidence rates in high/very high human development index (HDI) countries relative to low/medium HDI countries. However, updated global estimates by subtype are not currently available.

### Methods

To estimate country-specific incidence of the different leukemia subtypes, we calculated country-specific age- and sex-specific subtype proportions using data from the Cancer in Five Continents (CI5) volume XI database and applied these to the GLOBOCAN 2020 estimates of leukemia cases in 185 countries. Unspecified leukemia cases were reallocated to subtypes: acute lymphoid leukemia (ALL), chronic lymphoid leukemia (CLL), acute myeloid leukemia (AML), chronic myeloid leukemia (CML), and other lymphoid/myeloid leukemias. For countries where we could not produce national estimates, we calculated the region-specific averages. Age-standardized rates (ASRs) per 100,000 in children and adults were calculated.

### Results

The most common type of leukemia among children (0-19 years) was ALL (~65% of 470,000 cases worldwide, ASR = 2.1), followed by AML (~25%, ASR = 0.7). In children, ALL proportions varied across regions from ~70% (Eastern Asia) to ~80% (Caribbean and Central America) among males, and from ~65% (Southern Asia) to ~75% (Eastern Europe) among females. Exceptions were Eastern Asia and Northern Africa (females only), where the proportion of ALL was only ~50%. In adults (20+ years), the most common leukemia subtype was AML (~40%, ASR = 2.9), followed by CLL (~25%, ASR = 1.7). For both sexes, the proportion of AML was higher in Asia compared to Europe, Oceania, and Northern America. The opposite was observed for CLL.

### Discussion and Conclusion

We observed clear regional patterns of leukemia subtypes. Further research into underlying causes is needed to support cancer control strategies for prevention.

## Epidemiology of renal cell carcinoma in Germany

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Renal cell carcinoma (RCC) is the most common form of primary malignant neoplasms of the kidney and accounts for 3% of all cancers. We provide an overview of the current epidemiological situation of RCC by using data from the German Centre for Cancer Registry Data.

RCC diagnosed between 2009 and 2019 in patients 15 years of age and older were included. Age-standardized incidence (ASR) and relative 5-year-survival (RS) was calculated for stage, grade and the morphological subtypes clear cell (ccRCC), papillary (pRCC), chromophobe (chRCC), collecting duct (cdRCC) and sarcomatoid (sRCC). RS was calculated using period analysis for the 2015-2019 calendar period.

In 2019 a total of 12,409 RCC (8350 men, 4059 women) accounted for 86% of kidney neoplasms. The ASR remained constant over time and was 17.7/100.000 for men and 7.3/100.000 for woman.

In both sexes RCC were mostly detected in prognostically favorable stages (UICC I and II: 45%, UICC III: 10%, UICC IV: 10%, UICC unknown: 35%) and grading (G 1 and 2: 67%, G3/4: 15%, grade unknown: 19%). Clear cell RCC was the most common morphological subtype (men: ccRCC 55%, pRCC 17%, chRCC 6%, cdRCC 0.3%, sRCC 0.8%, RCC other 21%; woman: ccRCC 60%, pRCC 9%, chRCC 6%, cdRCC 0.2%, sRCC 0.8%, RCC other 24%). Overall RS was 81% in men and 83% in woman. Chromophobe RCC showed the highest RS with 96% (ccRCC: 84%, pRCC: 88%, cdRCC: 21%, sRCC: 27%). RS by stage was 97% for UICC I (89 % UICC II, 75% UICC III, 23% UICC IV, 85% UICC unknown) and by grade 95% for G1 (G2: 90%, G3/G4: 57%, Grade unknown: 64%).

RCC were mainly detected at early stages and low grading, resulting in a good overall prognosis. Moreover the most common morphologic subtypes clear cell, papillary and chromophobe RCC showed RS up to 90%.

## Incidence and relative survival of patients with merkel cell carcinoma in North Rhine-Westphalia, Germany, 2008-2019

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### Background

Due to the rarity of Merkel cell carcinoma (MCC), only few population-representative studies of incidence and survival have been performed. To provide most recent population-based incidence rates and survival estimates of MCC by sex, age, and anatomic location and to explore conditional survival of MCC patients who survived the first, second, third, and fourth year after diagnosis of MCC.

### Methods

We analyzed data from the population-based cancer registry of North Rhine-Westphalia (NRW, 18 million inhabitants), Germany, of the years 2008-2019. We included newly diagnosed MCC of all disease stages and calculated crude and age-standardized (old European Standard population) incidence rates and unconditional and conditional relative survival (period approach).

### Results

We analyzed 1825 patients with newly diagnosed MCC. The age-standardized incidence of MCC was 5.0 and 3.9 per million person-years for men and women, respectively. The 5-year relative survival was 59% in men (95%CI 52-66%) and 69% in women (95%CI 62-75%). The estimated 1-year relative probability of survival was 88% (95%CI 83-92%) and 93% (95%CI 90-97%) for men and women, respectively. This large within-year decrease in survival probability was observed only in the first year after diagnosis of MCC and the within-year decrease became considerably smaller when survival was calculated conditional on having survived the first, second, third, and fourth years.

### Discussion and Conclusion

The probability of survival after MCC diagnosis is most reduced in the first year after diagnosis. Each additional year after diagnosis of MCC that is survived improves the probability of survival. Future high-resolution studies that allow further biologically subtyping of MCC and contain detailed staging information are needed to provide further insight into the differential prognosis of MCC in men and women.

## The epidemiology of colorectal neuroendocrine tumors in Germany – A population-based study

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The incidence of colorectal neuroendocrine neoplasms (NENs) has increased in recent years. We aimed to analyze incidence-trends and relative survival (RS) of colorectal NEN in Germany by using data from the German Centre for Cancer Registry Data.

Malignant NEN (excluding appendix) diagnosed between 2009 and 2019 were included. The analysis was stratified by site (proximal colon cancer [PCC], distal colon cancer [DCC] and rectal cancer [RC]) and tumour size (T-Stage). We calculated age-standardized incidence rates (ASR), the average annual percentage change (AAPC) and RS for the calendar period 2015-2019 applying the period approach.

A total of 10,344 NEN (54% men) were included. The ASR for men and women was 1.15 and 1.01 in 2009 and 2.20 and 1.90 in 2019, the AAPC was 6.9% for men and 6.1% for women. Five-year RS was 63% for men and 68% for women.

Stratified by site the ASR for men and women for RC was 1.44 and 1.03 (AAPC 8.3% and 7.1%), for DCC 0.46 and 0.60 (AAPC 7.2% and 8.2%) and for PCC 0.19 and 0.18 (AAPC 4.4% and 4.4%), respectively, in 2019. Five-year RS for men and women was for RC 72% and 82%, for PCC 48% and 52% and for DCC 51% and 46%.

Information on tumor size is missing for about 40 %. The highest ASR in 2019 was for T stage 1 with 0.71 for men and 0.67 for women. The AAPC for men for T1 to T4 was 15.8%, 6.6%, 2.7% and 4.8%, respectively. The AAPC for women for T1 to T4 were 18.9%, 3.7%, 3.4% and 3.9%, respectively.

We observed most marked increases in incidence of NEN in the rectum and distal colon and for small tumors (T1). This might be explained by increased use of endoscopy and improvements in classification and tumor documentation.

## Trends in age specific incidence rates of invasive cervical cancer in Germany

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### Introduction

Temporary trends in cervical cancer incidence have recently shown an increase in rates in younger women in Finland and Norway. In Germany cervical cancer screening was implemented in 1971 and organized screening in 2020. However, recent trend analyses of incidence rates are rare and reports of other countries give cause of concern. Therefore, this study investigates temporary trends of age specific incidence rates of cervical cancer in Germany for the last decade.

### Methods

Incidence rates for invasive cervical cancer (ICD-10 C53) from 2009 to 2019 in Germany are based on estimates by the Center for Cancer Registry Data on pooled data from epidemiologic cancer registries in Germany with stable data quality. Descriptive analysis for age-standardized incidence rates (European Standard Population, 1976) and age specific incidence rates (15-29, 30-39, 40-59, 60-69, 70+ years) were performed. Percent reductions were estimated using incidence rates pooled for the years 2009/2010 and 2018/2019. Trend analyses are currently extended by using the joinpoint regression model.

### Results

Age standardized incidence rates decreased in Germany during the period 2009/2010 until 2018/2019 from 10.1/100.000 to 9.0/100.000. In age groups 15-29, 40-59, and 70+ years age specific incidence rates decreased (-24%, -15%, -21%). In age groups 30-39 years and 60-69 years no reduction of age specific incidence rates (+1.6%, -1%) during the last 10 years was observed.

### Conclusion

Age-specific trends for cervical cancer are heterogeneous and do not show any clear trends. Potential cohort effects associated with life style factors or different participation in the screening might play a role. Evaluation of cervical cancer screening coverage rates may help to enlighten variances in age specific incidence rates and guide further health protective measures.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Retrospective Evaluation of Childhood Retinoblastoma in Hungary from 1990 to 2019: Long-Term Outcomes

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#### Background

Retinoblastoma, a rare ocular tumour typically detected in childhood, exhibits unique subgroups of bilateral multifocal occurrences, hinting at genetic factors. The increased survival rates due to multimodal treatment enhancements necessitate focusing on late treatment effects.

#### Methods

We studied all retinoblastoma cases diagnosed in Hungary between 1990 and 2019, sourced from the population-based Hungarian Childhood Cancer Registry, analyzing disease patterns, treatment specifics, and patient outcomes. The comparison of varied treatment modalities and survival statistics was facilitated using the Kaplan-Meier method.

#### Results

Among 146 retinoblastoma patients, 51 (35%) had bilateral occurrences with a third being familial. The median age of diagnosis was 6 months for bilateral patients and two years for unilateral patients, with familial bilateral cases often diagnosed earlier due to careful surveillance. Recurrences were higher in bilateral (50%) versus unilateral cases (12%). Most unilateral cases (80%) underwent enucleation, while chemotherapy and radiotherapy were more prevalent in bilateral cases (41% vs. 86% and 16% vs. 57%, respectively). The 10-year survival rates for the three successive decades were 92%, 93%, and 97%, with no substantial survival difference observed between the unilateral and bilateral groups. Secondary malignancies were more common in bilateral cases. Disease progression was the leading cause of loss in the first 5 years after diagnosis, while secondary malignancies dominated after 5 years.

In conclusion, childhood cancer registries, when augmented with clinical data, can help observe shifts in treatment modalities and outcomes. Retinoblastoma generally has a high cure rate; however, bilateral cases pose a higher risk for late complications and secondary malignancies. Enhancing cooperation with clinicians can potentially optimize long-term risk assessment for survivors and aid in treatment decision-making.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Prevalence of tobacco use and oral cancer among Malayali tribes of South India

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**Background**
'Tribals' refers to a group of people who live in isolation in natural, unpolluted surroundings far away from civilization, retaining their traditional values. Globally, there are roughly 476 million indigenous peoples in 90 nations worldwide, representing a wide range of cultures, dialects, and spirits. India has the world's second-highest concentration of tribal people after African countries. Spread across 705 tribes accounting for 8.6% of the country's population, over 104 million tribal people live; making India home to numerous tribes with diverse origins, customs, and societal practices. The aim of the study was to assess the prevalence of tobacco use and oral cancer among Malayali tribes of South India.

**Methods**
Following a study population of 660 in 2010, a larger study with 2185 people was conducted in 2018. The study comprised residents from the 14 villages of the Yelagiri highlands who were willing to participate. Data was gathered using a cross-sectional survey, clinical examination, and a pre-tested questionnaire that contained demographic information and tobacco habits.

**Results**
Results revealed that 47% of the 2185 study participants had no formal education. Among those who smoked, 29% smoked beedi, 31% smoked cigarettes, 39% chewed raw tobacco, 33% chewed Hans, and 12% used both smoking and smokeless tobacco. Oral mucosal lesions are common. Tobacco use and a lack of understanding about the harmful consequences of the items used were responsible for 47% and 7% of the oral cancers in the study population, respectively.

**Conclusion**
According to the findings of this study, the Malayali tribes were characterised by a lack of understanding about oral health, deeply ingrained dental beliefs, a high rate of tobacco use, and restricted access to health services. The 8-year follow-up and mass awareness programme have undoubtedly contributed to a decrease in tobacco usage in this community.

## A population-based estimation of breast cancer recurrence in North-Estern Italy

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### Background

Cancer registries (CR) do not routinely collect information on cancer recurrence. Hence, the ENCR Working Group is currently drafting recommendations to CR on recording of recurrences, disease progression and transformations. The aim of this study was to identify breast cancer (BC) recurrences during a 10-year follow-up.

### Methods

We conducted a retrospective analysis by linking data extracted from the Friuli Venezia Giulia population based-CR (North-Eastern Italy) with several administrative, individual-record, regional databases.

5420 non-metastatic BC patients, diagnosed during 2004-2010, were included and followed-up until 31/12/2017. According to the expertise of epidemiologists, an oncologist and a surgeon, hospital discharge and outpatient medical claims were selected to identify a second BC event (*i.e.*, local/distant recurrence). Incidence of recurrence was calculated using individual person-time at risk (adjusted for competing events), starting at 24 months from diagnosis for HER2-positive BC, otherwise at 18 months. This time-window was the maximum length of initial treatment according the therapeutic guidelines.

### Results

After 18/24 months since BC diagnosis (median follow-up 10.5 years), 1406 cases (26.7%) had an indicator of recurrence , *i.e.*, 14.7% received chemotherapy, 8.4% radiotherapy, 8.2% additional breast surgery and 5.5% were hospitalized for a secondary malignant neoplasm. The overall recurrence rate was 31 per 1000 person-years, higher for women aged < 50 years (41), diagnosed at stage III (72) or with triple negative subtype (47).

Ten-year cumulative recurrence rate after a BC diagnosis was 26.0%. Ten years after BC diagnosis, the majority of women was alive (84%) and relapse-free (68%).

### Discussion and Conclusion

This study provides a method for estimating the frequency of recurrence after a BC diagnosis that is simpler, in terms of resources, than manual review of medical records. Our results are aligned with international literature and yield real-world information on long-term survival and recurrence in women with BC by major prognostic factors.

## Incidence, trends and spatial distribution of cutaneous melanoma in the Marche Region 2010-2018

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### Background

Malignant skin melanoma (CMM) is an aggressive form of skin cancer increasing in many areas of the world. In Italy it represents, both in males and in females, about 2% of all malignant tumors, given underestimated in consideration of the number of small melanomas removed in surgery and not subjected to histopathological analysis. The incidence of cutaneous melanoma has shown, in recent years, a significant increase with a decreasing trend from north to south; mortality is broadly stable. This study examines the incidence and spatial distribution on the territory of melanomas detected by the Cancer Registry of the Marche Region in the period 2010-2018

### Methods

Incidence trends were analyzed on a total of 3,783 (1,944 M, 1,839 F) invasive skin melanomas reported in 2010-2018 throughout the Marche Region. The cases were analyzed by age, sex, trends and geographical distribution throughout the period and for each year. The data was stored and processed using the CrTool management software and Excel software; spatial analysis was studied using the Open Source Geographic Information System (QGIS).

Only the first melanoma diagnosed, and all relapses excluded as established by IARC and ENCR rules.

### Results

In the Marche region, in the last decade, there has been a considerable increase in the incidence of melanoma in all age groups in both sexes.

In males, most new diagnoses of malignant melanoma in the period 2010-2018 were observed in the 70-79 age grou, in females in the 60-69 range.

### Discussion and Conclusion

From the analysis of the spatial disposition of the cases emerged from the georeferencing study it seems to be present a greater concentration of the cases in a coastal strip comprised between the municipality of Ancona and the municipality of Senigallia. This fact, confirmed by the analysis of standardized rates, seems to merit further study.

## Trend of pediatric cancer in the provinces of CT-ME-EN (2003-2019)

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### Background

Pediatric cancers are defined as malignant tumors that occur between the ages of 0-14 years (Childhood cancers) and 15-19 years (Juvenile cancers). They are tumors that are heterogeneous in location and biologically very different from cancer in adults. They represent 1.4% of cancers worldwide although this percentage varies from 0.5% in Europe to 4.8% in Africa, mainly due to differences in age and life expectancy. From the second half of the 1990s, an increase in their incidence was recorded in Italy; more recently this trend seems to have stopped and the mortality appears to be in sharp decline, mainly due to the increase in 5-year survival. The purpose of this work is to describe the trend of pediatric cancers in the provinces of the RTI CT-ME-EN in the period 2003-2019.

### Methods

We selected the cases of the first five incident malignant tumors in the 0-14 and 15-19 age groups from the CT-ME-EN Integrated Cancer Registry database (period 2003-2019); the two classes were analyzed both separately and as a whole (ages 0-19 years). Non-malignant tumors were excluded since the collection procedures and completeness for this type of lesion are still not homogeneous among the different registries. The international classification for childhood cancers was used (ICCC3). The series of incident cancers and annual mortality by age groups, the annual incidence time trend (TSE), and the annual mortality trend (TSEM) were calculated.

### Results

The data and the distribution of the cases detected show that the metropolitan area and the province of Catania have the highest incidence of tumors.

### Discussion and Conclusion

These results probably express the importance of environmental factors and exposure of the young population of a large city.

## Survival and health care burden of patients with retinoblastoma in Europe from 2000 to 2013

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### Background

Retinoblastoma (Rb) is a very rare cancer of infancy and childhood. Second primary tumours (other than Rb) occur in Rb patients due to RB1 tumour suppressor gene mutation and possibly due to radiotherapy.

### Methods

We conducted a Europe-wide study on children with Rb diagnosed between 2000 and 2013, using population-based data from European cancer registries adhering to the EUROCARE project. We estimated incidence and 5-year relative survival (RS), and the Excess Risk (ER) of second tumours per 10,000 children with follow-up to the end of 2014.

### Results

We included 3,419 subjects from 81 registries. The overall EU annual incidence rate (per 100,000; 95%CI) was 0.40 (0.41 to 0.43, 3,481 cases). Figures were similar for Northern (0.37, 0.31–0.44, 135 cases), Central (0.45, 0.43–0.47, 1,688 cases), Southern Europe (0.44, 0.40–0.48, 490 cases) and UK and Ireland (0.45, 0.42–0.49, 685 cases), whereas they were lower for eastern Europe (0.30, 0.27–0.33, 212 cases). No time trend of incidence was observed in any area.

The overall EU 5-year RS was 97.8% (95.5% - 98.9%; 3180 cases). Survival was lower for Eastern Europe (93.4%, 90.4% - 95.4%, 419 cases) with respect to Northern (98.2%, 92.9% - 99.5%, 1313 cases), Central (98.5%, 97.7% - 99.0%; 1542 cases) and Southern Europe (96.7%, 94.6% - 98.0%; 484 cases) or UK and Ireland (98.6%, 97.2% - 99.3%; 646 cases).

Twenty-nine second primary tumours were recorded during follow-up, with ER = 12.6 per 10,000 and cases occurring at mean ages between 2.4 and 8.9 years across different sites.

### Discussion and Conclusion

We have provided Europe-wide estimates of Rb incidence and survival, which will be useful for monitoring the quality of registration as well as outcomes in times of fast progressing therapies for this rare tumour in children.

## Lung cancer mortality and soil arsenic and cadmium: an ecological study in 26 EU countries

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### Background

Environmental risk factors, such as exposure to air pollution, are causally linked with millions of cancer deaths worldwide. However, potential health impacts of exposure to carcinogens in soil are less defined. In this ecological study, we evaluated at a regional scale potential associations between lung cancer mortality and the soil content of two carcinogens: arsenic and cadmium.

### Methods

Data on deaths from lung cancer were from EUROSTAT. Soil content of arsenic and cadmium were from the LUCAS 2009 survey. Analysis covered 26 EU countries and 21,035 sampling points. Three socioeconomic indicators and seven lung cancer risk factors were included. Data were linked at the NUTS2 level ($n = 219$) and analysed by negative binomial regression.

### Results

After adjustment for significant predictors, the population resident in the regions within the highest quantile of arsenic concentration in soil, compared to the rest of the dataset, had a 6.2% higher lung cancer mortality risk in females (95%CI 2.4%-10.1%) and 3.7 % higher risk in males (0.2%-7.4%). Analogously for soil cadmium, regions within the highest quantile showed a 6.2% increase in lung cancer mortality risk in females (1.9%-10.7%) and a 7.5% increase in males (3.3%-11.7%) in males. When data were stratified by land cover, significant ($p > 0.05$) positive associations in males were only shown for cadmium sampled from agricultural land (cropland, grassland) but not from the non-agricultural land.

### Discussion and Conclusion

Higher lung cancer mortality risk was reported in regions with high concentration of arsenic or cadmium in soil, after adjustment for lung cancer risk factors. Due to the ecological design, this study cannot prove causality but is in agreement with other reports linking exposure to arsenic or cadmium and lung cancer. This warrants future investigations at a finer geographical scale, focused on regions with high soil levels of arsenic and cadmium identified in this study.

## Survival of adolescent and young adult cancer patients in Europe: updates from EUROCARE-6

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### Background

To update survival of adolescent and young adult (AYA, 15-39 years) cancer patients in Europe and describe differences in survival between countries and over time.

### Methods

We used the EUROCARE-6 data (108 cancer registries; 29 European countries). We analysed 700,000 AYAs with cancer diagnosed in 2000-2013 (follow-up at 2014). AYA cancers were defined according to the new classification proposed by Barr in 2020. We focused the analysis on the 16 most commonly diagnosed tumours in AYAs. We analysed 5-year relative survival (RS) in Europe, differences in 5-year RS by country (2010-2014) and over time (2004-06 vs. 2010-14) using period analysis. We used funnel plots to identify relevant survival differences between countries.

### Results

The 5-year RS for AYA tumours was 84% overall, and exceeded 80% for many of the 16 cancers analysed, except acute lymphoblastic leukaemia (61%), acute myeloid leukaemia (59%), central nervous system tumours (62%), bone sarcoma (70%), soft tissue sarcoma (74%) and colon cancer (65%). Bone sarcoma includes osteosarcoma, chondrosarcoma, and Ewing sarcoma, with 5-year RS of 65%, 85% and 52%, respectively. We found differences in survival between countries for all of the 16 selected cancers except ovarian and thyroid cancer. The funnel plots confirmed that lowest survival was mainly observed in Eastern and Southern European countries for most of the 16 cancers. Time trend analysis is in progress.

### Discussion-Conclusion

This is the first time that survival for 16 AYA cancers has been reported across 29 European countries. We showed differences in survival between countries most likely due to differences in stage at diagnosis (*e.g.* uterine cervix), access to treatment/expertise (*e.g.* sarcomas), misdiagnosis (*e.g.* central nervous system). Our data confirm that cancer registry data are important to monitor and support ongoing efforts (ESMO-SIOPE AYA WG, Joint Action on Network of Expertise) to reduce survival differences between countries.

## Long term cancer survival in Europe: what is the gap between 5- and 10-year estimates?

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### Background

Survival statistics at 5 years after diagnosis are a recognised standard in population studies to assess and compare cancer outcomes. However, increasing chances of cure or chronicization of certain cancers make it important to know long-term survival. This study aims to investigate geographical and age differences in 10-year survival in Europe for 40 major solid tumours in adults (15+ years).

### Methods

Relying on the EUROCARE-6 database, we analysed data from 27 countries (21 with national registration coverage). Age-standardized relative survival (RS) estimates (5- and 10-year) and 10-year RS conditional on surviving 5 years (10/5y) were calculated using the period approach with a follow-up period 2010-2014. European estimates were weighted using countries populations.

### Results

Ten-year RS ranged from 93% for testis cancer to less than 10% for mesothelioma, pancreas and lung small cell carcinoma. Overall 10/5y conditional RS was 90%, ranging from 60% (mesothelioma) to 100% (testicular cancer).

For skin melanoma, breast and colorectal cancers, 10/5y conditional RS was 90-96% with scarce differences by age. For cancers of prostate, urinary bladder, kidney and cervix uteri, 10/5y conditional RS was also high (90-95% overall) but decreased significantly with age. Lung and pancreatic cancers showed a lower 10/5y conditional RS (73% and 80%) decreasing sharply by age.

Between country heterogeneity in 10-y RS was highest for breast (IQR: 5.3%), colon-rectum (6.2), stomach (7.1), cervix uteri (7.2), prostate (7.3), skin melanoma (8.7) and kidney (10).

### Discussion and Conclusion

The extent of survival decrease from 5 to 10 years after diagnosis varies according to tumour type, country and age. The excess risk of death attenuates from 5 to 10 years after diagnosis but does not disappear for many cancers and becomes negligible for testicular, thyroid and skin melanoma cancers. These results are consistent with indicators on cured patients estimated in other studies.

## Principal component analysis investigation of the association between cancer incidence, lifestyle, and infections

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### Background

Inoue reported that in Japan, 53.3% of cancer cases in men and 27.8% of cancer cases in women are attributed to lifestyle factors and infections. We investigated the association between cancer incidence, lifestyle, and hepatitis C virus (HCV) infection in each prefecture of Japan.

### Methods

Age-adjusted incidence rates of stomach, colon, liver, lung, female breast, uterus, and prostate cancer in 2017 were used as cancer incidence; salt intake, body mass index (BMI), number of steps, smoking rate, and alcohol consumption rate in 2012 were used as lifestyle factors; and HCV infection rate in 2006 was used as HCV infection. Principal component analysis was used to evaluate the relationships between cancer incidence, lifestyle factors, and HCV infection.

### Results

The first principal component (PC1) represented ‘lifestyle’ by using the positive direction of number of steps and the negative direction of smoking rate, alcohol consumption rate, BMI, and salt intake; it also included HCV infection rate in the positive direction. The second principal component (PC2) represented ‘cancer incidence’ by using a positive direction for cancers other than prostate cancer in men and cancers other than stomach cancer in women. The results suggested that smoking rate is associated with colorectal and stomach cancer in men, BMI is associated with colorectal cancer in women, smoking and alcohol consumption rates are associated with breast cancer in women, and HCV infection rate is associated with liver and lung cancer in men and women. Prefectures with high incidence rates were plotted in the positive direction of PC2. Eastern Japan plotted in the negative direction of PC1 had a higher prevalence of unfavorable lifestyle.

### Discussion and Conclusion

We visualized the associations between cancer incidence, lifestyle, and HCV infection by principal component analysis. The analysis identified cancers that showed associations with lifestyle and HCV infection and revealed regional differences.

## Urbanicity affects the associations between socioeconomic status and cancer incidence and mortality

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### Background

Evaluation of regional socioeconomic status (SES) associated with cancer in Asian countries is limited. Using 2016-18 nation-level cancer incidence and mortality data in Japan, we examined this association, focusing on its consistency across urbanicity, the degree to which a given geographical area is urban.

### Methods

We estimated the normalized areal deprivation index (normADI) (as an indicator of area-level SES) and Empirical Bayes standardized incidence and mortality ratio. With 20,973,045 incident cases and 1,163,143 cancer deaths, we examined heterogeneity in the impact of normADI on cancer by urbanicity categorized into the three groups of urban, suburban, and rural.

### Findings

We observed a highly significant positive association of normADI with mortality but no clear association with incidence. The impact of normADI on mortality was stronger in urban than suburban and rural areas. For males, the regression coefficients were significantly higher in urban than suburban and rural areas [urban, $\beta = 0{\cdot}167$; suburban, $\beta = 0{\cdot}047$ (HetP (p value for test of heterogeneity compared with urban area) $= 6{\cdot}74 \times 10\text{-}11$); rural, $\beta = 0{\cdot}074$ (HetP $= 2{\cdot}35 \times 10\text{-}7$)]. The same was true for females. Such heterogeneous impact was not clear regarding incidence.

### Interpretation

The impact of areal SES on cancer mortality is heterogenous by urbanicity. The development of cancer prevention policies should likely take account of the combined effects of urbanicity and areal SES in secondary and tertiary cancer prevention.

## Monitoring regional cancer incidence and mortality preceding and following Fukushima Daiichi nuclear plant accident

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### Background

To elucidate the health effects of the nuclear accident caused by the 2011 Great East Japan Earthquake, we examined trends in cancer incidence and mortality rates across Fukushima Prefecture and its regions.

### Methods

A retrospective trend analysis on the National Cancer Registry (NCR) was performed to study incidence rates, and the Vital Statistics was used to examine mortality rates. We focused on all-site cancer and eleven common types, stratified by gender and age. Age-standardized incidence (ASIR) and mortality rates (ASMR) were calculated and analyzed using Joinpoint regression, conducted across Fukushima and its four regions (Evacuation area, Hama-dori, Naka-dori, and Aizu).

### Results

Overall, ASIRs for all-site, colorectal, prostate, and thyroid cancers increased, while stomach and liver cancers decreased in males across Fukushima. In females, ASIRs for all-site, colorectal, lung, pancreas, breast, thyroid, and leukemia cancers increased, while stomach and liver cancers decreased. For all-site cancer, Aizu exhibited the highest ASIR, with Evacuation area the lowest. In Evacuation area, ASIR for all-site cancer in males was increased from 2008 to 2012 and decreased thereafter, the decreasing trend continued even after the cancer registration system transitioned to the NCR in 2016. In the other three regions, an ongoing upward trend was observed in both genders preceding and following the accident. Regarding mortality trends, a consistent decrease was observed in ASMRs for all-site, stomach, lung, and liver cancers for males across Fukushima. While an increase was observed for cervical cancer, with a decrease in ASMRs for all-site, stomach, and liver cancers for females.
No potential regional disparities were detected in mortality.

### Discussion and Conclusion

In Fukushima, a consistent increase in ASIR of all-site cancer was observed in both genders. Dual residency of evacuees, their registered and actual addresses, potentially explaining the reduced ASIR in the Evacuation area. This issue is currently under investigation.

## Factors associated with cancer screening uptake in Japan using The Comprehensive Survey of Living Conditions

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### Background

The health checkup system in Japan does not have a unified program for the entire population. Therefore, the health checkup opportunity are diverse, including municipalities, workplace/Health Insurance Association (HIA), Comprehensive Health Checkup System (Ningen Dock), and school/others. Cancer screening uptake rate is calculated using questions on cancer screening uptake during the past year from Comprehensive survey of living conditions (CSLC), one of the core statistics. In this study, we examined factors influencing cancer screening uptake by health checkup opportunity.

### Methods

Data from the 2004 and 2016 CSLC were included. The number of subjects analyzed was 85,866 in 2004 and 78,669 in 2016. We analyzed items related to cancer screening uptake among non-attendants and attendants to health checkups classified into four opportunity (municipalities, workplace/HIA, Ningen Dock, and school/others).

### Results

From 2004 to 2016, the proportion of persons aged 60 years or older increased in both non-attendants and all attendant groups.

In 2016, the percentage of cancer screening attendants was about 50% for workplace/HIA, about 30% for municipalities, and about 10% for Ningen Dock.

Comparing the age-adjusted cancer screening uptake rates in 2004 and 2016, workplace/HIA had the highest increase. However, the highest age-adjusted screening uptake rate in each year was in Ningen Dock.

Ningen Dock was also characterized by higher total income, household expenditure, current level of savings, and lifestyle expenses.

### Discussion and Conclusion

We found that different health check-up opportunity had different impact on the cancer screening uptake. Future analyses should take into account health checkup opportunity when analyzing cancer screening uptake.

## Summary 10 years after the nuclear power plant accident: Long-term trends in cancer in Fukushima

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### Background

A long-term trend of incidence and mortality of cancers around Fukushima before and after the earthquake-induced nuclear plant accident in 2011 to summarize the effect.

### Methods

We calculated the age standardized incidence and mortality rate and annual percentage of change by joinpoint analysis in Fukushima, Iwate, Miyagi, 7 neighboring and 37 other prefectures, by 25 primary sites by sex, and by age-group using population-based cancer registry data and vital statistics between 2008 and 2019. In view of the successive quality improvement of data, we confirmed indicators in association with the trend.

### Results

In Fukushima, in males, continuously increased in all sites, oral cavity/pharynx, colon, prostate, kidney, brain, thyroid, malignant lymphoma and multiple myeloma, and decreased in stomach, liver and larynx even before the accident. In females, there was a continuous increase in all sites, oral cavity/pharynx, colon, pancreas, lung, breast, corpus uteri, ovary, kidney and thyroid, malignant lymphoma and leukemia, and a decrease in stomach, liver, and gallbladder. There were no joinpoints during the observation period. In seven neighboring prefectures and 37 other prefectures, joinpoints were observed in 2010 (5 and 17 sites for males, respectively, and 8 and 18 sites for females, respectively), as well as many more in 2011 and 2016.

### Discussion

The extended observation period highlights two joinpoints that can be reasonably explained: 2010 and 2011 (when the improvement in completeness of data settled down) and 2016 (when the legalization of cancer registries led to an overestimation of incidence). The observed joinpoints are in the direction of a calming of the increasing trend due to improved quality, and do not indicate an increase in the risk of cancer incidence after the earthquake. The continuous declines in stomach and liver are consistent with the overall national trend, along with a decrease in H. pylori and HCV carriers.

# Evaluating the impact of the Chornobyl disaster on thyroid cancer incidence in Lithuania (1978-2016)

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## Background

The worldwide increase in thyroid cancer (TC) incidence has been closely monitoring since the 1990s. The rapid rise in incidence trends is often attributed to overdiagnosis of asymptomatic TC. Lithuania, a country affected by the Chornobyl disaster, experienced significant fallout, resulting in equivalent thyroid doses as high as 160 mSv for infants and 20 mSv for adults. The study aimed to evaluate TC trends in the radiation-affected population following the Chornobyl NPP disaster.

## Methods

TC cases diagnosed from 1978 to 2016 were extracted from Lithuanian Cancer Registry database. Patients were categorized into age groups (0-29, 30-59, 60+) and by sex. All TC cases were classified according to histology type. Trends were analyzed using the Joinpoint software, and the annual percent change (APC) was calculated.

## Results

A total of 7,679 TC cases were analyzed. During out study period, the APC increased by 4.6% for men and 6.0% for women. The most significant increases were observed in 1998-2001 for men (APC: +20.9% per year) and in 2000-2003 for women (APC: +27.8% per year). In the age group 0-29, the incidence rate increased continuously by 2.2% in men and by 5.7% in women. The APC for papillary TC was +9.0% and for follicular TC was +2.1%. Two rapid periods of incidence rise in papillary TC were identified: 1989-1994 (APC: +63.9%) and in 1999-2002 (APC: +38.1% per year).

## Discussion and Conclusion

In previous studies an increase in TC incidence after the Chornobyl disaster has been observed in Belarus, Ukraine and Russian Federation among individuals exposed as children or adolescents, no substantial impact on exposed adults was found. The simultaneous occurrence of the development of diagnostic techniques, particularly ultrasound technology, and the impact of the Chornobyl disaster on thyroid cancer incidence trends crates challenges in isolating their individual contributions.

## A population-based analysis of hematological malignancies from a French-West-Indies cancer registry's data (2009-2018)

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### Background

A worldwide increased incidence of HM has been marked in recent decades. Therefore, to update the epidemiological characteristics of HM in a French West Indies territory, we have performed analysis through Martinique's population-based cancer registry database.

### Methods

We included cancer case data, from 2009-2018, coded in strict compliance with international standards set by International Agency for Research on Cancer (IARC). We calculated standardized incidence (SIR), cumulative incidence at age 74, and temporal distributions using the global population standard, by sex and five age group. Mortality rates (SMR), were obtained from CépiDc.

### Results

1047 new cases and 674 deaths from HM were recorded, of which 501 MM (47.8%), 377 LMNH (36%), 123 LAM (11.8%), and 46 LH (4.4%) were reported in both sexes. MM is one of the hematological malignancies with the highest incidence in Martinique among men. Temporal distribution of trends in standardized incidence of all HM decreased overall in both sexes, except for MM in men. There is significant variability in mortality rates for both sexes. In addition, over the period, the temporal distribution of mortality trends for all HMs has decreased overall. Gender-specific rates, between 2009-2018, showed that all lymphoid HM have a multimodal distribution curve that increased with age.

### Discussion and Conclusion

Characteristics of HM in Martinique over the reporting periods differ from mainland France. Higher incidences have been observed, particularly for MM, and non-significant sub-mortality is observed compared to mainland France. Moreover, temporal distribution of mortality and incidence trends had decreased over the reporting periods except for MM. Our results showed similarities with African-Americans groups in United States and in particular an equivalence in the frequency distribution of diagnosed HM. However, SMR remains lower compared to US black ethnic groups. Our results contributed to expanding knowledge on the epidemiology of HM with Caribbean data.

## Implementation of a population-based cancer registry network in Mexico 2017-2020

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### Background

The growing cancer burden particularly among less developed countries requires local data to plan and evaluate cancer control measures. We describe the development of a population-based cancer registry network (PBCRN) in Mexico that took place between 2017 and 2020 and present related data.

### Methods

The PBCRN, led by the National Cancer Institute INCAN, included nine registries representing 11.0% of the Mexican population. Definitions, coding, and operative processes were based on international standards. All cities were visited to set up local structure; personnel were hired by INCAN and trained in basic cancer registration in Merida. A specific software was developed. Regular virtual meetings took place for data verification and quality control. Data were processed and analyzed with the SPSS program.

### Results

Data collection included only institutions of the public health system. Personnel included 34 registrars, 9 local leaders, and 12 staff members at the INCan. A total of 20,199 cases were recorded between 2017-2020, 64% percent of them were among females.  Breast cancer was the more frequent malignancy (26.5%), followed by digestive organs with (16.7%) and female genital cancers (15.6%). Childhood cancers (0-14 years) represented 2.3% of the total new cancer cases. The network was suspended in 2020.

### Discussion and Conclusion

The present effort lacked sustainability and data were only partial. However, the experience needs to be taken into consideration for the renewed cancer registration efforts that are currently ongoing in Mexico.

## Breast and gynecological cancers in Morocco according to Casablanca cancer registry

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### Background

Breast and gynecological cancers are different types of cancers that primarily affect women. These cancers can develop in various parts of a woman's reproductive system or other organs. Gynecological cancers encompass several specific types, including vulvar cancer, vaginal cancer, cervical cancer, uterine cancer, and ovarian cancer. Generally, breast and gynecological cancers can be life-threatening if not detected and treated in the early stages. Therefore, the main objective of this study is to estimate the incidence of breast and gynecological cancers and identify the most common localizations of these cancers within the Moroccan population.

### Methods

Analyzed data were obtained from Casablanca Cancer Registry (CCR) database, including all new cases registered from January 2013 to December 2017. CCR is a population-based cancer registry encompassing more than 4 million inhabitants in the Greater Casablanca region. Data collection is carried out actively in both public and private health structures. Canreg5 tool was used for data recording and processing, adhering to the International Agency for Research on Cancer (IARC) standards.

### Results

During the study period, 7,914 cancer cases were registered, corresponding to a crude rate of 72.9 per 100,000. The age-standardized rate was 65.7 per 100,000. Our statistical analysis revealed that breast cancer has the highest incidence rate of 51.2 per 100,000, followed by cervical cancer with 10.9 per 100,000. Furthermore, uterine and ovarian cancers have respective incidence rates of 4.2 and 4.7 per 100,000.

### Discussion and Conclusion

Breast cancer is the most common cancer type among women worldwide. Although survival rates are generally high and satisfactory, this is not true in developing countries. Additionally, staging at the time of diagnosis is often delayed due to the lack of effective screening programs.

*Keywords:*
*Breast, gynecological, cancer, incidence rate, Morocco*

Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

## Cancer of adolescent and young adults in Nepal: comparative study from PBCR 2018 and 2019

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### Background

Population-based cancer registry is the most reliable source for cancer data which gives not only trustworthy data but also guide cancer prevention and control interventions. Nepal Health Research Council (NHRC) has been conducting PBCR in Kathmandu, Bhaktapur, Lalitpur, Siraha, Saptari, Dhanusha, Mahottari, Rukum East, and Rukum West districts of the country representing three ecological regions such as Tarai, hills, and mountain. PBCR covered 21.03% population.

### Objectives

To present cancer patterns of adolescents and young adults (AYA) aged 15-39 years in Nepal.

### Methods

The data were collected from multiple sources such as health facilities, laboratories, and hospices as well as from the community. Data quality was checked by trained registry staff and quality indicators (MV ratio, MI ratio, and proportion of cases per source) were also assessed. Further data quality control was done by IARC, Mumbai. CanReg5 and Excel software were used for the final analysis.

### Findings

A total of 3349 and 3295 new cancer cases were registered in the year 2018 and 2019 respectively. Out of the total cases, 14.89% and 14.59% were AYA in 2018 and 2019 respectively. Age-adjusted rate (per 100000 people) in 2018 and 2019 was 18.5 and 15.1 for men and 20.1 and 18.7 for women respectively. Myeloid leukemia followed by colon and cancer of the bone and brain was commonest among male AYAs in 2018 and 2019 respectively. However, breast cancer followed by thyroid was the commonest cancer among female AYA in both years. Every 1 in 248 men and 189 women (15-39 years) was at risk of having cancer in 2019.

### Discussion and Conclusion

The registry has captured a similar proportion of AYA cases which gives scientific evidence to formulate effective cancer control, prevention, and early detection intervention in order to prevent the loss of young people due to cancer in Nepal.

## Incidence of childhood cancer in Poland in 2010-2020

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### Background

In Poland, there is no registry dedicated to childhood cancer, all diagnosed cases are registered in the Polish National Cancer Registry (PNCR). In April 2023, a new cancer data collection system was implemented in PNCR, in which the International Classification of Childhood Cancer (ICCC) was introduced, and all childhood cancer cases in the registry database were recoded to this classification. This operation made it possible to analyse the burden of cancer in the population of children in the years 2010-2020.

### Methods

Cancer data comes from the PNCR. All cancers registered in the registry (ICD-10 C00-C96) in years 2010-2020 among patients aged 0-19 years were included in the analysis. The topography of the cancer and the morphological type are coded in the PNCR additionally in the ICD-O-3 classification and the International Classification of Childhood Cancer (ICCC). Age-standardized rates were estimated using the revised European Standard Population (ESP2013).

### Results

In 2010-2020, over 11,700 cases of cancer among children aged 0-19 were registered in Poland, about 1,100 cases per year. Incidence rates during this period increased from 12/100,000 to 14/100,000. The range of tumour types varied with age group. In the group 0-19 the most common were: leukemia (27%), lymphoma (15%), CNS tumors (13%), epithelial tumors and melanoma (10%). Other types of cancer occurred with a frequency of less than 10%.

### Conclusion

The pattern of cancer incidence in children in Poland does not differ from that observed in other European countries. Growing morbidity is accompanied by a decrease in child mortality.

## Colorectal cancer – epidemiological approach of the Autonomous Region of Madeira, a Portugal Insular Region

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### Background

Colorectal cancer (CRC) ranks 3th in frequency and 2nd in number of deaths, worldwide. In Portugal, it is the most frequent and the 2nd most lethal overall (GLOBOCAN 2020). The aim of this study is to present the general epidemiology of CRC on the Autonomous Region of Madeira (RAM; population = 250,744, census 2021; total area = 801km²) obtained for the last 10 years of cancer registration.

### Methods

Data were collected from adult patients (> 14yrs) diagnosed with CRC on the RAM between 2012-2021, registered on the platform of the National Cancer Registry (RON). Epidemiological variables were evaluated, including sex, age, age-specific, crude and age-standardized incidence rate (wASR), cumulative risk, age group distribution and disease stage.

### Results

It was registered 1,428 (56.0% males) cases of CRC, with a median age of 68 yrs (IQR = 77-59). It was the 3th most frequent, and the 2nd among each sex – following prostate in males, and breast cancers in females. 32.1% were diagnosed as stage III and 26.0% as metastatic disease. The wASR varied from 22.3 (2012) to 35.2/100.000 (2019). In 2020 wASR was 30.0/100.000 (World = 19.5, Southern Europe = 31.9 and Portugal = 39.4/100.000, Globocan 2020). The mean cumulative risk was 3.3% (min = 2.8%, 2012; max = 3.9%, 2019) Regarding age-specific rate, it was found a tendency for an increase in incidence among both elderly (≥ 65yrs) and young (< 65yrs) groups.

### Discussion and Conclusion

Considered a marker of socio-economic development, CRC is one of the most frequent cancers on the RAM, its incidence continues to rise over the years, a reflection of risk factor exposure like animal-source intake, sedentarism, increased BMI, alcohol and tobacco consumption, among others. The implementation and adherence to the population based colorectal screening (50-74yrs), which begun in 2021, may invert this picture over the next years.

# Prognostic factors and survival in Slovenian women with breast cancer in relation to organized screening

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## Background

Organized screening programs aim for early detection, early treatment, and ultimately reductions in mortality. In Slovenia, the roll-out of organized breast cancer screening was during 2008-2018, enabling comparisons in prognostic factors and outcomes between women who were and were not offered screening.

## Methods

We used 2008-2018 data-from the Slovenian population-based cancer registry and screening registry. We compared stage distribution and mean time to surgery in women who underwent at least one mammography as part of organized screening (ever attenders), women who received at least one invitation but did not undergo mammography (never attenders) and women who were not invited (never invited). We also compared their net survival by stage.

## Results

Ever attenders had lower disease stage, but mean time to surgery was shortest in never invited (36.0 days vs. 40.3 days).

The highest 5-year net survival was in ever-attenders (local stage: 100.4%; 95% CI: 99.4–101.5%; regional stage: 96.0%; 93.7–98.3%), while the other two groups did not differ significantly; never invited: local 94.4% (92.8–96.1%), regional 82.6% (80.6–84.6%); never attenders: local 90.3% (85.0–95.8%), regional 87.4% (81.8–93.5%).

## Conclusion

We found the expected differences in stage distribution but unexpected differences in time to surgery that could be explained by quality assurance in organized screening with a mandatory multidisciplinary approach, which may increase the time to treatment, but allows better cancer management. This assumption is supported by the results of survival analysis by stage.

Our results show that the introduction of organized screening has an impact on population cancer burden indicators already during roll-out, which should therefore be as short as possible.

## Five-year survival rates and trends of childhood haematological malignancies in Spain

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### Background

Survival of children with haematological malignancies (HM) has improved over time. The objective of this study was to analyse the survival trends of HM in children (0-14 years) according to sex, age and subtype using data from the Spanish Network of Cancer Registries (REDECAN).

### Methods

Data were extracted from 15 Spanish population cancer registries which cover 20 provinces/islands. All HM incident cases diagnosed between 1985 and 2014 were included, coded following the ICD-O, 3rd edition and grouped into leukaemias and lymphomas according to the International Classification of Childhood Cancer, 3rd edition. Vital status follow-up was carried out using multiple sources of information. Overall survival (OS) was estimated by the Kaplan-Meier method. Sex and age-specific estimates of OS were calculated, as well as its changes according to ten-year periods of diagnosis (1985-1994, 1995-2004, and 2005-2014).

### Results

A total of 3,832 HM were included, of which 60.2% were boys. The age-distribution [n (%)] was: < 1 year 207 (5.4%), 1-4 years 1,397 (36.5%), 5-9 years 1,135 (29.6%), and 10-14 years 1,093 (28.5%). Leukaemias were the most frequent group, with 2,617 (68.3%) cases whilst lymphomas accounted for 1,215 (31.7%) cases. The 5-year overall OS was 77.0% (95% CI: 75.7; 78.3), with 72.6% (95% CI: 70.9;74.3) and 86.4% (95% CI: 84.5, 88.4) for leukaemias and lymphomas, respectively. Five-year OS for all HM combined increased from 67.7% in 1985-1994 to 84.4% in 2005-14. The improvement was also observed among age groups, sex, and subtypes. Specifically, survival rates were similar by sex, although they differed between age-groups ($p < 0.001$). This pattern was observed in the two subtypes analysed.

### Conclusions

Survival in childhood HM has increased in recent years although it is still low in children < 1 year of age. Strategies are needed to improve survival for this specific population.

## Risk of second primary cancers in women with breast cancer in Granada (Spain), 1985-2017

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### Background

The growing number of women diagnosed with breast cancer (BC) together with high survival has resulted in an increasing population of survivors at risk of subsequent cancers. Our objective was to assess the risk of developing a second primary cancer (SPC) in women diagnosed with BC.

### Methods

A population-based cohort study was conducted on women with BC in the province of Granada (Spain) between 1985 and 2017, utilizing data from the Granada Cancer Registry. SPCs were defined as proposed by the IACR and IARC. Age-standardised incidence rates (ASR) were calculated for decadal periods from 1985 to 2017. Women were followed-up to the date of a SPC, date of death or study termination. The risk of developing SPCs was assessed using standardised incidence ratios (SIR), dividing the observed number of SPCs by the expected number, calculated from person-years at risk and age-year-specific incidence rates in Granada.

### Results

11,167 cases of primary BC were included. The ASR increased from 55.5 per 100,000 women in 1985-1995 to 87.4 in 2007-2017. 863 women (7.7%) developed a SPC. The most common SPC sites were non-melanoma skin cancer (35.0%), colon-rectum (11.4%), uterine corpus (10.0%), stomach (3.6%), ovary (3.4%), and central nervous system (3.4%). The overall risk of SPCs was higher than in general population (SIR = 1.31; 95%CI = 1.22-1.40), with women under 50 being at the highest risk (SIR = 2.17). The risk of SPCs was particularly high in the digestive tract, lung, non-melanoma skin and genitourinary system. Women over 50 were also at excess risk (although to a lesser extent) for colon-rectal, stomach, corpus uteri and non-melanoma skin cancers.

### Discussion/conclusion

Women diagnosed with BC had increased risk of developing SPCs, particularly those under 50 years old. This excess risk may stem from shared risk factors, including patients' characteristics and environmental exposures, as well as effects of BC treatments.

## Trends in incidence, mortality and survival in HPV-associated anogenital cancers in Granada, Spain

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### Background

HPV infection is a common risk factor for anogenital cancers. Important differences exist in the epidemiology of anogenital cancers, which have barely been compared considering diverse epidemiological indicators over a long period of time. Our aim was to analyse the incidence, mortality and survival of anogenital cancers in the province of Granada in 1985- 2017.

### Methods

Cervical, vulvar, vaginal, anal and penile cancer were included. Incidence data were obtained from the Granada Cancer Registry. Cases follow-up was conducted through linkage with the Death National Index and active case finding. Mortality data were taken from the Ministry of Health. Crude and age-standardised rates were estimated. Time-trend analysis was conducted using log-linear joinpoint regression. Overall survival was calculated by the Kaplan-Meier method. For net survival, we used the Pohar-Perme estimator, with life tables smoothed by the Elandt-Johnson method.

### Results

A total of 1,951 cases of anogenital cancer were registered. Most occurred in women (82.1%). Cervical cancer was the most incident malignancy (57.0%), followed by vulvar (17.6%) and penile cancer (12.0%). The annual percent change was overall negative, but not significant for any cancer location. Incidence was higher in patients over 65 years with the exception of cervical cancer (45-64 years). There were 532 deaths by anogenital cancers, of which women accounted for 88.0%. The chief causes of death were cervical (58.5%) and vulvar cancer (22.4%). Yet, cervical cancer mortality displayed a statistically significant decreasing trend (APC = -3.5%). Cervical and vulvar cancer showed an upward trend in survival, with a 9.9% and a 13.8% increase in the 5-year net survival rates, respectively. However, survival changes over time were not significant.

### Discussion and Conclusion

Mortality decreased significantly for cervical cancer over the study period but increased non-significantly for the remaining cancer sites. Cervical cancer was the greatest contributor to the burden of anogenital cancers.

Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

## Childhood and adolescent cancer incidence in Southeastern Spain from 2016 to 2020

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### Background

Childhood (0-14) and adolescent (15-19) cancer has a relevant importance in public health. The objective of this study is to describe its incidence in the Region of Murcia during the period 2016-2020.

### Methods

Source of data is the population-based Cancer Registry of the Region of Murcia (1,5x106 Hab.). All cases diagnosed between 0-19 years old during 2016-2020 were included. Cases were registered according to International Classification Diseases for Oncology 3rd Edition (ICD-O-3) and recoded using the International Classification of Childhood Cancer 3rd Edition (ICCC-3). Number of cases by sex and group age at diagnosis (<1, 1-4, 0-4, 5-9, 10-14, 0-14, 15-19 and 0-19) are showed. Age specific incidence rate per 1,000,000 (ASIR) is calculated by sex and the previous groups age. Age-standardized incidence rate per 1,000,000 to world population (ASRw), European population 2013 (ASReu-13), and European population 1976 (ASReu-76) were calculated for group age 0-14 and 0-19.

### Results

318 cancer cases were registered in 0-19, 216 children and 102 adolescents. Ratio boy:girl was 1.1 in 0-14 and 1.4 in 15-19.

ASRw was 188.9 (205.9 boys, 170.9 girls) in 0-19, and 172.8 (183.3 boys, 161.7 girls) in 0-14. ASIR was 244.5 (283.7 boys, 202.7 girls) in 15-19 and 167.8 (176.5 boys, 158.5 girls) in 0-14.

Among children, most burden of cancer was in <1 (ASIR 300.5). Highest incidence were 'leukemias, myeloproliferative diseases, and myelodysplastic diseases' (ASIR 51.3) and 'central nervous system and miscellaneous intracranial and intraspinal neoplasms' (39.6) in 0-14; and 'lymphomas and reticuloendothelial neoplasm' (71.9) and 'other malignant epithelial neoplasms and malignant melanomas' (47.9) in 15-19.

### Discussion/Conclusion

Incidence cancer was higher in adolescents than in children. In children highlighted <1 group age. Hematological and central nervous system tumors were the most diagnosed in 0-19 years.

## Histopathologic characteristics and survival of testicular cancer in a South-Eastern Spanish region along 26 years

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### Background/Objective

Testicular cancer (TC) incidence is rising in Europe and affects significantly to adolescents and young adults. We describe TC survival and its evolution, in a south-eastern Spanish region, from 1993 to 2018.

### Methods

Data were retrieved from the population-based Cancer Registry of Murcia's Region, selecting all cases of malignant tumours with CIE-10 code = C62, occurring between years 1993 to 2018. Vital status at the end of follow-up period and date of death were collected from official death registry and clinical registries.

Input variables for the study were: year of diagnosis, patient age at diagnosis, morphology code according to ICD-O-3 and vital status at 1, 3 and 5 years since diagnosis.

Output variables were: Groups of histology codes: Seminomatous, Non-seminomatous Germinal Cell Tumours (GCT), and Others. Age at diagnosis was grouped in four strata according to definition of Paediatrics and Adolescents and Young Adults (AYA) groups. Observed and Net Survival were estimated by Kaplan-Meier and Pohar-Perme methods.

### Results

Along the observed period, 791 TC had been registered.

Regarding histology, the vast majority were GCT, being identical the proportion of non-seminomatous and seminomatous.

Survival at 5 years ranged from 97.8% for Seminomas occurring in men aged 25 to 39 y. to 81.8% in Non-seminomatous GCT occurring in men aged 40 and over, considering combined age-histology groups with enough number of cases. Survival for all TC combined were 95.5% in the 2010-2018 period, without statistical significant differences compared to the 93.6% in the 1993-2000 period.

### Discussion/Conclusion

Non-seminomas have a statistically significant different prognosis depending of the age group considered, this is not the case for Seminomas.

The better prognosis of Seminoma over Non-seminoma, already described in literature, is also observed in our study for the age groups 25 to 39 over 40 y., not so for those aged between 15-24 y.

## Survival of patients with oral and pharyngeal cancers in Spain. A REDECAN study

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### Background

Oral cavity and pharyngeal cancers (OCPC) are a heterogeneous group of malignancies involving different subsites that may have different prognoses. The aim was to analyze the survival of patients diagnosed with OCPC in Spain.

### Methods

Adult cases diagnosed with OCPC during 2002-2007 and 2008-2013, from 13 Spanish population-based cancer registries included in the REDECAN network, were selected and followed up until the end of 2015. 5-year age-standardized net survival (5-ASNS) using the Pohar-Perme method, and excess mortality rate ratios (EMRR) through flexible parametric relative survival models were estimated. Age (continuous), sex, and period of diagnosis were included in the models as covariates.

### Results

We included 14,828 OCPC cases (78.4% men). In 2008-2013, 5-ASNS was highest in oral cavity (50.2%, 95%CI 47.5–53.0%), tongue (50.2%, 95%CI 47.4–53.2%) and nasopharynx (45.6%, 95%CI 40.7–51.0%) sites, and lowest in oropharynx (32.8%, 95%CI 29.5–36.4%), hypopharynx (24.7%, 95%CI 21.8–28.0%) and other/overlapping (O&O) sites (24.6%, 95%CI 19.6–30.8%). In multivariable analysis, older age at diagnosis predicted poorer survival overall (EMRR 1.03, 95%CI 1.03–1.03 per 1-year increase) and in all subsites. EMRR was higher in men than in women overall (EMRR 1.46, 95%CI 1.38–1.54) and in all subsites, except hypopharynx and O&O sites which showed no significant differences between sexes. Patients diagnosed in 2008–2013 showed a better prognosis than those diagnosed in 2002-2007 (EMRR 0.90, 95%CI 0.86–0.94) for all OCPC; however, by subsite, significant improvement between periods was only observed for tongue and oral cavity cancers.

### Discussion and Conclusion

This study confirms the prognostic heterogeneity among OCPC by subsite. Worse survival was found for hypopharyngeal and O&O sites, possibly largely related to later-stage diagnosis. Improvement was observed for tongue and oral cavity cancers. Further research should include other prognostic factors, such as stage at diagnosis, treatments, and comorbidities.

# Poster Presentations

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Brain cancers in Spain, 1985-2015. Are they related to mobile phone use?

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#### Background

The association of cell phone use with brain cancer risk remains controversial. In agreement with the Ministry of Health, the Spanish Network of Cancer Registries (REDECAN) analysed trends in the incidence of malignant brain tumours (MBT) over a period of time covering the different stages of mobile device use.

#### Methods

Population-based study of MBTs from 1985 to 2015 in Spain. Adult incidence data from 12 global cancer registries covering 12 provinces and three islands were used. For childhood, data from two childhood registries were also used, providing data from eight additional provinces. The study included only malignant tumours. Analyses were performed globally and by sex, age (15+ years, 0-14 years), topography and morphology. Trend changes in age- and registry-adjusted incidence rates were assessed using Poisson change-point models. Annual percentage changes (APCs) were estimated for the period 1985-2015 and for periods before and after the estimated change points.

#### Results

20,325 and 2,372 MBTs were included in adults and children, respectively. In adult males, incidence rates of MBT remained stable (APC: 0.0 95%CI: -0.3;0.2), while in females they increased by about 2% per year (95%CI: 1.4;3.1) until 1999 and remained stable thereafter until 2015 (APC: -0.2, 95%CI: -07;0.3). Increases were observed in the incidence of frontal and temporal lobes tumours, and in some specific histological types, and decreases in non-specific types. Over the study period, childhood MBTs do not show a significant trend either overall or in any of the tumour types. By tumour type, only rates of glioma increased between 1985 and 1991 (APC: 6.0, 95%CI: 1.2;11.0).

#### Discussion and Conclusion

The upward trend in the incidence of MBTs in the 1980s, probably due to diagnostic improvements in those years, and the subsequent stabilization do not support the hypothesis of a possible correlation between mobile phone use and MBTs.

## Pregnancy-associated breast cancer and pregnancy outcomes in the east coast of Spain

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### Background

Pregnancy-associated breast cancer (PABC) is defined as breast cancer (BC) diagnosed during pregnancy and/or the postpartum. Objective: To analyze the risk of PABC and to identify differences in the pregnancy outcomes depending on BC diagnosis or not in the Valencia Region (VR), Spain.

### Methods

Women between 15-54 years old with at least one pregnancy between 2009-2018 were obtained from the population-based birth registry. To identify women diagnosed with BC between 2004-2019, they were linked with the Castello Cancer population-based registry (CCR) or with the Cancer Information System (CIS) depending on their province of residence.

The BC risk was analyzed according to the time of diagnosis, classifying women into 3 groups: before pregnancy, during pregnancy -PABC- (from the date of conception to 12 months after the delivery) and after pregnancy. For multiparous, the first pregnancy was classified. The Standardized Incidence Ratio (SIR) and their 95% Confidence Interval (95%CI) were calculated considering the CCR and CIS rates as standard.

### Results

1,847 women were identified with BC of the 316,865 with at least one pregnancy.

Between women with vs. without BC, statistically significant differences were identified in: proportion of women who only had one pregnancy (68.5% vs. 59.2%), mean age at birth (35.3 vs. 31.8 years) and vaginal delivery or caesarean section (more caesarean sections in women with BC, $chi2 = 38.3$ and $p < 0.05$).

In PABC group, the risk of BC was lower in relation to the population for VR (SIR: 0.7 (95%CI 0.6-0.8)) and no statistically significant differences were found for the residents at Castellon (SIR: 0.8 (95%CI 0.5-1.2)).

### Discussion and Conclusion

Despite BC is the most frequent during pregnancy, no increased risk of PABC was identified in the VR nor in Castellon. Women with BC are more likely to have just one pregnancy, in an older age, and a caesarean section.

## HPV prevalence in women ≥ 40 years of age: a neglected population

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### Background

Chronic infections with oncogenic HPVs are the leading cause of cervical cancer. HPV prevalence shows large health inequalities, being twice the average values in Spain in women at risk of poverty and/or social exclusion and four times as high among female sex workers (FSW). Furthermore, in recent years, a rise in this infection has been observed in women aged ≥ 40 years, although its causes remain unclear. The aim of the study is to describe the prevalence of HPV and its genotypes in women aged ≥ 40 years living in Valencia (Spain) and from different social backgrounds.

### Methods

The study population included 318 women aged ≥ 40 years from 2 cohorts: one with women at risk of poverty and/or social exclusion (PAPILONG, n = 129, including 50 FSW) and another population-based cohort consisting mostly of women without such risk (INMA-Valencia, n = 189). Cervical screening was performed for HPV detection and genotyping.

### Results

HPV prevalence in the INMA-Valencia cohort was 6.88%. For the PAPILONG cohort, prevalence was 60% in women who reported having been prostituted at some point in their lives (coexisting with up to 4 types of HPV, with co-infection by 2 or more HPV types in 53.33% of HPV+ cases). For the remaining PAPILONG women, the prevalence was 26.58%. For all populations, HPV16 was the most frequent genotype, followed far behind by HPV42.

### Discussion and Conclusion

The prevalence obtained in this study, compared to the estimated values for women ≥ 30 years living in Spain (5-10%), are in the same range for INMA-Valencia (6.88%), but are much higher in the case of PAPILONG (60% in FSW and 26.58% in the rest of the women). This study demonstrates the need for prevention strategies for women ≥ 40 years of age, especially in females at risk of poverty and/or social exclusion.

## Childhood tumours of the central nervous system and congenital anomalies: is there association?

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### Background

Although childhood tumours are rare, they are a major cause of death in the population under 20. Central nervous system tumours (CNST) are the second most frequent tumours among children. Several studies showed an increased risk of tumours in patients with congenital anomalies (CA). Objectives: to explore and describe the potential association between CNST and major CA in children residing in the Valencian region (VR) born between 2007-2020.

### Methods

CNST were provided by the Childhood Tumours population-based Registry (CTPBR) and the CA were obtained from the CA population-based Registry (CAPBR). Children diagnosed with CNST in 2007-2020 were linked with the CAPBR to identify major CA diagnoses.

Standardized incidence ratio (SIR) and their 95% confidence intervals (95%CI) were computed to analyse CNST risk among children with nervous system CA, considering the CTPBR rates as standard. The person-years were calculated from the date of birth to the CNST diagnosis, date of death or end of study.

Kaplan-Meier analysis was used to estimate survivor function and Cox regression for investigating the CA hazard ratio (HR) and their 95%CI adjusting by diagnosis period, sex, CNST subgroup and behaviour.

### Results

From the 229 children with a CNST diagnosis, 15 cases had, at least, a CA diagnosis before first year of life. Nervous system CA were the most frequent (47%).

CNST risk was higher among children with nervous system CA compared with the general population (SIR = 289; 95%CI: 114-542). CA HR was 7 (1.4-37.3).

### Discussion and Conclusion

Association between CA and CNST was found with a negative impact on childhood health: higher CNST risk in children with nervous system CA and worse survival among children with both pathologies.

Since CA and CNST are rare diseases, a study limitation was the low number of cases. A collaborative European project would improve the statistical power of the results.

# Incidence and survival of childhood haematological neoplasms in Castilla y León (Spain), 2010-2020

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## Background

Castilla y León is a spanish region with about 300,000 child population, which is covered by a Population-Based Childhood Cancer Registry (CYLPBCCR) from 2010. The aim of this study was to analyse the incidence and survival of childhood haematological neoplasms (HNs) in Castilla y León, during the period 2010-2020.

## Methods

Data provided from CYLPBCCR included all incident HNs (leukaemias and lymphomas) registered in children (0-14 years) for the period 2010-2020. Cases were coded following the ICD-O, 3rd edition, and classified according to the International Classification of Childhood Cancer, 3rd edition. Crude rate (CR), age-specific rate and age-standardised incidence rates using the 2013 European standard population (ASRe) per 1,000,000 children per year were calculated. We estimated 5-year observed survival (OS) rates for the cohort of incident HNs 2010-2015 using Kaplan-Meier method.

## Results

A total of 239 childhood HNs (55.6% leukaemias and 44.3% lymphomas) were registered during 11 years in Castilla y León (on average 22 HNs per year), of which 57.7% were boys. 100% of the cases of HNs had microscopic verification. Leukemias were the most frequent HNs, with a CR of 40.7 and an ASRe of 40.9 (95%CI: 31.6;52.2), predominating the lymphoid subtype. CR and ASRe of lymphomas were 32.5 and 43.5 (95%CI: 34.2;54.9), respectively, highlighting the subtypes Hodgkin's and Burkit's. Leukemias were more frequent in girls, with a CR 42.2 and ASRs 43.5 (95%CI: 33.7;55.8), and in the younger age group and lymphomas in boys, with a CR 42.9 and ASRe 43,5 (95%CI: 34.1;54.9), and in the upper age group. The 5-year overall OS was 86.8% (IC 95%: 82.2; 91.6), with 77.8% (95%CI: 68.7;88.0) for leukaemias and 92.6% (95%CI: 85,9;99,8) for lymphomas.

## Discussion and Conclusion

This study provides health authorities and clinicians with updated population-based data on the incidence and survival of childhood HNs in Castilla y León.

## The effect of socioeconomic status on lung cancer incidence in the Basque Country

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### Background

Trends from 2001 to 2017 in Lung cancer (LC) in residents of the Basque Country (BC) show significant increases in cancer rates among women and slight decreases in men.

The aim of this study is to analyze a possible association between socioeconomic status (SES) and LC incidence.

### Methods

LC cases diagnosed in BC residents between 2001 and 2017 were obtained from the BC Cancer Registry. Population was that of the census of the BC. For each small area SES was estimated using the local MEDEA index of deprivation in 2011, computed from census-based socioeconomic indicators: unemployment, manual work, temporary work, and low educational attainment for general population and for young population, with ranging from 1 (most affluent) to 5 (most deprived). The Age-Standardized Incidence Rate (ASR) of LC was calculated for each SES by sex. We analyzed the influence of SES in two interval and the whole period. Lifestyle surveys in the BC were used to estimate the consumption of tobacco.

Kaplan-Meier analysis was used to estimate survivor function and Cox regression for investigating the CA hazard ratio (HR) and their 95%CI adjusting by diagnosis period, sex, CNST subgroup and behaviour.

### Results

Between 2001 and 2017, 23,566 LC were diagnosed. (92% with deprivation index). The incidence in men increased significantly with increasing SES indexes and showed a gradient in the rate ratio (1.42 of the most disadvantaged vs the most affluent). However, in women, the opposite was observed, the most affluent population presented the highest rates of LC, but no gradient was regarded.

### Discussion and Conclusion

In men, the lowest SES level had the highest LC incidence rates. Lifestyle surveys in the BC showed the highest consumption of tobacco among more deprived men. However, in women, the most affluent population presented the highest rates of LC. Smoking is not so Linked to SES as it is in men. Therefore, SES index may not be so accurate in women to explain differences in LC incidence.

## Trends in cancer survival across the Nordic countries 1990-2016 – the NORDCAN survival studies

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### Background

Previous cancer survival trends until 2003 in the Nordic countries showed large improvements in survival, albeit with some differences across countries. In a new joint Nordic effort, we aimed to provide updated trends until 2016 to investigate if these differences remain.

### Methods

From the NORDCAN database,  we included patients ≥ 18 years diagnosed with invasive cancer between 1990 and 2016 in Denmark, Finland, Iceland, Norway, and Sweden. Trends in age-standardised 1- and 5-year relative survival were estimated within a model-based framework using flexible parametric models over calendar time and by sex. Reference-adjusted crude probabilities of death and life-years lost were also estimated. We included cancers of the colon, rectum, lung, kidney, breast, uterine, ovary, prostate and melanoma of skin, with a focus on breast, colon and rectal cancer.

### Results

Consistent improvements in both 1- and 5 year relative survival were observed in all five countries across the majority of cancer types. The improvements in relative survival were particularly large in Denmark, where the previous survival disadvantage compared to the other countries was now eliminated. For breast, colon and rectal cancer, the improvements in relative survival were consistent across age groups. However, women with breast cancer above 70 years, as well as men and women with rectal cancer above 70 years, had lower relative survival compared to younger age groups. In contrast, the relative survival of colon cancer was similar across age groups and sexes.

### Discussion and Conclusion

Several factors could explain the observed improvements in cancer survival, including earlier diagnosis, improved treatment options, implementation of national cancer plans, uniform national cancer care guidelines and standardized patient pathways. Importantly, the previous survival disadvantage in Denmark is no longer present for most sites. Continued monitoring and diversification of reported measures are important for cancer control and communication to stake holders.

## Incidence and mortality of cancer in adolescent and young adutls (AYAs) in Switzerland

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### Background

Cancers in adolescents and young adults (AYAs) aged 15-39 years have distinct biological features and distribution from cancers in children and older adults, hence require special attention in epidemiological research. This is the first study in Switzerland that aims to investigate cancer incidence and mortality in AYAs.

### Methods

We included primary cancers diagnosed in Swiss AYA residents between 1980-2019. Cancer data were obtained from the Childhood Cancer Registry (15-19 years) and from the National Agency for Cancer Registration (20-39 years). Swiss resident population and mortality data were obtained from the Federal Statistical Office. Cancers were coded according to ICD-O-3 and grouped using Barr's classification system. Cancer deaths were coded according to ICD8 (before 1995) and ICD10. We weighted the observed number of AYA cancers to adjust for regional differences in cancer registration. We calculated crude incidence and mortality rates, and age-standardized rates using the European standard population (1976). We used NIH's Joinpoint regression software to investigate cancer incidence and mortality trends.

### Results

We observed 44,075 (69,332 after adjustment) primary cancers and 9,973 cancer deaths in Swiss AYA residents between 1980-2019. Most cancers (40%) were carcinomas, mostly of the breast, thyroid, colon, skin, and genital sites (excl. ovary and testis). Testis tumors, melanomas, lymphomas, CNS tumors, leukemias, and sarcomas occurred also frequently. Preliminary analysis showed higher incidence and stronger increase in cancer incidence of female compared to male AYAs over time (1980-1989: 58.74 vs. 54.17, 2010-2019: 82.16 vs. 64.20 per 100,00 person-years). No such differences between sexes were observed for mortality. We found evidence for an increase in AYA cancer incidence after 1988.

### Discussion and Conclusion

This is the first of a series of AYAs epidemiology-focused studies in Switzerland, integrating all accessible cancer registry data and adjusting for regional differences in cancer registration.

## Time trends in 5-year relative survival for common cancer types in Zurich, Switzerland

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### Background

Survival trends help to evaluate the progress made to reduce the burden of cancer. Our study aimed to estimate the trends in five-year relative survival of patients diagnosed with breast cancer, prostate cancer, lung cancer, colon/rectum cancer, or skin melanoma in the Canton of Zurich, Switzerland, by comparing the incidence periods 1980-89, 1990-99, 2000-09 and 2010-15. Furthermore, we investigated relative survival differences by stage and age group.

### Methods

Data from the Cancer Registry of Zurich, Zug, Schaffhausen, and Schwyz were used from 1980 to 2015, including incident cases of breast cancer (N = 26,060), prostate cancer (N = 23,858), colon/rectum cancer (N = 19,305), lung cancer (N = 16,858) and skin melanoma (N = 9,780) with follow-up until 31 December 2020. The cohort approach was used to estimate 5-year relative survival in STATA.

### Results

The 5-year relative survival increased significantly between 1980-89 and 2010-15: from 0.70 to 0.89 for breast cancer, from 0.60 to 0.92 for prostate cancer, from 0.09 to 0.23 (men) and from 0.10 to 0.27 (women) for lung cancer, from 0.46 to 0.66 (men) and from 0.48 to 0.68 (women) for colon/rectum cancer, and from 0.74 to 0.94 (men) and from 0.86 to 0.96 (women) for skin melanoma. Survival for stage IV tumors was considerably lower compared to earlier-staged tumors for all localisations. Furthermore, relative survival was similar for the age groups $< 80$ years but lower for patients aged 80 years and older.

### Discussion and Conclusion

The observed increasing trends in survival are encouraging and likely reflect raised awareness around cancer, improved diagnostic methods, and more efficient treatments. The fact that stage I tumor patients have generally high relative survival supports the efforts made regarding early detection of tumors, such as screening.

## Updating cancer prevalence for Switzerland using the completeness index method

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### Background

The cancer prevalence gives the number of past or present cancer patients alive at a certain index date. Cancer prevalence mirrors the current burden for the healthcare system. Since few of the Swiss cancer registries are collecting cases for 30 years or longer, complete prevalence estimation is only available via statistical modeling. The latest complete prevalence figures were estimated in 2013. It is of utmost importance to have regularly updated cancer prevalence statistics available for Switzerland.

### Purpose

The main objectives of our study are to update the limited-duration as well as the complete cancer prevalence statistics for Switzerland. The most recent diagnoses included are for the incidence year 2019. As a secondary objective, the new estimates are compared with the projected cancer prevalences for 2019 published in 2013.

### Methods

The study is based on the national cancer data set, which combines data from all Swiss Cancer Registries, and is managed by the National Agency for Cancer Registration (NACR). Limited duration prevalence is determined based on the data of existing cantonal registries, and subsequently extrapolated to the whole country. Completeness indices specific for Switzerland are based on parametric models for incidence and survival and will be estimated with the Complete Prevalence Program (Comprev) produced by the National Cancer Institute. The combination of the limited duration prevalence together with modeled completeness indices will give rise to the complete prevalence estimates.

### Conclusion

We will report on the feasibility of applying the completeness index method to Swiss data. The updated complete and limited-duration prevalence estimates for Switzerland will support policy makers and the health care officials in the planning of health services and particularly survivorship care.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Cancer risk among patients presenting with fatigue and other vague symptoms in primary care

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#### Background

Presenting to primary care with fatigue is associated with slightly increased cancer risk, although it is unknown how this varies in the presence of other 'vague' symptoms. We aimed to quantify cancer risk in patients with fatigue who present with other 'vague' symptoms in the absence of 'alarm' symptoms for cancer.

#### Methods

We conducted a cohort study of patients presenting in UK primary care with new-onset fatigue during 2007-2015, using Clinical Practice Research Datalink data linked to national cancer registration data. Patients presenting with fatigue without co-occurring alarm symptoms or anaemia were identified, who were further characterised as having co-occurrence of 19 other 'vague' potential cancer symptoms. Sex- and age-specific 9-month cancer risk for each fatigue-vague symptom cohort were calculated.

#### Results

Of 285 382 patients presenting with new-onset fatigue, 84% (n = 239 846) did not have co-occurring alarm symptoms or anaemia. Of these, 38% (n = 90 828) presented with ≥ 1 of 19 vague symptoms for cancer. Cancer risk exceeded 3% in older males with fatigue combined with any of the vague symptoms studied. The age at which risk exceeded 3% was 59 years for fatigue-weight loss, 65 years for fatigue-abdominal pain, 67 years for fatigue-constipation, and 67 years for fatigue-other upper gastrointestinal symptoms. For females, risk exceeded 3% only in older patients with fatigue-weight loss (from 65 years), fatigue-abdominal pain (from 79 years), or fatigue-abdominal bloating (from 80 years).

#### Discussion and Conclusion

In the absence of alarm symptoms or anaemia, fatigue combined with specific vague presenting symptoms, alongside patient age and sex, can guide clinical decisions about referral for suspected cancer. The chance of underlying cancer exceeded risk referral thresholds in older men with fatigue combined with any of another 19 vague symptoms for cancer, and in older women with fatigue-weight loss, fatigue-abdominal pain, or fatigue-abdominal bloating.

## World-wide survival trends for young patients aged 0-24 years diagnosed with lymphoma during 2000-2014 (CONCORD-3)

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### Background

CONCORD-3 highlighted global variations in five-year survival from lymphomas in children (0-14 years) and lymphoid malignancy in adults (15-99 years). Here, we examine world-wide trends in survival from lymphoma and its morphological sub-types in young patients (0-24 years) diagnosed during 2000-2014 in 62 countries.

### Methods

We grouped patients by age as children (0-14 years), adolescents (15-19 years) and young adults (20-24 years). We categorised lymphoma sub-types by the International Classification of Childhood Cancer (ICCC-3), updated with ICD-O-3 codes. We estimated net survival up to 5 years by age and sub-type, using the non-parametric Pohar-Perme estimator. To control for background mortality, we used life tables by country/region, single year of age, single calendar year and sex, and where possible by race. All-ages survival estimates were standardised using the marginal distribution of young patients included in the analysis.

### Results

We analysed data for 41,177 (34.3%) children, 33,904 (28.2%) adolescents and 45,039 (37.5%) young adults. The most common sub-types were Hodgkin lymphoma (54.1%) and Non-Hodgkin (excluding Burkitt) (32.0%).

Age-standardised 5-year net survival in children, adolescents and young adults diagnosed during 2010-2014 varied widely, from below 60% in Chile to over 95% in Belgium, Germany, Iceland, Norway, Slovenia and Switzerland. Individuals with Hodgkin lymphoma experienced higher survival, with a global range from 70% to over 95%. The difference in survival between children and adolescents decreased over the period 2000-2014. Nonetheless, the gap in survival between high-income and low- and middle-income countries persisted.

### Conclusion

This study offers the first world-wide picture of the characteristics and trends in survival from lymphomas in children, adolescents and young adults. Our results show that survival is systematically higher for children and adolescents than in young adults, world-wide. Exploring trends in survival is an important indicator of the quality of management of cancer in this age range.

# Reporting Childhood Cancer Incidence in Kentucky Leads to Significant Investments in Childhood Cancer Research

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## Background

Childhood cancer is relatively rare, representing less than 1% of all cancers diagnosed in Kentucky. However, a diagnosis is severely burdensome to children and their families, including side effects from treatment and lifelong economic and social costs. The Kentucky Cancer Registry (KCR) has developed an annual report to document the burden and notable disparities.

## Methods

Incidence data reported to the KCR for children ages 0-19 were grouped into International Classification of Childhood Cancer (ICCC) sites for analysis. Data for the most recent ten years (2020-2019) were used to generate a variety of informative data tables and graphics by sex, age, and ICCC site group. Age-adjusted rates were generated by site group, sex, diagnosis year, and geographic regions. Comparisons were made between Kentucky, the United States (U.S.), and other U.S. states.

## Results

Data reveal higher incidence among males (54%), the greatest number of cases among very young children (ages 0-4), and greater numbers of cases among males for 9 out of the 11 major ICCC sites. Comparisons with rates in the U.S. show significantly high rates of brain and central nervous system tumors, lymphoma, epithelial tumors, and retinoblastoma. Joinpoint trend analysis for all sites combined show a significant 1.78% annual percent change increase. An official publication has been printed and a PDF version placed on the KCR website for wide dissemination.

## Discussion

The publications have been well received by public health professionals, childhood cancer advocates, and government authorities. Advocates used report data to convince Kentucky legislators to invest $27.5 million in childhood cancer research, including an investigation into the high rates of brain and CNS tumors.

## Conclusion

Publication of population-based childhood cancer incidence data is an effective means to inform the public and others about the burden and possible disparities. Other states and countries could benefit from generating similar reports.

## Systematic assessment of prevalence of childhood cancer survivors in the who European region

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### Background

Quantifying the prevalence of childhood cancer survivors (CCS) is essential for planning health care in a population. In the absence of a comparable data on prevalence of CCS in Europe we developed estimates for 40 countries of the WHO European region.

### Methods

We used the Prevalence Of Childhood Cancer Survivors (POCCS) model – developed within the Cancer risk in childhood cancer survivors (CRIC-CS) project – to estimate prevalence of survivors who were diagnosed with cancer before 15 years of age. The model was informed by aggregated cancer data from the Automated Childhood Cancer Information System (ACCIS) database, data on cancer mortality and population extracted from the Human Mortality Database (HMD) and the United Nations population estimates, depending on availability of the required data in each country. We computed 10-year limited duration prevalence of CCS in 2011 for the WHO European region and four sub-regions.

### Results

In the WHO European region, we estimated 125,021 10-year CCS alive in 2011. This corresponds to a 10-year age-standardised prevalence proportion (ASPP) of 312 per million general population. The highest number of CCS (43,165) lived in the Eastern European region, where the crude prevalence proportion (CPP) was lowest (147 per million). In the other regions, CPP varied from 183 per million in Southern Europe to 189 per million in Northern Europe and British Isles. The 10-year ASPP was highest in Southern Europe (348 per million), followed by Western Europe (339 per million), Northern Europe and British Isles (310 per million), and lowest in Eastern Europe (276 per million).

### Conclusions

This study is the first comprehensive assessment of prevalence of CCS in Europe, quantifying CCS prevalence in Europe. This information will assist policymakers to allocate health resources required to support the CCS population.

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## Trends in Thyroid Cancer Mortality in Adolescents and Young Adults in Brazil, 1980-2020

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### Background

Thyroid carcinoma is the most common malignancy of the endocrine system, and the most frequent incidence of cancer in Adolescents and Young Adults (AYA). Although thyroid cancer mortality rates are much lower relative to incidence, it is important to know if these trends are consistent with temporal across the time. We analyse the trends in Thyroid Cancer Mortality rates of AYA in Brazil.

### Methods

Data retrieved by Brazilian Mortality Information System, aged 15-39 years, occurred between 1980-2020. Mortality data were extracted from the Health Ministry Mortality Information System, by the Brazilian National Health System Department of Information Technology, according to the municipality of residence of the registered deaths. Death records of adolescents and young adults, aged 15 to 39 years, due to thyroid cancer – International Classification of Disease C73 code – 10 (ICD-10) and ICD-9 code 193, residents in Brazil. Simple linear regression model was used in the analysis.

### Results

A total of 797 cases were identified. When considering the age groups chosen for analysis, it is evident that the mortality rate is higher in Brazil in most years and in all age groups studied. In some years, the number of deaths was not enough to calculate the rate. In general, the age group in which the mortality rate was highest is that of 35 to 39 years. Throughout the study period, the mortality rate ranged from 0.5 to 0.1/100,000inhabitants (R2 = 0.009)

### Conclusion

The occurrence of mortality has undergone some changes over the years, but according to the applied linear regression, it was possible to see indicators with little oscillations. Furthermore, the mortality rates are not high compared with developed countries, thus the results must consider the quality of health assistance for cancer in this region.

## Comparison of cancer incidence from Brazil with cancer incidence in Jahu, Sao Paulo State

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Cancer Registries play a key role in cancer control programs. Analysis of the variation the incidence across different geographic areas can be useful study potential local risk factors or indicate regions where further study may be needed.

Comparetion age-adjusted (ASR) incidence rates among 27 Population-Based Cancer Registries (PBCRs) brasilian with the PBCR-Jahu rates for the major tumors. Incidence rates (ASR) will be compared for prostate, bronchial and lung, for males, and breast and cervical uterine tumors, for females.

For prostate cancer, the highest incidence rate was found in the city of Goiânia, 113.6 cases/100,000. The lowest was found in the State of Roraima, 19.1 cases/100,000. Jahu presented a rate of 50.8 cases/100,000, below the median found (58.6 cases/100,000) taking into account the set of PBCRs. Still among males, bronchial and lung cancer had the highest incidence rate in the city of Florianópolis, 32.5/100,000. Palmas had the lowest incidence rate, 8.4/100,000. Jahu had a rate of 11.9/100,000, below the median calculated across all PBCRs (16.4/100,000). For females, the highest incidence rate for breast cancer was found in the city of Santos, 88.8/100,000. The State of Roraima had the lowest incidence rate, 9.2/100,000. Jahu had a rate of 50.6/100,000, below the median among RCBPs (52.2/100,000). Cervical cancer had the highest incidence in the city of Manaus (38.3/100,000) and the lowest incidence in the city of Jau (6.2/100,000), practically half of the median found among all RCBPs, 11, 6/100,000.

Considering the incidence rates, the variation between the different geographic areas covered by Brazilian PBCRs is evident. This variation may indicate, the presence of potential local risk, the need to implement prevention policies and/or differentiated assistance resources for these areas. The city of Jaú has an important hospital specialized in oncology, which maintains effective prevention programs for breast, prostate and cervix cancer.

## Brazilian mortality trend analysis by head and neck cancer, by age, sex and ethnicity

João Wilson da Rocha, Fernanda Oliveira, Maria Paula Curado

[1]Brazil

### Background

The incidence of head and neck squamous cell cancer (HNSCC) associated with HPV-infection is rising. Other risk factors include smoking and alcohol consumption; late stage at diagnosis is an important factor for poorer survival. This study aimed to analyze the HNSCC mortality Brazilian trends, by age, sex and ethnicity in the period of 2012 to 2021.

### Methods

We performed a trend analysis using the Joinpoint Regression Program - Version 5.0.2. (4) and the annual average percentage change (AAPC) was calculated by age, sex and skin color. $P < 0.05$ was considered. Data were extracted from TabNetWin32 3.0 Datasus and the International Classification of Diseases for Oncology (ICD-O) (6) included: larynx (C32) - group 1; hypopharynx (C13) - group 2; oropharynx (C10), base of tongue (C01.9), tonsil (C09) - group 3 and oral cavity: retromolar trigone (C06.2), floor of mouth (C04), $^2/_3$ tongue (C02), buccal mucosa (C06) and hard palate (C05) - group 4.

### Results

For all groups, the mortality rates tended to decrease aging between 40-59 and to increase between 60-79 years. White people benefit from the decrease of mortality rate, and black people bitter the raise of this rate.The female mortality rate for oral cavity increased in the period 2015-2021 (AAPC 1,74; p-value 0,019); the male decreased in the same period (AAPC -0,57; p-value 0,022).

### Discussion and Conclusion

The mortality rate by oral cavity cancer tended to increase for women and not for men, probably due to changes in lifestyle, with a reduction in the prevalence of smoking and alcohol consumption in men and an increase in women. Black people are historically placed on the margins of society, with greater difficulties in accessing health services, which may explain the tendency towards worsening mortality rates by HNSCC for this ethnic group.

## Climate-sensitive cancer incidences: a global population-based study of 430 million underlying population across 696 locations

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### Background

Cancer etiology is multifactorial, with climate change and environmental factors such as extreme weather events and global warming potentially increasing cancer risk. Investigating a range of climatic factors with cancer incidence can provide valuable insights for prevention and future disease burden prediction.

### Methods

We conducted an ecological study using climate panel data from 1998 to 2020 for 696 locations across 36 countries using World Health Organization's Cancer Incidence in Five Continents CI5plus, and US Surveillance Epidemiology and End Results cancer registries. We tracked climate factors, including green space, total ozone concentration, surface net solar radiation, average daily precipitation, and average skin temperature through satellite-based remote sensing. We analyzed the association of climate factors with age-standardized cancer incidence for 33 major cancers, adjusting for smoking status, air pollution, and gross domestic product per capita. We assessed the rate of climate factor changes, as well as lagged effects in the models.

### Results

Our study identified associations between known and novel climate factors and cancer incidence. Both higher green space and positive change in green space were associated with decreased lung and prostate cancer incidences, and reached maximum effects at a lag of 8-9 years. Higher solar radiation was associated with increased melanoma skin cancer incidence and decreased colorectal cancer incidence. Positive change, especially rapid increase in precipitation, showed relationships with a higher incidence of prostate, colon, and lung cancers. Temperature rise was linked to higher incidences of kidney, melanoma, and thyroid cancers.

### Conclusions

Our study confirmed previously identified associations (solar radiation and melanoma), and identified novel cancer risk factors (precipitation and greenspace) that warrant further investigation into etiology.

## Cancer survival analysis in Tianjin, 2010 to 2016

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### Background

Survival analysis of primary cancer and all brain tumors (ICD10: C00-C97, D32-D33, D42-D43 and D45-D47) in Tianjin from 2010 to 2016 was conducted to provide the basis for formulating and evaluating regional health policies on cancer prevention and treatment.

### Methods

Registration data in Tianjin were used between January 1, 2010 to December 31, 2016 and collected by Tianjin Center for Disease Control and Prevention. Life-table and Edered II methods were used to calculate the observed and relative survival rate, respectively. The data were stratified by year, gender, age group and cancer sites. Difference in survival time between group was analyzed by Kaplan-Meier method.

### Results

The 5-year relative survival rates of cancer were 41.92% to 53.65% from 2010 to 2016 for residents in Tianjin, with an increasing trend ($P < 0.001$), and the average was 48.56%. Survival rate of females was higher than males (57.71%vs. 39.20%), and that of urban residents was higher than rural residents (49.38%vs. 47.24%). The 5-year relative survival rates were 63.14%, 78.39%, 58.25% and 32.67% in 0-14, 15-44, 45-64 and 65 and above age groups, respectively. The median survival times of all cancer were increased from 2010 to 2016 in Tianjin ($P < 0.001$). Median time of females was higher than males, and the time of urban residents were higher than rural residents. The shortest median survival time is for residents among 65 and above age groups.

### Discussion and Conclusion

The cumulative survival rate and median survival time of cancer increased significantly from 2010 to 2016 in Tianjin, indicating that the prevention and treatment effect of cancer was obvious. The difference between subgroups was significant, suggesting that the focus should be on male, rural areas, higher age group, pancreas, lung, gallbladder, liver and esophagus, and take targeted prevention and treatment measures to improve survival status continuously.

## Evaluation of cancer registration in early screening of stomach cancer in Gansu Province, China

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### Background

To evaluate the effectiveness of early screening for stomach cancer, theoretical reference is provided for exploring the causes of high incidence of stomach cancer in Gansu Province and for the government to formulate comprehensive prevention and control strategies for stomach cancer.

### Methods

Application of descriptive epidemiological methods to evaluate the epidemic characteristics and early screening effectiveness of stomach cancer in Gansu Province. Using Joinpoint software to fit a logarithmic linear regression model, analyzing the trend changes and predictions of stomach cancer incidence (mortality), and estimate the burden of stomach cancer disease.

### Results

In 2019, it is estimated that the number of new cases of stomach cancer was 15,800 (11,700 males and 4,100 females), the gross incidence rate was 48.54/105, the number of deaths from stomach cancer was 7,300 (5,400 males and 1,900 females), the gross mortality was 29.12/105, and the incidence and mortality of stomach cancer reach the highest in the 75~79 age group, and then decline. From 2010 to 2019, the incidence and mortality of stomach cancer both showed a downward trend (AAPC = -5.01%, 95% CI: -8.05%~-1.86%; AAPC = -5.62%, 95% CI: -9.29%~-1.79%), and the trend change was statistically significant ($P < 0.05$). The DALY caused by stomach cancer from 2010 to 2019 was 116,832 person years, with a DALY rate of 5.61 per thousand people. It is predicted that by 2022, the incidence and mortality of stomach cancer will reach 44.16/105 and 21.48/105, respectively; The detection rate of early screening for stomach cancer from 2010 to 2019 was 1.87%, the early diagnosis rate was 63.14%, and the treatment rate was 90.13%; The detection rate and early diagnosis rate both showed an upward trend, with an average annual increase of 10.14% and 10.28%, respectively.

### Conclusion

Early screening work for stomach cancer should focus on high-risk groups, especially the elderly, with good screening cost-effectiveness.

## Survival pattern and trends of lung cancer: a systematic review of population-based registration data

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### Aim

Using the published survival rates from cancer registration or population-based studies, we aimed to describe the global pattern and trend of lung cancer survival.

### Methods

By searching SinoMed, PubMed, Web of Science, EMBASE, and SEER, all survival analysis from cancer registration or population-based studies of lung cancer were collected by the end of November 2022. The survival rates were extracted by gender, period, and country. The observed, relative, and net survival rates of lung cancer were applied to describe the pattern and time changes from the late 1990s to the early 21st century.

### Results

Age-standardized 5-year relative/net survival rate of lung cancer was typically low, with 10% to 20% for most regions. The highest age-standardized relative/net survival rate was observed in Japan (32.9%, 2010-2014), and the lowest one was in India (3.7%, 2010-2014). In most countries, the five-year age-standardized relative/net survival rates of lung cancer were higher in females and younger people. The patients with adenocarcinoma had a better prognosis than other groups. In China, the highest 5-year overall relative/net survival rates were 27.90% and 31.62% in men and women in Jiangyin (2012-2013).

### Conclusion

Over the past decades, the prognosis of lung cancer has gradually improved, but significant variations were also observed globally. Worldwide, a better prognosis of lung cancer can be observed in females and younger patients. It is essential to compare and evaluate the histological or stage-specific survival rates of lung cancer between different regions in the future.

***Keywords:***

*Lung cancer; relative survival rate; age-standardized relative survival rate; prognosis; population-based survival study; time trend; cancer registration.*

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Survival of patients with chronic lymphocytic leukemia in a European cohort from the ERIC consortium

Elsa Rodrigues,[1] Thomas Chatzikonstantinou,[2] Kueshivi-Midodji Atsou,[1] Stéphanie Girard,[1] George Karakatsoulis,[2] Eva Minga,[2] Paolo Ghia,[3] Amélie Cransac,[4] Kostas Stamatopoulos,[2] Adrien Guilloteau,[1] Marc Maynadié[1]

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Chronic Lymphocytic Leukemia (CLL), is a frequent haematological malignancy with a 5-year overall survival (OS) of 72% in France. Until 2012-2013, the main treatment in CLL was FCR (fludarabine-cyclophosphamide-rituximab). Starting 2014, ibrutinib, an inhibitor of Bruton's tyrosine kinase (BTKi) was introduced in patients with relapsed/refractory and untreated CLL with high-risk factors like del(17p), TP53 mutations or unmutated IGHV genes.

In this context, we aimed at evaluating the evolution in OS at 3 years in European patients with CLL since the introduction of BTKi and its effect compared to FCR.

We took advantage for this study of patient's data from 38 centres from 15 different European countries, that have been collected within the database of the international consortium ERIC (European Research Initiative on CLL). Two periods of diagnosis were chosen: 2011-2012 (P1) and 2017-2018 (P2). All patients with CLL were included. A Cox model will be used to estimate the adjusted evolution of OS between the two periods. Then, a propensity score analysis will be carried out to assess the effect of ibrutinib vs FCR on OS, Time To Next Treatment and Overall Response Rate (ORR).

A total of 3,845 patients were eligible for analysis. Patients were comparable across sex, age and Binet stage at diagnosis between periods. During the follow-up period, 57% of patients diagnosed in P1 vs 41% diagnosed in P2 were treated. In first-line treatment, FCR usage sharply declined (37.1% vs 20.5%) overtaken by ibrutinib (3.5% vs 19%). No significant difference was observed between the two periods for OS (log-rank = 0,77) and ORR at first-line (84.5% vs 81.4%, p-value = 0.13).

To conclude, this study shows that real-world evidence can be utilized to assess the efficacy of different drugs in different eras as compared to what is observed in randomized controlled trials, with all its limitations. Additional analyses are in progress.

# Poster Presentations

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Lung cancer epidemiology in Hungary based on the characteristics of patients diagnosed in 2018

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#### Background

Among malignant diseases, lung cancer as one of the highest mortality and incidence. Most epidemiological studies conclude that Hungary faces the most severe burden in association with this disease. However, for various reasons both estimates and population-based studies show discrepancies, therefore a clarification was in order.

#### Methods

In this study an intense data cleansing was performed on lung cancer cases that in the Hungarian National Cancer Registry. Based on the cleansed database, the major clinico-pathological parameters as well as survival characteristics were described. Moreover, our population-based figures were compared to the European estimates.

#### Results

As a result of our thorough revision, the corrected incidence of lung cancer has fallen below the number of cases that were reported to the Registry. We also show that although the country is still among the ones with the worse statistics, Hungary did not have the highest incidence and mortality in Europe in contrast to estimates. Analysis of the annually reported case numbers revealed a gender-specific difference trend in incidence: while it slightly decreased among males, it increased among females. The most dominant subtype was adenocarcinoma, which was more frequent among female patients. Unfortunately, the majority of the newly diagnosed cases were in advanced stage, where current oncological treatment provides only limited benefit.

#### Discussion and Conclusion

Despite the applied data adjustment, the Hungarian lung cancer burden is one of the most serious in the European continent. We predict that in longer term, improved incidence and survival rates may be expected from the development of primary and secondary prevention programs in the country.

# Oral cancer survival in India. Results from PBCR's under National Cancer Registry Programme

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## Introduction

Globally, oral cancer incidence account for 2.1% of total cancer while in India it account for 10.3% in 2020. Patient survival is the most important single measure for cancer patient care. Cancer prevention and control activities such as screening, early diagnosis and treatment can be measured by survival studies. The objective of the study is to estimate the five-year survival of oral cancer patients diagnosed between 2012-2015 from the PBCRs in India.

## Methods

Eleven PBCRs of 2012-2015 diagnosed incident cases of oral (ICD10: C01-C06) cases followed till 31, June, 2021 (N = 14075). Follow-up is done mostly by active method. Actuarial survival method was used to estimate Observed Survival (OS). Relative survival is the ratio of the observed survival of cancer patients to the expected survival of a comparable set of the general population. Using the Ederer-II and the UN's life table, expected survival was calculated. Age Standardized Relative Survival (ASRS) estimates at 5 year was computed for the PBCRs. STATA 14 was used to conduct the survival analysis.

## Results

Overall, 93% of cases were microscopically verified. Manipur had a lower 5-year ASRS of 23.4%, while Ahmedabad urban had a higher ASRS of 58.5%. The observed survival rate (combined data) for the age groups of 15 to 39, 40 to 64, and 65 and older was 53.8%, 45.2%, and 28.0%, respectively.

## Discussion and Conclusion

In India, lower oral cancer survival rates were seen across all PBCRs. Based on population data, oral cancer survival rates show that early diagnosis and treatment are essential for enhancing prognosis and survival.

## Obesity related cancers in India: analysis from National Cancer Registry Programme

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### Background

Obesity is a modifiable risk factor for cancer which is emerging as an epidemic in developing countries. It has been documented that change in body mass index (BMI), was 55 % over a 22-year period (1985-2017) in some countries.

### Methods

With NCRP database availability on cancers associated with obesity, geographic distribution and variation, distribution by gender,age, trends over time and risk involved have confirmed the role of obesity in adding to burden of cancer.

Data on patterns of such cancers is extracted for a period of five years (2012-16) from 28 PBCRs. Composite data of PBCRs has been used for charting trends of such cancers over time and projections for future years for India.

### Results

Age -adjusted rates (AARs) for obesity related cancers in males was highest in Aizawl, Papumpare and East Khasi Hills districts of North east India, whereas in females, Papumpare, Aizawl and Kamrup districts were highest.

Future projections showed that among obesity related cancers, oesophagus and stomach cancers in males, and breast and ovarian cancers in females, will have highest incidence of cases in 2025.

Cancers of Colon, Rectum, Liver, Gallbladder, Pancreas, Liver, Gallbladder, Pancreas, Thyroid and Multiple myeloma showed an upward trend in older PBCRs from year 1984-2014.Oesophageal and stomach cancers show downward trend in some registries A significant reduction in Annual Percent Change(APC) was seen for oesophageal cancer in Mumbai, Bhopal, Barshi rural, with Mumbai showing highest reduction (-3.4). For stomach cancers,reduction in APC was seen for Bhopal, Mumbai and Bangalore.

### Discussion and Conclusion

Proportion of obesity related cancer is higher in women when compared to men in India. AARs for males and females is highest in northeast parts of country. Increase in age-specific incidence rate of males is observed within age group of 45-75; in case of females, it is 50-75.

## Estimates of burden of oral cancer in India: results from National Cancer Registry Programme

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### Background

Oral cavity cancer is the sixth most prevalent type of cancer worldwide, with India accounting for over one-third of the total burden and having the second largest number of cases. The incidence of oral cavity cancer varies by region in India. Certain states have higher rates of incidence than others. As a result, the aim of this study is to estimate and report the burden of oral cavity cancer in India by state from 2012 to 2016, in terms of years of life lost (YLLs), years lived with disability (YLDs), and disability adjusted life years (DALYs), and to project the burden until 2025.

### Methods

Cancer incidence and mortality data were collected from 28 population-based cancer registries. The average mortality-to-incidence ratio was estimated to overcome underreporting. The DisMod-II tool, WHO lifetables, disability weights, and Census data were used to assess the burden of oral cavity cancer at the national and subnational levels. In addition, negative binomial regression was used to predict the burden in 2025.

### Results

In 2016, the burden of oral cancer per 100,000 people in India was 187.2 DALYs (males: 270.7 DALYs, females: 99.3 DALYs). In India, the YLL contributes 97.3% of oral cancer DALYs.

### Conclusion

The burden metrics highlight the importance of strengthening screening and prevention plans for oral cavity cancer across India. Despite the country's inadequate coverage of oral cavity cancer screening, the findings of this study can assist policymakers in developing effective interventions aimed at reducing the burden of oral cavity cancer.

Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

## Demographical and Epidemiological Contribution to Cancer Incidence in Delhi and its Trends from 1991-2015

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### Background

Cancer incidences are rising worldwide. The three components of cancer incidence change are cancer risk factors, population size, and population structure. The present study was conducted to derive the contribution of these factors on cancer incidence and to assess the trend of these components from 1991 to 2015.

### Methods

The Data was extracted from the Delhi population-based cancer registry. The secular trends of cancer incidence from 1991-2015 for all sites combined and top-five cancer sites among males and females were assessed using joinpoint regression and Risk-diff for evaluating the trend among the components of incidence change.

### Results

An insignificant overall trend in ASIR was observed for both sexes (0.68% for males and -0.16% for females) for all sites combined. Lung, prostate, oral, and gallbladder cancer showed a significant rising trend in the ASIR in males while in females breast and endometrial cancer observed a rising trend. There was a markable rise in cancer counts in males (252%) and females (208.5%) from 1991 to 2015. The population size was the major component in increasing cancer incidence in both genders (170% for females and 180% for males) and the population structure was 35% and 40%. The site-specific risk changes were more than 100% for prostate, oral, and gallbladder cancers in males and endometrial cancer in females. The population structure(aging) contribution was varying from 35% to 60% in both genders.

### Discussion and Conclusion

Population growth was the main reason for the rise in cancer incidence apart from the population structure and cancer-specific risk factors. Continued efforts are needed to expand and improve existing cancer care infrastructure owing to growing demand from aging and population growth. A stringent population policy should frame and implement.

## Patterns of care and survival of ovarian cancer in India

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### Introduction

To study the patterns of care and clinical characteristics of ovarian cancers in India and to estimate its demographic survival.

### Methodology

This multicentric longitudinal study was initiated in tertiary care cancer hospitals in India. Under these detailed patterns of care and survival information was collected from these centers. Descriptive analysis using frequency(n) and percentages (%). 3-year survival percentage was calculated and Kaplan Meier analysis was performed to find the difference in survival between various stages of ovarian cancer.

### Results

Data of about 1,338 cases of ovarian cancers was collected from the tertiary care cancer hospitals in India. In ovarian tumors, Epithelial tumors constituted 44.3% of tumors, Adenocarcinoma 24.2%, Mesenchymal tumors 6.6%, Sex cord tumors were 4.4% and germ cell tumors were 3.4%. Peak age of occurrence of ovarian cancer was 45-49 years of age group, 57.1% of the cases were in stage III and 23.9% of the cases were in stage IV. The surgical procedures for treating the cancers were as high as 96.7% of the cases. The major surgical procedures for ovarian cancers included Hysterectomy, Omentectomy and Bilateral Salphingo-oophorectomy. Chemotherapy was received in 89.7% of the ovarian cancers. Dual drug combination of Cisplatin + Taxane were chosen for 79.7% of cases respectively. The median survival rate was found to be 20 months.

### Conclusion

The finding of this study helped clinician and public health experts to gather information regarding the present care, treatment and survival pattern.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Population based survival analysis of childhood cancer patients in Greater Mumbai

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**Background**
Worldwide, several studies on survival of cancer patients including paediatric ages are available. However, a smaller number of survival studies have carried in developing countries. In India, data on survival rate of cancer patients is limited. The objective of this study to estimate survival time for childhood cancer patients (00-14) ages in Greater Mumbai.

**Methods**
Follow-up information on 744 childhood cancer patients registered in Population-based cancer registry of Mumbai during 2009-13 was collected by a different follow-up method viz. rescrutinise of medical records, postal/telephone enquiries, and home visits. The survival of each patient was calculated as a period between date of cancer diagnosis and date of death, or date of lost to follow-up or the closing date of study (December 31st, 2017). One, three and 5-years observed and relative survival were calculated.

**Results**
The common cancers diagnosed in childhood patients are leukaemia, lymphoma, brain, bone, and kidney. For all childhood cancer patient's combined survival rate is 47%. The 1-year observed-survival rate is 57.7%, 3-year observed-survival rate (49.9%). Highest five-year observed-survival rate reported by lymphoma (66.4%), followed by bone (61.4), and kidney (59.9%). 5-year survival rate was similar for boys (48.8%) and girls (44.1%). A clear effect of age at diagnosis was seen in 0-4 years, survival rate was considerably lower compared to 10-14 years. About to international comparisons, the overall Mumbai rates are relatively low.

**Conclusion**
Survival from childhood cancer is significant information as childhood mortality trends and survival can help doctors and public health planners to assess requirement of this age-group. Further research focusing to innovative treatments and therapies for childhood cancers will helpful to improve survival and mortality trends.

## Trends in incidence of gynecological malignancies in Delhi, India

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### Background

Gynecological malignancies which originate in any of the five reproductive system organs-cervix, uterus, ovary, vulva, and vagina constituted about 21% of incidence cases among females in Delhi. The incidence and trends of gynecological cancers among females in Delhi is described using population-based cancer registry data.

### Methods

The data of the year 2015 collected by Delhi Population Based Cancer Registry (PBCR) has been utilized. Crude rate, Age-standardized incidence rates (ASR) and age-specific incidence rates (ASIR) has been calculated. Time trends have been studied using twenty-eight years of data collected by Delhi PBCR from the year 1988 to 2015. Trends in ASR were analyzed using Joinpoint regression.

### Results

During the year 2015 a total 10,103 female cancer cases were registered with 2078 gynecological malignancies consisting of vulva (47; 2.3%), vagina (33; 1.6%), cervix (918; 44.4%), uterus (422; 20.3%) and ovary (658; 31.7%).

ASR for vulva (0.67 per 100,000), vagina (0.48), cervix (12.41), uterus (6.19) and ovary (8.58). The increased with age till 69 years and started to decline from 70 years onwards.

A statistically significant ($P < 0.05$) increasing trend in ASR was observed for uterus (Annual percentage Change (APC): 3.4%) and ovary (APC: 0.46%). A significant decreasing trend in ASR was observed for cervix cancer (APC: -3.07%). Though an increase in trend was observed for vulva (APC : 2.40%) it was not statistically significant. For cancer of vagina a significant decline (APC: -7.77%) was seen during 1988 to 2006 and an insignificant increase was observed for the period 2006-2015 (APC: 2.35%)

### Conclusion/Discussion

The ASR of ovarian cancer in Delhi was the third and uterus the fifth highest among the Indian registries. The incidence rates of ovary in Delhi are higher than other metropolitan cities in India whereas the incidence of uterus was less compared to Hyderabad, Chennai and Bangalore.

## Incidence and burden of cancer in adolescents (13-19 years) in Nairobi County, Nenya

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### Background

Cancer poses a significant health concern worldwide, affecting individuals of all ages, including adolescents. In Kenya, cancer is the third leading cause of death. The cancer burden can be reduced through early detection, limitation of risk factors, and implementation of evidence-based prevention strategies.

### Objective

The purpose of this study is to establish the incidence of cancer among adolescents aged 13-19 years in Nairobi County and its burden to inform national health policies.

### Methodology

Data was collected as per the standard operating procedures of population-based cancer registries by the Nairobi Cancer Registry over five years (2013-2017). Trained cancer registrars performed active case finding and abstraction from various sources including health facilities and pathology and hematology laboratories. Coding and classification of tumors was done using ICD-O-3. CanReg5 was used for data entry, quality checks, and data analysis.

### Results

237 cases of cancer in adolescents were recorded between the years 2013 to 2017, 60% male and 40% female. Adolescents aged 17 years recorded the most cases (18%). The highest number of recorded cases over the five-year period was in 2014 (27%). The four most common cancers in adolescents that made up 64% of the total cases were osteosarcoma (20.7%), lymphoma (19.8%), leukemia (17.3%), and brain tumors (5.9%).

### Discussion and Conclusion

Cancer in adolescents, though relatively rare compared to other age groups, still poses a great health concern including death. Osteosarcoma is the most common cancer in adolescents. The burden of cancer for adolescents is financial constraints and limited access to healthcare. Bearing in mind the high incidence level, it is pivotal to create awareness of adolescent cancer incidence to promote early screening and detection, reduce mortality and inform national health policy.

## Digestive organs cancers: Incidence rates from a Population-Based Cancer Registry in Morocco

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Digestive cancers pose a substantial burden on global public health, contributing to significant morbidity and mortality worldwide. Understanding the incidence patterns of these cancers is essential for developing effective prevention and control strategies. This population-based study aimed to estimate the incidence rates of digestive cancer according to Casablanca Cancer Registry.

Data were collected from the Casablanca Cancer Registry based in Casablanca-Morocco. This registry covers more than 4 million inhabitants. The collection is operational in all public and private structures. The tool used for recording and processing the data is the CanReg5 software. IARC standards are adopted for case definition, multiple tumour management and variables definition. This present study records cases for the period between 2013 and 2017. The registry provided comprehensive information on the incidence of digestive cancers, including oesophageal, stomach, small intestine, colon, rectum, anus, liver and intra-hepatic bile ducts, gallbladder and extra-hepatic bile ducts, and pancreas cancers. Age-standardized incidence rates per 100,000 person-years were calculated using the World population.

During the study period, a total of 3901 incident cases of digestive organ cancers were identified. The overall age-standardized incidence rate for this groupe of sites was 18.1 per 100,000. The most common site was colorectal, accounting for 9 per 100,000. Incidence rates were almost similar in males and females (8.8 and 9.2 per 100,000, respectively).

This population-based study provides valuable insights into the incidence patterns of digestive cancer in Greater Casablanca region. The findings highlight the fact that digestive cancers become common in Morocco due to lifestyle changes by adopting an unhealthy diet and decreasing in physical activities by our population. This emphasizes the need of strategies based on prevention and early detection. Effective public health interventions and awareness campaigns are crucial for reducing the incidence and improving outcomes of digestive cancer.

Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

# Childhood cancer in Morocco according to the Casablanca cancer registry

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## Background

Childhood cancer is a spectrum of different malignancies occurring in younger less than 20 years of age. These cancers represent a multitude of rare diseases and a significant cause of death among children and adolescents worldwide, both in developed and developing countries. The aim of this work is to estimate the childhood cancer incidence rate and describe the most common sites.

## Methods

Casablanca cancer registry is a population-based cancer registry established in 2004 and covers more than 4 million inhabitants in the Greater Casablanca region. Data collection is done actively by registrars trained in different health services in the public and private sectors. IARC standards are adopted and Canreg 5 is used to enter data. In this work, we analyze data from 2013 to 2017.

## Results

A total of 494 cases were registered among children aged between 0 and 14 years, this corresponds to an overall crude rate of 93.1 per 1 million. This rate is slightly higher in males compared to females with a crude rate of 104.0 and 81.8 per million respectively. The most common type of cancer was hematological malignancies, accounting for 32.5% of the total registered cases in children, with a crude rate of 38.4 and 20.1 per 1 million among boys and girls, respectively. The other common types of cancer were brain and central nervous system, kidney, and urinary tracts then thyroid and other endocrine Glands with a proportion of 21%, 12.3%, and 9.8% respectively in both males and females.

## Discussion and Conclusion

Childhood cancers remain a public health issue especially in low- and middle-income countries due to the significantly lower survival rates compared to high-income countries.

*Keywords:*
*Cancer, childhood, Morocco, Incidence.*

## Soft Tissue Sarcoma Incidences and Clinical Characteristics in The Netherlands and Taiwan

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### Background

Understanding the occurrence of soft tissue sarcomas (STS) in diverse ethnic and geographic populations is crucial for identifying disparities and risk factors. However, comprehensive investigations on STS incidence among different populations are currently limited.

### Methods

STS data from national cancer registries in the Netherlands and Taiwan (2013-2016) were analyzed. Liposarcoma (LPS), leiomyosarcoma (LMS), angiosarcoma (AS), synovial sarcoma (SS), and malignant peripheral nerve sheath tumor (MPNST) were selected as key STS histotypes. Age-standardized incidence rates (ASRs) and clinical features were assessed.

### Results

During the four-year study period, 3960 new sarcoma cases were diagnosed (2250 cases in Taiwan, 1710 cases in the Netherlands). LPS and AS were more prevalent in Taiwan (LPS: 38.2% vs. 34.6%, AS: 18.0% vs. 14.2%), while LMS had a higher proportion in the Netherlands (36.9% vs. 30.8%). Taiwan exhibited higher ASRs for LPS (6.5 vs. 4.8), LMS (5.3 vs. 4.7), and AS (2.93 vs. 1.6). Gender differences were notable across the histotypes. LMS primarily affected women (Taiwan: 79%, Netherlands: 61%), while LPS predominantly affected men (Taiwan: 61%, Netherlands: 62%). AS had a female predominance in the Netherlands (64%) but a male predominance in Taiwan (63%). In the Netherlands, more female patients had SS (55%), while in Taiwan, the majority were men (54%). MPNST cases were predominantly observed in men in the Netherlands (59%) and in women in Taiwan (53%). Age distribution patterns varied, with the Netherlands showing a shift towards older age groups for LPS, LMS, and AS. AS cases differed significantly in primary anatomical sites, with abdomen/pelvis being prevalent in Taiwan, whereas thorax/extremities were common in the Netherlands.

### Conclusion

The notable variations in incidence and clinical characteristics among the chosen STS types indicate that geographic and ethnic factors play a role in the development of STS. This study contributes to a better understanding of STS epidemiology.

## The cancer status of Syrians under temporary protection in Turkey, the example of Gaziantep

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### Background

Due to the conflict that started in Syria in 2011, many Syrians have migrated to Turkey. Since Gaziantep is a large province close to the Syrian border, it has hosted the most immigrants. We aimed to asses types of cancer, gender and age distributions, percentages and incidence changes over the years since these information are crucial for the planning of health services for immigrants.

### Methods

In this study, the cancer data of Syrian immigrants at the Gaziantep Cancer Registry were selected. Gaziantep registry is one of the population-based active cancer registries in Turkey and the data of this registry is quite qualified. All cancers that between 2012-2018 were included. Desriptive analysis were used.

### Results

The total cases are 3,211 and males are 1,773 (55.2%), females are 1438 (44.8%). The percentage of most common cancers for males are leukaemia (14.0% ), lung (11.6% ), colorectum (7.7% ), non-Hodgkin lymphoma (7.2% ), bladder (6.3%); for females breast (32.2%), leukaemia (11.1%), thyroid (8.0%), colorectum (6.6%), brain, nervous system (4.5%). The most common cancers are leukaemia (55.2%), cns, intracranial/spinal cancer (12.6%) and lymphoma (10.9%) at both gender in children.

### Discussion

This study contributes to the understanding the burden of cancer among Syrian immigrants and the planning of health services to be provided to these people. The most common cancer patterns are similar to Globocan estimates of Syria. However, since the human mobility is high in this population in the early years, it is difficult to specify the population clearly and interpret the differences between the time periods.

## Pattern of Cancer in Kabul, Afghanistan: First Results from the Kabul Cancer Registry

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### Background

Literature on the subject of cancer in Afghanistan is limited mainly due to the more than 40 years of conflict and lack of cancer control activities in the country. This paper analyzed and presents the 2018-2020 data of the first and only population-based cancer registry in Afghanistan for the first time. Cancer data of this scale has not been analyzed and reported before.

### Methods

Cancer cases were actively collected from tertiary care hospitals and pathology laboratories in government and private sectors in Kabul. The cancer registry staff manually abstracted data from paper-based medical records on the form. The data was then entered into the CanReg5. Duplicates were removed using the name and father name (in the local language), medical record and cancer registry numbers, address, telephone number, topography, and morphology. CanReg5 version 4.00.1, STATA version 16, and Microsoft Excel 2016 were used for the analysis of the data sets.

### Results

Between 2018 and 2020, 3,778 cases of Kabul residents were registered by the Kabul Cancer Registry. Female patients constituted 2,145 (56.79%) while male patients constituted 1,633 (43.31%) of the cases. Nearly 92% were verified by cytology and histology (MV%). The overall age-standardized incidence rate was 42.85 per 100,000 persons, which was 51.4/100,000 per year in women and 34.3/100,000 per year in men.

### Discussion and Conclusion

Overall, the ASIR of cancer in Kabul is lower as compared to ASIRs of cancer in Karachi, Lahore, Delhi, Kathmandu, Colombo, and Razavi-Khorasan. However, the ASIRs of esophagus in Kabul is higher than in most cities/provinces of neighboring countries. This is the first attempt to determine the epidemiological pattern of cancer in Kabul which can represent the whole country. The results can guide policy makers, especially the Ministry of Public Health to plan cancer prevention and control in Afghanistan.

## Etiology of liver cancer in the Unites States: incidence and trends of HCV-, HBV-, Alcohol-, NAFLD- hepatocellular carcinoma, and cholangiocarcinoma

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Liver cancer is a prominent cancer in the US especially among non-white populations with ample variation in patterns by sex, age and race for etiology-specific hepatocellular carcinoma (HCC). However, cholangiocarcinoma (CC) is on the rise and there is limited data on its epidemiology on a population basis. Florida is the 3rd largest state in the US in population and ranks second in annual number of newly diagnosed cancer cases.

The totality of Florida cancer registry data from 2010-2018, 14,420 cases of HCC, 2,930 of ICC, and 2,166 of ECC were linked with population-based discharge statewide data and the department of health viral hepatitis data with 88.2% of cases successfully matched. We analyzed incidence, all-cause 5-year survival (lifetable method) and trends (using joinpoint regression) for HCV-, HBV-, alcohol- and NAFLD-related HCC, as well as total intrahepatic CC and extra-hepatic CC. Because overlap between the different causes of HCC was frequent, a hierarchical classification was used to identify each subject's HCC predominant cause.

HCV cases accounted for most cases of HCC (47%), followed by NAFLD (27%) and alcohol (13%). However, since 2017 NAFLD is the number one cause of HCC in women. HCV-HCC age-adjusted incidence rates were particularly high among US-born males of Black, and Hispanic ancestry. Overall trends are increasing for NAFLD-HCC (+4.3% annually), alcohol-HCC (+6.0%), and ICC (+7.0%), are stable for ECC and HBV-HCC, and have been decreasing since 2015 for HCV-HCC (-9.6%). Five-year age-adjusted survival remains poor for all types of liver cancer: HCC 18.5% (95%CI 17.7-19.3), Intra-hepatic CC 11.0% (9.2-12.8), and extra-hepatic CC 12.9% (10.5-15.3). For HCC, 5-year survival varied by cause being notably low for the HCV-alcohol combination at 11.4% (9.6-13.1).

Population patterns of liver cancer are considerably heterogeneous. Characterization and prevention of liver cancer are limited by its consideration as a single disease. Its prognosis remains uniformly poor. Priorities should include screening for risk factors and HCC and developing a better understanding of cholangiocarcinoma.

## Epidemiological characteristics of hematological malignancies in the wilaya of Algiers during the decade 2010-2020

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### Introduction

In Algiers, hematological malignancies are among the top ten cancerous localizations in men and women. They represent 10% of all cancers.

### Objective

The purpose of this work is to describe and comment on the evolution of epidemiological profile of hematological malignancies in Algiers based on data from the tumor register of Algiers during the decade 2010-2020.

### Results

5565 new cases of hematological malignancies were recorded between 2010 and 2020 in Algiers. 54.79% are men and 45.21% women. Their mean crude incidence is estimated at 14.24 new cases/100,000 and the standardized incidence rate is 14.40 new cases/100,000. The mean crude incidence by sex is 15.54 new cases/100,000 men and 12.94 new cases/100,000 women. The standardized incidence is 16.21 new cases/100,000 men and 12.60 new cases/100,000 women (2010-2020).

Crude and standardized incidence rates increased significantly during the decade. In men, the standardized incidence rate was 11.76/100,000 in 2010; it rose to 18.08 /100,000 in 2020; *i.e.* a percentage change of 53.74%.

Among women, the crude incidence rate was 8.49/100,000 in 2010; it rose to 12.09 /100,000 in 2020; *i.e.* a percentage change of 42.40%.

Hematological malignancies affect all ages but their incidence increases rapidly from the age of 50.

Non-Hodgkin's lymphomas are the first malignant hemopathy for both sexes (men: 5.87; women: 3.8)

### Discussion and Conclusion

Hematological malignancies represent 10% of all cancers. They are more common in men. Their incidence has experienced a permanent rise during the decade 2010-2020.

Our presentation will attempt to analyze the distribution of hematological malignancies on the territory of the wilaya and to seek an association between this distribution and the presence of risk factors for these pathologies, in particular those related to lifestyle, environmental or professional factors.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### Cancer Incidence in older adults in Annaba-Algeria 2015-2019

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**Background**

In Algeria the increase of life expectancy at birth can explain the increase of new cancer cases. The aim of the study is to calculate monitoring indicators of cancer in older adults aged 60 years or over in Annaba.

**Methods**

Annaba Cancer Registry data was used for the period 2015-2019. It's a population based cancer registry.

The average annual population was 721,294 . The proportion of older adults was 8.8%.

**Results**

Over the period 2015-2019, 3147 new cases were registred in older adults population among 6635 all new cancer cases but not melanoma skin cancer (all sites but C44)

Truncated Crude Incidence Rates were respectively in males and females 1117.1 per 100,000 M and 833.8 per 100,000 F.

Compared to population younger than 60 years old, the part of all cancer sites but not C44 in older adults is higher in men (59.8%) than women (36.7%)

Prostate cancer, lung, colorectal and bladder cancer were the leading cancer sites representing the two-thirds of all cancer cases in older males.

Breast cancer, colorectal and stomach cancers were the most common cancers representing the half of all cancer cases in older females.

**Conclusion**

An emphasis should be given to geriatric male population in planning the management of cancer.

## Epidemiology of lung cancer in Batna, Algeria 1995-2020

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### Background

Lung cancer ranks first among incident cancers in men and is less frequent in women, although the gap is narrowing to the detriment of the latter. The aim was to draw up an epidemiological profile of lung cancers in Batna from1995 to 2020.

### Methods

Batna tumor registery was in charge of recording incident cases resident in the territory of the state.

### Results

Over 25 years, a total of 1,222 cases were recorded, with a clear male predominance, from a standardized incidence rate of 5 per 100,000 in 1995 to 16.2 in 2020, and a sex ratio of 5.84. There were also an increase in the number of cases among women from the year 2010. The modal age group was between 60 and 69. Adenocarcinomas accounted for almost 20% of cases.

### Discussion

The profile of lung cancer has evolved over the last two decades, hence the importance of looking for risk factors other than tobacco, particularly in women.

## Determinants of breast cancer survival in Batna, algeria, 2010-2012

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### Background

Breast cancer is the first female cancer and a public health problem in Algeria. The goal of this study was to estimate the survival rate and its determinants among breast cancer patients living in the state of Batna.

### Methods

Prognostic study conducted among patients diagnosed with breast cancer from 2010 to 2012, living in Batna, recorded in the local cancer registry. The date of inclusion in the study corresponded to the date of histological confirmation of the cancer. Information on vital status was obtained through active research on medical files, hospital mortality registers, by calling the patients or their relatives, and as a last resort, we made a research at local Civil registry Center. The medical records of patients were made in 2018 to get info on disease stage and treatments. 5- year survival was estimated by the Kaplan Meier method. The log rank test and the Cox model were used to study determinants of survival.

### Results

396 cases of breast cancer were included in the study, of which 21.49% had died (N = 77), and 08.3% were lost to follow up (N = 33) before 31 Dec. 2017. The clinical stage was recorded for 275 patients, stage III and IV represent 49.4% and 5.8% respectively. Overall survival was 78.5% at 5 years (95%CI 72,0-81,6). In analyses, 5-year survival was significantly lower in patients with advanced clinical stage ($p < 10\text{-}4$), metastases (HR = 7, 95%CI [3,39-14]), not operated, not treated with chemotherapy, radiotherapy or hormonal therapy.

### Conclusion

The advanced clinical stage and the presence of metastases were factors of poor prognosis of female breast cancer, in Batna as elsewhere. Early detection, and timely access to treatments are essential in order to improve the survival of our patients.

*Keywords:*
*Determinants, Breats, Cancer, Survival, Batna.*

## Cancer Burden Estimates in Algeria using the National Network of Cancer Registries

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### Introduction

Population-based cancer registries were implemented in Algeria in the mid-1980s. By the mid-1990s cancer registries covered 26% of the Algerian population, and in 2015 the Algerian National Network of Cancer Registries (ANNCR) was created as part of the national plan against cancer, in order to estimate the cancer burden, provide health-decision makers with robust cancer incidence data, and forecast future incidence rates in order to organize health services accordingly.

### Methods

Cancer data sources, data collection and quality control methods are standardized throughout registries. The ICD-O-3 is used for coding the site and morphology of neoplasms. Cancer data registration, validation and analysis is performed with the CanReg software. Reports on cancer incidence and characteristics are released annually.

### Results

In 2020, about 50,000 new cancer cases were diagnosed nationwide. Among them 57.5% in women and 42.5% in men. Median age at cancer diagnosis was 54 years for women and 64 years for men. Standardized incidence rates (SIR) per 100 000 were 141.7 for women and 129.7 for men. Breast, colorectal and thyroid cancers represented 56% of cancer cases in women (SIR: 55.8; 14.2 and 8.0 respectively), whereas in men lung, colorectal and prostate cancers represented 41% of cancer cases (SIR: 20.2; 17.0 and 16.5). Geographic disparities were observed with higher SIRs in Northern Algeria compared with the South. An increase in SIR has been observed over the past decade varying with cancer topography (APCs: +3% to +8%). By 2025 about 60,000 new cancer cases will be diagnosed nationwide.

### Discussion

Algeria has been experiencing a cancer epidemic for over 10 years mainly due to an ageing population, increased life expectancy, and a high prevalence of modifiable risk factors. With the health system facing new challenges, relevant and accurate cancer data are needed to evaluate cancer control and prevention programmes.

## Analysis of the relationship between socioeconomic and demographic factors and mortality from cervical cancer

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### Background

Cervical cancer is a relevant public health problem in Brazil, especially in less developed regions, particularly in Pernambuco and Recife. It is important to expand studies that analyze its association with individual factors related to the socioeconomic and demographic situation of women.

### Methods

The authors conducted a cross-sectional analytical study with record of 123 deaths from cervical cancer as a cause Basic in the Mortality Information System and 24,775 women living in Census 2010 the Brazilian Institute of Geography and Statistics. The deaths were described according to socioeconomic and demographic variables and then conducted a multiple logistic regression to verify the existence of statistically significant association between them and death from cervical cancer. The explanatory variables were: age, race/color, education level, marital status and region policy and administrative (RPA). It calculated the odds ratio as a measure of association.

### Results

The deaths were concentrated in women between 40-59 years of age (47.9%), black women (75%), with high school education or incomplete higher (49.59%) and unmarried (74.8 %). There was no concentration RPA. Aside from this variable, all the others addressed in the study showed a statistically significant correlation with death from cervical cancer ($p < 0.05$).

### Discussion and Conclusion

The chance of a woman might die from cervical cancer in Recife is higher with advancing age, the nonwhite women living without a partner and with low education, setting differences in the probability of death due to its relation with the factors socioeconomic and demographic statistically sensitive.

## Oncologic diseases characterization of Colombian indigenous community

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### Background

Higher prevalence of risk factors, poor outcomes, and under-reporting are among the cancer control challenges for Indigenous peoples. Data related to cancer in the indigenous populations of Latin America are limited, and the scant information that exists comes from a few high-income countries.

### Methodology

The work was carried out in the Pijao indigenous community in the Natagaima region, Tolima, in the upper part of the Magdalena River Valley in the Andean mountains in west-central Colombia.
It has a population of 51,635 inhabitants, where 50.4% are males, who represent 2,7% of the indigenous population of Colombia. We obtained News cancer cases from the administrative cancer registry's High-cost national disease database for 2021.

### Results

In 2021 290 new cancer cases were registered in the Pijao indigenous community. The most common cancers (listed in descending order according to new cases in 2021) were: skin, breast, hematolymphoid, thyroid, cervix uterine, stomach, prostate, colorectal, and ovary.

Excluding non-melanoma skin cancer, 56% of new neoplasm diagnoses are breast, cervix uteri, and thyroid in women. In turn, in men, 50.5% are occupied by prostate, Hemato-lymphoid, and stomach cancers.

### Disussion and Conclusion

Implementing a cancer registry of the indigenous population is a priority to guide, monitor and evaluate cancer control activities. Although there is a cultural and holistic barrier to implementing cancer control programs, it is necessary to implement strategies to improve adherence to the health system of these communities considering their religion and culture.

## Preventable and treatable avoidable cancer deaths in 185 countries for 34 cancer sites

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### Introduction

Disparities in cancer-specific incidence, mortality, and survival exist worldwide. Avoidable deaths have recently been used to estimate the burden of disease and as a measure of the inequality between countries.

### Methods

Five-year net survival estimates were obtained from the SURVCAN-3 project and from a review of the literature for 34 cancer sites. Survival estimates were then obtained using a regression model versus HDI level for 185 countries. Age-specific survival estimates were estimated using patterns seen in the available individual patient data. Attributable fractions for five major risk factors across all 35 cancer sites were included to estimate preventable avoidable deaths. We then estimated the risk factor preventable and treatable avoidable deaths for 2020 scaled to IARC's GLOBOCAN incidence estimates. Analysis was done by country, region, HDI, cancer site and globally.

### Results

In total 3.1 million (34.1%) of cancer deaths are potentially risk factor preventable and 1.3 million (14.5%) treatable avoidable deaths. In total, 4.4 million (48.6%) cancer deaths are avoidable out of an estimated 9.1 million deaths through prevention and treatment improvements There are large disparities in the number and proportion of avoidable deaths globally. A significant proportion of avoidable deaths can be found across country income levels, but low- and middle-HDI countries are disproportionately affected, having large total proportions of avoidable deaths. The total proportion of avoidable deaths internationally range from 28.9% in Sweden to 70.6% in Uganda.

### Discussion and Conclusion

Our analysis provides a detailed mapping of global avoidable cancer death disparities in treatment and risk factor prevention and can be used to indicate where resources should be allocated. Prevention should be a priority, but as its impact can take decades, global efforts are also needed to address present screening and treatment inequalities.

## Changing cancer incidence pattern and trend among young adults population in Chennai, India during 1994-2018

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### Background

Significant disparities in common cancer incidence pattern are observed among special populations between more developed and less developed countries. This study focuses on young adults (YA) aged 20-39 years in Chennai, India.

### Methods

The Madras Metropolitan Tumour Registry (MMTR) exists since 1982 covering entirely urban population of 5 million in Chennai city. Systematic registration of incident cancers was carried out using standard international norms and disease coding is done using international classification of diseases for oncology (ICD-O) 3rd edition. Age standardized Rate (ASR) was computed using Segi's world standard population and cumulative risk of acquiring cancer was expressed as ratio at risk.

### Results

A total of 13,885 cancers were reported among young adults comprising 10.6% of all ages with female preponderance (1:1.4) during 1994-2018. The ASR of all cancers together rose from 22.6 per 100,000 population in 1994-98 to 29.9 in 2014-18 among men. The cumulative risk of acquiring cancer increased from one in 208 to one in 157 men. It decreased from 38.3 to 35.1 among women in corresponding periods. Cancers of the lip, oral cavity leapt from eighth rank (ASR: 1.0) in 1994-98 to top most cancer (ASR: 8.7) in 2014-18 among men. It is of grave concern that in 20-29 years age-group, these cancers were not within top ten till 1994-98, but emerged among top three in 2014-18; there was not any change in women. The ASR of lung cancer among YA showed a fall from 1.4 to 0.7 in men. Large bowel cancer rose from 1.2 to 1.8 among women but not among men.

### Disussion and Conclusion

Smoking and smokeless tobacco cessation strategies need to be revisited among men and women in this vulnerable age group. There is a urgent need to pay attention on young adults to control preventable cancers occurring among them.

## Descriptive epidemiology including special populations (*e.g.*, children, adolescents and young adults)

### High cancer incidence in North-East India

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**Background**

The North-Eastern (NE) region has the highest incidence of cancer in India, and there must be higher risk factors compared to rest of Indian population. The NE region has a predominantly rural population (81.64%). There is tribal majority in Mizoram (94.5%), Nagaland (89.1%), Meghalaya (85.9%) and Arunachal Pradesh (64.2%). The aim of this study was to describe the cancer profile of the NE region, focusing on the cancer sites that have high incidence and to identify risk factors related to food habit.

**Methods**

Incidence data from population-based cancer registries (PBCRs) in the North-East region (8 States) were utilized and relevant literature was reviewed to identify risk factors.

**Results**

Aizawl district in Mizoram had the highest incidence of cancer in men [age-adjusted rate (AAR) of 269.4 per 100,000]. Among women, Papumpare district of Arunachal Pradesh had the highest incidence (AAR of 219.8) in India. East Khasi Hills district in Meghalaya had the highest incidence of esophageal cancer (AAR of 75.4 in men and 33.6 in women). Aizawl district in Mizoram had the highest incidence of stomach (AAR–44.2 in men) and Papumpare district had highest incidence of stomach (AAR 27.1 in women), liver (AAR–35.2 in men and 14.4 in women) and cervical cancers (AAR–27.7).

**Discussion**

Esophagus, stomach & liver cancers have highest incidence in NE states and documented risk factors for these are alcohol & red meat consumption. The food habit of tribal people is different compared to city dwellers in terms of more red meat and country liquor consumption. Vegetable and fruit intake in tribal community is low because of limited availability and cost.

**Conclusions**

These dietary habits of tribal people in NE region of India are different from rest of India and can be attributed to higher cancer incidence in NE region.

## Epidemiology of oral and oropharyngeal cancer based on population cancer registry in Khuzestan province; Iran

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### Background

Oral and oropharyngeal cancer is known as one of the few lethal Oral diseases with a great burden associated with high cost of treatment and nearly 50% mortality rate. We aimed to investigate epidemiological features of oral and oropharyngeal cancer in the Khuzestan province; Iran.

### Methods

Raw data on cancer incidence was obtained from the Khuzestan cancer registry as a subsequent of the Iranian Cancer Registry in the five years from 2014 to 2019. The recorded cases were standardized according to IARC guidelines for Population-based cancer registries. The population and Demographic data were acquired from the official reports of the Statistical Centre of Iran. Descriptive data for frequency and rate of variables and associations between variables using Chi-Square-Test.

### Results

Total of 941 valid cases were identified in the time period of the study with the composition of Males 675 cases and Females 266 cases in total. More than 85% of reported cases were submitted to database with pathologic reports which verifies a high-level of data validity. Crude rate in female cases is on an upward trajectory in contrast to crude rate in males which shows a downward trend. Squamous cell carcinoma is the most diagnosed malignancy with 532 (55%) cases in total.

### Disussion and Conclusion

Data on oral and oropharyngeal cancer suggests that the overall trend of incidence is increasing particularly in females and younger age groups in the period of study. Concerning increasing trends in this study and the presence of majority of oral and oropharyngeal cancer cases in the active and young members of society in this study, an extensive screening and prevention programme with the addition of rehabilitation efforts should be on the agenda, to ensure most at-risk populations have enough tools and opportunities to prevail and enveil this burden and efforts for the affected groups, avail.

## Epidemiology of Childhood Cancers in Kerman, Southeast Iran: results of population-based cancer registry

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### Introduction

Data from population-based cancer registries are increasingly used to conduct research and guide policy. However, few studies of cancer registry data have been conducted, particularly among children. This study aimed to provide comparable local data on the incidence of childhood cancers to promote research of causes and improvement of population-based cancer registries.

### Method

In this retrospective cohort study, all patients who had been diagnosed with primary tumors, aged under 20 years old, and registered with the Kerman Cancer Registry Program (KPBCR) during 2014-2019 were included.

### Results

Of 26,154 cases registered by KPBCR during 2014-19, 1060 cases were diagnosed in individuals younger than 20 years (4.05%). Most childhood cancers emerged in males (n=574, 54.15%), and individuals aged 0-14 years (n=819, 77.26%). The most common cancer groups were leukemia (n=407, 38.4%), brain and central nervous system tumors (n=153, 14.4%), and lymphoma (n=110, 10.4%). The most common single diagnoses were Precursor T-cell lymphoblastic leukemia (n=269, 25.4%), acute myeloid leukemia (n=61, 5.7%), and Hodgkin lymphoma (n=50, 4.7%). A number of very rare pediatric tumors including papillary thyroid carcinoma (n=37, 3.5%), Neuroblastoma (n=29, 2.7%), Nephroblastoma (n=19, 1.8%), Retinoblastoma (n=16, 1.5%), Hepatoblastoma (n=4, 0.4%), and malignant melanoma (n=4, 0.4%) were observed during the study period. Further, a series of high-grade gliomas and skin cancers were also observed. The overall incidence rates of pediatric cancers were reduced over the study period.

### Conclusion

Regarding the decreased trend of childhood cancer incidence, there is an essential need to address the current under-reporting of cancer, especially certain pediatric types, and establish validation studies and quality control plans to identify practices and procedures leading to the highest quality information.

## Lebanon Cancer Registry Incidences from 2005 to 2016

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### Background

Cancer represents major health burden as 18% of causes of deaths are related to cancer diseases. The national cancer registry was established in 2003. The objectives are to measure cancer incidences by topography, morphology, time, place and person; to maintain updated national database; and to facilitate epidemiological studies and research.

### Methods

The data sources include hospitals, histopathology laboratories and hematology laboratories from both the public and private sectors, in addition to the MOPH database for patients benefiting from MOPH cancer drugs dispensation.

Reports are shared on annual basis to the MOPH as hard or soft documents, some are canreg-5 excel templates. Medical coding is done with ICD-O-3. Data is entered into canreg5 directly or indirectly via excel file importation. Once a full year is entered, data cleaning is performed to eliminate the duplicates and identify multiple primary cases. Once analysis is finalized, summary of results is posted on the MOPH website.

### Results

From 2005 to 2026, the cancer annual incidence (excluding the non-melanoma) has increased from 7,406 to 11,392 cases. In terms of crude rate per 100,000, the increase was from 187 to 208 for females, and from 181 to 197 for males. As for the age-standardized rate per 100,000, the increase was from 185 to 249 for females, and from 180 to 233 for males.

Since 2011, the cases include the Syrian displaced population.

The top sites for males were prostate, lung and bladder, colo-rectal and non-Hodgkin lymphoma. For females, they were breast, colo-rectal, lung, thyroid and non-Hodgkin lymphoma.

### Disussion and Conclusion

The NCR activities were disrupted by the COVID-19 pandemic as the team has contributed to COVID-19 surveillance and investigation.

Starting 2022, the data collection, coding, entry and importation have been resumed with the objective to cover the gaps of past years, and avoiding future disruption.

## Assessing trends of Kaposi Sarcoma (KS) in face of HIV/AIDS interventions in Lilongwe, Malawi (2018-2021)

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### Background

KS is the most frequent cancer diagnosed in HIV infected individuals. Between 2015 and 2021, Malawi registered a significant reduction in the prevalence of HIV. According to MPHIA report on the progress of the 95 95 95 campaign whose goal is to eliminate HIV/AIDS as a public health issue in the country by 2030, the prevalence of HIV was 10.6% in 2015-2016 and 8.9% in 2020-2021. The aim of this study was to assess the trend of KS over a period of 4 years between 2018 and 2021 and relate to the reducing trend of HIV prevalence in Lilongwe.

### Methods

Trained cancer registrars engaged in active data collection and completion of notification form of all confirmed cancer cases from various data sources for the stated period. Passive data collection was also employed where doctors, nurses were involved in filling the notification form every time they encounter a cancer case. Canreg5 software was then used for analysis.

### Results

According to the data collected, a total of 375 cancer cases were recorded. The age standardized incidence rates (ASR) for KS in males was 8.7% in 2018, 15.5% in 2019, 14.5% in 2020 and 10.2% 2021, whereas in females 2.3% in 2018, 4.2% in 2019, 4.2% in 2020 and 2.2% in 2021.

### Discussion and Conclusion

The age standardized incidence rates of KS was high in males than females and this can be attributed to male's negligence in seeking medical attention. There was a significant decrease in the incidence of KS in both gender after the year 2020 and this can be attributed to the reduction in HIV prevalence. Therefore, further studies are recommended to ascertain that HIV/AIDS interventions help in reducing the burden of HIV-related cancers like KS.

## The Feature of Rare Cancer Incidence Pattern in East and Southeast Asia

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There is still lack of understanding of rare cancer, which sometimes causes delays in diagnosis, treatment, and care. The information of rare cancers burden in Southeast Asian (SEA) countries is limited. As part of the RARECAREnet Asia project, this study aimed to estimate first time the incidence of rare cancers in SEA using the population-based cancer registries (PBCR) data.

This study used data from national PBCR of Malaysia and two PBCR in northern Thailand including Chiang Mai and Lampang cancer registries. A series of steps were performed to check data quality. The age-standardized rates (per 100,000 person-year) of the rare cancers included in RARECAREnet list that classified to 12 families of rare cancers: head and neck, digestive, thoracic, female genital, male genital and urogenital, skin, sarcomas, neuroendocrine, endocrine organ, pediatric, central nervous system and hematological cancers were estimated. All analyses were performed using SEER*Stat (version 8.3.5).

Data quality assessed in terms of proportion of microscopically-verified case was satisfactory (more than 80%) for most of rare cancers. In SEA, cancers defined rare by RARECAREnet were also rare. Most of the hematological cancers were rare except lymphoid diseases in Thailand. However, the ASR of some rare cancers in SEA is higher than east Asia included nasopharynx and some pediatric cancers: pancreatblastoma and odontogenic malignant tumours in Malaysia, eye and adnexa cancer and epithelial tumours of penis in Thailand.

In conclusion, although most of rare cancers are also rare in SEA, some cancers defined as rare by RARECAREnet are not rare. While some cancers are rare in SEA as what found in Europe but the ASR is higher in East Asia. To enhance the diagnosis and understanding of rare cancers, there is a need to generate reliable epidemiological data under RARECAREnet Asia project by working with the potential PBCR in Asia.

## Comparative analysis of lymphoma: a population based study across three regions of Nigeria

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### Background

Lymphoma is a broad term for cancer that begins in cells of the lymph system. It is like other cancers that are dreaded and in many of the cases life terminal.

The disparity in incidence of Lymphoma among top ten cancers in Nigeria as evaluated and published in Nigeria System of Cancer Registry (NSCR) newsletter for the period 2009 to 2016 called for concerned. The need to examine their differences as gathered in African Cancer Registries Network (AFRCN) members' population based cancer registries across the three regions of Nigeria cannot be over emphasized. Lymphoma is among the top ten cancers in Nigeria.

### Methods

This is a retrospective studies of cancer data collected, cleaned and managed by trained cancer registrars in population based cancer registries. Incidence of Lymphoma in Ekiti, Abuja and Enugu in Nigeria as a whole were reviewed. Top ten cancer in Nigeria as captured using the standardized Cancer Registry soft-ware called CanReg5 was evaluated. Lymphoma ASR for Sub-Saharan Africa and other parts of the world as reported via Global Cancer Statistics for the period under review was studied.

### Results

The Lymphoma incidence rate (ASR was 3.7 per 100,000 per year in Nigeria). ASR for Enugu, Abuja and Ekiti were 4.5, 5.2 and 7.1 per 100, 000 per year respectively. Lymphoma ASR in Sub-Saharan Africa is 3.9 in the overall while for Black American we have 17.2 as their Lymphoma incidence.

### Conclusion

The incidence rate of lymphoma cancer in Ekiti is relatively higher than those reported in other parts of Nigeria and Sub-Saharan Africa, but lower than the rate from developed countries. This called for the review of likely exposures that may be associated with the higher rate of this health menace for the purpose of alleviating it.

## The burden and pattern of cancer in Abuja; 5-year review of the Abuja Cancer Registry

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### Background

Cancer Registries worldwide have evolved to provide useful information for establishing appropriate programs for early detection and treatment. Cancer statistics and control policies is limited in Nigeria. The Abuja Population-based Cancer Registry was established as a Hospital-based registry in 2005 and evolved to a population-based registry in 2009 covering Abuja area council with a population of 2,491, 671 (males 1,335,071, Females: 1,156,600). The registry has been a major source of incidence and mortality data utilized in informing cancer control interventions in Nigeria.

### Objectives

Our aim was to determine the burden of cancer in Abuja for a 5-year period (2016-2019) and describe the patterns by age and sex distribution.

### Methodology

Trained cancer Registrars were involved in active case finding of cancer cases in health facilities within the defined population. Confirmed cases were abstracted onto the case notification forms. Topography and morphological coding were done using the International Classification of Disease for Oncology (ICDO-3). Data checks, entry, analysis done using the CANREG software. Population dataset was obtained from 2019 population estimate and used to compute age standardized rates.

### Results

A total of 4,109 cases of cancers were registered; 1,449 (35.3%) males and 2,660 (64.7%) females. In male, prostate is the most commonly diagnosed malignancy with an ASR of 35.3 per 100,000. In female, breast is the most commonly diagnosed malignancy with an ASR of 64.6 per 100,000. The most burdened age-groups were 50-69 (46.4%), 30-49 (28.0%) for males and 30-49 (48.6%), 50-69 (36.6%) for females.

### Conclusion

Cancer is a significant health problem especially in the younger more active age groups and there is need for intervention and comprehensive cancer care programme in the city and beyond to address the growing menace.

## Epidemiology of malignant tumors in Uzbekistan

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### Background

The burden of cancer continues to grow worldwide, with enormous physical, emotional and financial consequences for individuals, families, communities and health systems.

### Methods

We collected cancer incidence and mortality data from official statistical reports in Uzbekistan for the years 2013-2022.

### Discussion

The results of the study showed, that the cancer incidence of Uzbek population (including basal cell skin cancer) increased over 2013-2022 by 31.8%. Thus, the number of newly diagnosed patients with malignant tumors over the last 10 years has increased from 20,003 to 26,367 cases and incidence rate per 100,000 population has increased from 66.9 to 73.2. The most commonly diagnosed cancer for both sexes in the country is breast (17.2%), followed by stomach (7.9%) and cervical (7.1%) cancer. Meanwhile, for men the most frequently occurring cancers are stomach (11.8%), lung (10.7%) and colorectal cancer (9.9%), and for women: breast (28.1%), cervical (11.9%) and ovarian (6.6%) cancer. In turn, the number of death cases from cancer over 2013-2022 raised from 11,249 to 13,888 (by 23.4%). Mortality rate per 100,000 population over 2013-2022 has increased from 37,2 to 38,6. Breast (12.9%), stomach (10.1%) and lung (8.2%) cancers remained the leading cause of cancer death for both sexes in Uzbekistan. In men stomach (13.8%), lung (12.7%) and colorectal (8.7%) cancer are the main cause of death and in women: breast (23.4%), cervical (12.7%) and stomach (7.1%). In 2022, 49.1% of cancer cases were detected in the early stages (I-II st) (2013 y -31.9%), and almost 44% of cancer cases (2013 y-64.8%) were diagnosed in advanced stages of the disease.

### Conclusion

Cancer incidence and mortality continues to increase in Uzbekistan. Moreover, over the past decade, the state of the oncological service has improved significantly due to the improvement the quality of healthcare, medical equipment and implementation of guidelines.

## Inequality in spatial patterns of breast cancer incidence in Hanoi, Vietnam: a Bayesian Spatial Analysis

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### Background

Breast cancer is a significant public health concern in Vietnam. Understanding its spatial patterns is crucial for effective healthcare planning and resource allocation. This study aimed to investigate the incidence rates and spatial distribution of female breast cancer in Hanoi, Vietnam.

### Methods

We utilized 2,424 female breast cancer incidents during 2017 to 2018 from a population-base cancer registry in Hanoi to estimate age-standardized rates (ASRs) and standardized incidence ratios (SIRs). In addition, spatial autocorrelation was performed by using Moran's Index. To estimate relative risks (RRs) with approach accounting for spatial dependencies, we employed a Bayesian spatial model with Integrated Nested Laplace Approximation (INLA), the modified Besag, York, and Mollie model (BYM2).

### Results

The ASR of breast cancer was 28.5 per 100,000 women from 2017 to 2018 and varied from 7.5 to 56.8 per 100,000 women across 30 districts in the city with a female population of approximately 3,900,000 persons. Additionally, the SIRs ranged from 0.26 to 1.98, with 13 of 30 districts showing an elevated breast cancer incidence. We observed an inequality in incidence rates and ratios within the districts. Particularly, Hoan Kiem district, the downtown area of Hanoi, had the highest ASR and SIR. However, Moran's Index values were -0.004 and 0.002 for 2017 and 2018, respectively, and no significant clustering of female breast cancer was found (all $p\text{-value} > 0.05$). Accounting for spatial dependencies, the RRs (95% CI) ranged from 0.38 (95% CI = 0.24-0.54) to 1.91 (95% CI = 1.58-2.29).

### Discussion and Conclusion

This study reveals inequality in breast cancer incidence at the district-level in Hanoi, which indicates an unbalanced spatial distribution of medical resources within the districts. The findings provide valuable insights for allocating medical resources and developing targeted preventive strategies in high-risk areas.

Theme: **Registry innovations, research, and health policy**

## Analysis on incidence and mean age at diagnosis for Cancer in Albania

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Albania faces a double burden of disease, with non-communicable diseases, including cancer, rising rapidly alongside continued morbidity and mortality from infectious diseases. While age-standardized rates of cancer have changed only marginally, the absolute number of patients diagnosed with cancer annually in Albania is growing rapidly, due to increasing life expectancy, growing urbanization and lifestyle changes. Information on stage at diagnosis and follow-up data on outcomes and long-term survival after a cancer diagnosis are less likely to be reliably captured or reported in cancer registry. Objective: To analyze the age distribution characteristics of different cancers in the Albania according to the database from Cancer Incidence of Cancer Registry, and to compare the age differences of cancer incidence in world. Methods: The average age of cancer incidence in Albania, gender and cancer sites were analyzed and stratified according to world standard population. Results: This study included 29,841 of the new cancer cases, including 10,064 men and 13,777 women for the years 2015-2019 in Albania. The analysis showed that the median age of cancer incidence in Albania was increased by 60 years in 2015 to 64 year in 2019, respectively. Among them, the median age of breast cancer was changed from 55 to 57 years, 2015-2019, and that of lung cancer was 64 to 66 years. But cancer is mostly a disease of middle age and beyond, meaning that half of all new cases are found before then and half are diagnosed later. The literature showed that the average age of cancer incidence in developed countries or regions was 66.38 years old, and that in less developed countries was 61.75 years old. Conclusions: There are different characteristics of the age distribution for different cancer sites. Prevention and control of cancer should be carried out according to the age distribution characteristics of different cancers.

## Setting a minimum sample size for comparing survival outcome between health care centres

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### Background

The Belgian Cancer Registry has been involved in quality of care projects comparing cancer survival outcome between Belgian health care centres. With about 100 hospitals and a population of roughly 11.5 million inhabitants in Belgium, hospitals may treat very few cancer patients (<5) per year for a specific cancer type. No meaningful results can be obtained for centres with small number of patients treated.

We present a method to guide setting the volume threshold to be applied in survival analyses.

### Methods

Simulations were performed to obtain the width of the prediction interval (PI) of the observed and relative survival outcome probability, the (excess) hazard and the (excess) hazard ratios. A size threshold is set based on the width of the prediction interval.

### Results

For observed survival probability, a sample size of 40 gives a maximum PI width of 30 percentage points (pp), while 90 patients are needed for a PI width of maximal 20 pp. Relative survival requires about 10 patients more for achieving the same PI widths.

For the hazard, about 15 observed deaths are needed for a relative PI width of about ±50%, and 50 deaths for a relative PI of about ±25%. Similarly, about 15 excess deaths are needed for the excess hazard.

This procedure was generalised for reporting (excess) hazard ratios. High survival probability results in higher thresholds: for invasive female breast cancer a minimum of 100 patients was used for observed survival and 300 for relative survival, while for rectal cancer the thresholds were 50 and 70 respectively.

### Discussion and Conclusion

This study reveals inequality in breast cancer incidence at the district-level in Hanoi, which indicates an unbalanced spatial distribution of medical resources within the districts. The findings provide valuable insights for allocating medical resources and developing targeted preventive strategies in high-risk areas.

Theme: **Registry innovations, research, and health policy**

## Productivity loss related to premature cancer mortality in Brazil between 2001 and 2030

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### Background

Studies assessing productivity loss related to premature cancer mortality in Brazil are limited. This study aimed to calculate the Years of Potential Productivity Life Lost (YPPLL) and productivity loss due to premature cancer mortality in Brazil between 2001-2015 and project this up to 2030.

### Methods

We defined premature mortality as those occurring before retirement age: 65 and 60 years for men and women, respectively. Mortality data from all types of cancer were obtained from the Ministry of Health. Economic data and population were obtained from the Brazilian Institute of Geography and Statistics databases. The Human Capital Approach method was applied to estimate productivity loss.

### Results

Between 2001-2015, there were 591,641 deaths among men and 437,917 among women. Between 2016-2030, we estimate 737,207 deaths among men and 557,669 among women. Among men, the highest ASR cancer mortality was observed for lung and trachea (12.8 in 2001-2005 to 7.2 in 2026-2030), stomach (9.4 in 2001-2005 to 5.9 in 2026- 2030), and lips, oral cavity, and pharynx (7.3 in 2001-2005 to 5.4 in 2026-2030). Among women, the highest ASR cancer mortality was observed for breast (11.1 in 2001-2005 to 11.8 in 2026-2030), cervical (8.0 in 2001-2005 to 6.9 in 2026-2030), and lungs and trachea (4.1 from 2001-2005 to 3.8 in 2026-2030). There were 32.2 million YPPLL, corresponding to USD 141 billion: 15.5 million YPPLL (USD 102 billion) among men and 16.6 million YPPLL (USD 38.8 billion) among women.

### Discussion and Conclusion

The substantial economic and social impacts of premature mortality from cancer in Brazil highlight the need to strengthen public policies to promote a population-based healthy lifestyle and reduce cancer morbidity and mortality.

# Estimating colorectal cancer incidence trend in Brazil (1995-2025) using gam with multidimensional penalized spline

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## Background

Colorectal cancer (CRC) is estimated to be the second most incident cancer in Brazil, in 2023. National cancer incidence trends can be estimated even in countries with no national population-based cancer registries (PBCR). AIM: To estimate the national incidence trend over 1995-2025 from colorectal cancer (CRC: ICD C18-21) in Brazil, with predictions over 2020-2025.

## Method

Data from 25 PBCR between 1995 and 2019 were used to estimate the national CRC incidence trend and project it up to 2025. We employed a General Additive Model (GAM) with Multidimensional Penalized Splines (MPS) to smooth the rates by age and year.

## Results

From 1995 to 2025, 1,119,713 new cases of CRC are estimated in Brazil, of which 552,756 among men and 566,957 among women, 27% of these are expected to occur during 2020-2025. The incidence rate among men is expected to increase by 92% from 1995 to 2025, rising from 14.03 to 26.95 cases per 100,000 inhabitants (with an Average Annual Percentage Chance (AAPC) of 2.2; $p\text{-value} < 0.001$). Similarly, among women, the incidence rate is predicted to increase by 59%, from 14.90 to 23.68 cases per 100,000 inhabitants (with an AAPC of 1.6; $p\text{-value} < 0.001$) in the same period.

## Discussion and Conclusion

Applying GAM with MPS by age and year, it was demonstrated that both men and women experienced an increasing trend in colorectal cancer (CRC) incidence rates from 1995 to 2025. These rising rates are related to the aging population process and the adoption of a Western lifestyle, including factors such as high-fat diet, sedentary behavior, and smoking. Our findings underscore the need for targeted interventions and prevention strategies to reduce the burden of CRC, particularly among older adults and those with Westernized lifestyles.

## Experience in the design and implementation of a hospital-based cancer registry in Chile

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Cancer is not only one of the leading mortality causes and disease burden worldwide but also the leading cause of death in Chile. There are various levels of development of information systems that collect and consolidate cancer data. In Chile, Hospital-Based Cancer Registries (HBCRs) are available in only nine of the 16 administrative regions, with a total of fifteen HBCRs nationwide. There is a need for implementing new HBCRs to gather information and implement strategies focused on prevention and early diagnosis. A retrospective descriptive analysis of the development process of an HBCR in a private cancer center in Chile was conducted, starting from a manual registration system to implementing a partial automated process, including a software development, data-entry profiles design, and the use of tools to capture and process data. The development of the HBCR-software took six months and has been operational for two years. A critical aspect was the design of the Unitary Database of Patients for each year, following a semi-automatic identification process to register probable cancer cases. Currently, the HBCR has 13,330 registered cases. Differences were observed in the total registering time of the incident cases per year, which decreased from 36 to 8 months on average, when comparing both methods, manual (*ie.* excel sheets) and semi-automatic identification (*ie.* software). The number of incident cases per year did not differ when using both methods. This is the first time in Chile that data-entry profiles consider data complexity during the registration process. The results support the hypothesis that registry of annual incident cases using a partial automated method, during the registration process, increases the registration efficacy, thus becoming a possible tool to implement on a nation-wide level.

# Implementation in the Dominican Republic of a molecular cancer registry to enhance the molecular landscape

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IMPLEMENTATION OF MOLECULAR CANCER REGISTRIES TO ENHANCE THE MOLECULAR LANDSCAPE IN LOW- AND MIDDLE-INCOME COUNTRIES

Molecular profiling of tumors is rapidly developing and has entered the mainstream of clinical practice. The characterization of molecular markers for cancer has the potential to improve cancer classification, surveillance, treatment, prediction of response to therapy, and survival. Cancer control strategies that are effective in high-income countries are often not applicable to low- and middle-income countries (LMICs) due to differences in genetics, systems capacities, and sociocultural factors. Cancer registries generate country-specific evidence for effective public health intervention and cancer research. Comprehensive genomic profiling can provide complete information on common oncogenic drivers and rare biomarkers.

We developed a standardized database with the molecular and non-molecular characteristics of tumors diagnosed in the Instituto Nacional del Cáncer of the Dominican Republic. Tumor characteristics such as morphology, treatment, clinical outcome, and genetic mutations were consolidated in a SQL relational database. The SQL database had the potential to interact with hospital-based or population-based cancer registries through a web portal.

The hospital database had 11,380 unique cases from 2015 to 2022. The most common cancer location were breast, prostate, hematopoietic, colorectal, and lung. The molecular alterations identified were EGFR, AKT1, BRAF, BCRA, PD-L1, and ALK. 33% of lung cancer has a mutation in the EGFR gene. A molecular cancer registry bridged gaps in determining the main mutations present in the population. The Dominican Republic has led off to enhance access to molecular testing by covering them through social security. An epidemiologic approach to genomics will contribute to determining complex disorders attributed to gene-environment interactions. Molecular cancer registries provide a unique resource for testing new molecular classification schemes for cancer and validating new biologic markers of malignancy. Generate country-specific evidence for effective cancer classification, treatment, and prevention to accelerate cancer control.

Theme: **Registry innovations, research, and health policy**

## Acceptability of risk-based cervical cancer screening: women's perspective – a qualitative study

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### Background

Cervical cancer (CC) remains a significant health concern, causing high number of cancer-related deaths among women. The traditional 'one size fits all' screening focus is shifting towards a more personalized risk-based strategy. For the risk-based screening to be successful, it is essential to assess its acceptability among the target population.

Our study aimed to explore women's perspectives on the implementation of risk-based CC screening.

### Methods

Fourteen women from Estonia and ten women from Norway (25 to 69 years old) with diverse educational backgrounds, HPV status, and varying number of births took part in semi-structured individual interviews. Prior to the interviews, participants were provided a short introduction explaining the risk-based CC screening concept and were given hypothetical examples of women categorized as having high and low risk for CC. The interviews were structured based on the concept of acceptability of healthcare interventions (Sekhon et al). Interviews were recorded and transcribed, and content analysis was carried out.

### Results

Overall, women showed a positive attitude towards the risk-based approach, but their hypothetical adherence to screening recommendations varied based on estimated risk. They were inclined to agree with more frequent screening for high-risk situations, but hesitant to undergo less frequent screening for low-risk cases and would actively seek additional opportunistic screening. Anxiety was reported in both scenarios- fear of cancer in high-risk situations and fear of delayed diagnosis in cases of longer screening intervals for low-risk individuals. Avoiding serious illness seemed to legitimize the burden of screening. Discrepancies in information needs, preferred risk communication routes and risk counselling professionals were identified.

### Discussion and Conclusion

Our study has revealed a positive attitude of women to the risk-based CC screening. However, the successful implementation of this approach requires extensive information and communication efforts, as well as strong support from screening programs.

## Colorectal cancer patients’ use of health services prior to cancer diagnosis

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### Background

Health service (HS) use among colorectal cancer (CRC) patients increases before cancer diagnosis. Our aim was to compare CRC patients’ use of HS before cancer diagnosis to that of the healthy reference population.

### Method

All incident CRCs (N = 48228) diagnosed between 2000 and 2017 and born before year 2000 were identified from the Finnish Cancer Registry. From the Finnish Population Registry, we retrieved ten randomly selected matched cancer free controls alive at the time of diagnosis (N = 482213) for each CRC case. All HS events in public primary care and all in specialized care were linked to cases and controls up to 48 months prior to cancer diagnosis. To calculate incidence rate ratios (IRRs) for comparisons of monthly HS rates between CRC cases and controls, we broke the matching and used a negative binomial regression model with cluster robust variance on individual level. We report the rate ratios and corresponding 95% confidence intervals separately by sex, and for HS events in primary and specialized care.

### Results

We found a statistically significant increase in the cases’ monthly HS event rate in primary care among women four months (IRR 1.25, 95% CI 1.01-1.49) and among men six months (IRR 1.22, 95% CI 1.04-1.40) prior to CRC diagnosis compared to the control population. In specialized care the monthly HS event rates were systematically higher among cases compared to control population but started to increase steeply four months (IRR 1.77, 95% CI 1.69-1.85) prior to CRC diagnosis among women and five months (IRR 1.62, 95% CI 1.55-1.70) among men.

### Discussion and Conclusion

A significant increase in health care seeking behavior was observed in CRC patients several months before cancer diagnosis both in primary and specialized HS and in men and women.

## Centralization of rectal cancer care in France: what cost and benefit and for which populations?

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### Background

Resection of the mesorectum is currently the gold standard for the treatment of localized invasive rectal cancer (RC). The quality of this surgery and the risk of relapse seem to correlate with the surgical activity level of the center. In France, a threshold of 30 annual interventions for digestive cancer has been set for centers to be authorized to surgically treat CR. Centralizing the RC care could benefit patients but would likely have a cost that would not be the same for all.

### Objective

To study the impact of RC treatments centralization on survival (benefit) and patients travel distance (burden) in metropolitan France and the distribution of these benefits and costs.

### Method

We study a sample of non-metastatic invasive RC cases diagnosed from 2010 to 2015 that underwent curative surgery identified by 16 French cancer registries and the national data on hospital stays to retrieve the total number of digestive cancer surgeries and among them the number of RC. The residence of the cases and the treatment centers were geolocalized to build an origin-destination distance matrix using QGIS software. Current recourse was described and different authorization thresholds were studied.

### Results

3,221 patients (median age 69 y, sex-ratio 1.7) were included. One-third of them consulted the nearest treatment center, were older than those who consulted farther center ($p < 0.001$) but didn't differ regarding social disadvantage. However, the most disadvantaged patients (EDI 4 and 5) as well as the oldest ones consulted more frequently centers performing fewer interventions on RC ($p < 0.001$).

### Discussion

Our first results suggest that a concentration of care towards centers with the highest activity will be more restrictive for the oldest and most disadvantaged patients, although nothing predicts the meaning of the relationship in terms of survival. The next step of this study will focus on these analyses.

## Socioeconomic position and risk of cervical cancer in the Nordic countries

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### Background

The Nordic countries have benefited from steep declines in cervical cancer incidence rates, as a consequence of the implementation of nationwide screening programmes. However, it is not clear whether all social groups have equally benefited from these preventive services. We provided an assessment of the magnitude and temporal trends of cervical cancer incidence by socioeconomic position (SEP), as measured by occupational group, across four Nordic countries (Denmark, Norway, Finland, and Sweden) using population-based data from the Nordic Occupational Cancer Study (NOCCA).

### Methods

We computed age-standardized incidence rates (ASRs) of cervical cancer per 100,000 person-years truncated at ages 50-69 years by SEP during 1961-2005. ASR ratios and differences for low_vs_high SEP levels we estimated. Using Poisson regression models, we estimated the relative risks (RRs) and corresponding 95% confidence intervals of cervical cancer for SEP levels in the Nordic countries separately and combined for the period 1991-2005.

### Results

There was a general decline in the incidence rates of cervical cancer among all SEP groups. Rates were generally higher among lower SEP groups in all countries, with a social gradient consisting of a progressive increase in risk as SEP decreased. RRs for lowest vs highest SEP in the most recent period ranged from 1.33 in Sweden to 1.76 in Denmark and was 1.42 when the four selected Nordic countries were pooled together. The ASR difference decreased over time in all selected countries, ranging from 31.1/100,000 in Sweden to 4.6/100,000 in Denmark.

### Discussion and Conclusion

Despite the general declining trends, socioeconomic inequalities in cervical cancer remained in the most recent study period, this suggesting that not all women benefited equally from screening. Low SEP women still carry the highest risks of the disease, everywhere in the Nordic countries. Efforts should be continued to ensure broad access to preventive services.

Theme: **Registry innovations, research, and health policy**

## Use case for reorganisation of population-based cancer registration in Saxony-Anhalt (Germany): mesothelioma incidence

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### Background

With the dissolution of the Joint Cancer Registry in East Germany after 70 years of existence, Clinical Cancer Registry Saxony-Anhalt is preparing to take over the population-based cancer registration and related scientific activities. The biggest challenges are the data integration of the individual data and the search for historical metadata in a suitable form. Southern Saxony-Anhalt was one of the industrial centers of the former GDR, and environmental pollution was significant, including the use of asbestos. This use case aims to combine historical and current data for Saxony-Anhalt to show trends in incidence of mesothelioma for the period between 1961 and 2022 in an international comparison.

### Methods

Sources of aggregated data that allow the reporting of incidence trends of mesothelioma should be identified. Furthermore, the aggregated data should be converted to allow for both: county-level reports after several administrative reforms and international comparisons. The individual data will be evaluated if a legal basis comes into force.

### Results

Data allowing for comparison of mesothelioma incidence trends were obtained from literature only for males and without age standardization because of unavailability of age-stratified data. There is still no legal basis for the use of historic individual data in Saxony-Anhalt. The crude incidence rate of mesothelioma for Saxony-Anhalt was 2.4 per 100,000 person-years 1980 to 1989 and 1.7 per 100,000 person-years 2005 to 2014. The counties with highest crude incidence rates 1980 to 1989 were Zeitz and Merseburg with 6.0 and 5.5 per 100,000 person-years, respectively.

### Discussion

While the crude incidence for mesothelioma for men in Saxony-Anhalt sank by relative 29% between periods 1980-1989 and 2005-2014, it rose in Denmark by 75%. These preliminary results are promising for further research, but individual data are indispensable to interpret the figures in international comparison and to adjust for effects of demographic changes.

Theme: **Registry innovations, research, and health policy**

## Creation of realistic synthetic cancer registry data with Synthea

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### Introduction

Comprehensive cancer registry data has to be evaluated as personal data, even when no names of patients, address or full birth date are included. Risk of reidentification of patients by record linkage with other data sources is high. So, data sharing might not always be possible, especially when large, open science datasets are needed, as for AI development. For such purposes synthetic data should be as realistic as possible, *e.g.*, survival analyses should lead to realistic figures. With our project we aimed to generate realistic cancer data with the use case of laryngeal cancer.

### Methods

We used the open-source software Synthea (https://github.com/synthetichealth/synthea) and programmed an additional module for development, treatment and follow-up (5 years) of laryngeal cancer (ICD 10: C32), using external, real-world (RW) evidence from guidelines, cancer registries and literature for Germany. To generate an incidence-based cohort view, we randomly draw laryngeal cancer cases from the simulated population and deceased persons, stratified by the real-world age- and sex-distribution of laryngeal cancer at diagnosis.

### Result

A Synthea module letting person fall sick with laryngeal cancer, with age- and stage-specific treatment and prognosis could be successfully implemented. The synthesized population reflects RW prevalence quite well. Extracting laryngeal cancer patients leads to a cohort of more than 50,000 laryngeal cancer patients. Descriptive data, as well as stage-specific and overall 5-year survival, was in good agreement to published data.

### Discussion

Using synthetic cancer patients, generated by Synthea, will enable the creation of realistic and large (even larger than RW incidence) cancer patient cohorts. Such data could be easily shared and published as open-source without any data protection issues. Using the data for analyses will lead to realistic results, whereas realism is limited by the amount of information included in the module.

# Population based survival of major cancers in women in Greater Mumbai

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## Background

In Greater Mumbai, breast, cervix and ovarian cancers are the major and contribute more than 40% of total cancer in women. Globally, these cancers are sharing major burden of cancer in women. Many survival studies based on these cancers have yield better survival rate. Here authors have aim to evaluate survival proportion of these cancers in Greater Mumbai.

## Method

During 2009-2013, a total 14,650 cancer of breast, cervix and ovarian cancer registered in Greater Mumbai. A follow-up information has been obtained by a different method *e.g.* re-scrutinize of medical records, postal/telephone enquiries, public databases, and home visits. The survival of each patient was calculated as a period between date of cancer diagnosis and date of death, or date of lost to follow-up or the closing date of study (December 31st, 2017). One, three and 5-years observed and relative survival were calculated. For comparison with other populations, age standardized relative survival (ASRS) was calculated. The log rank test and cox regression model have been used to identify the relationship with other variables.

## Results

Five-year observed-survival rates for breast, cervix and ovarian cancers are ranged from 32-67%. The highest survival rate reported by breast (67%), cervix (38%) and lowest by ovary (32%). An effect of age at diagnosis is observed, for each cancer survival declined with advancing age. Survival declined rapidly with advancing of stage for each cancer. The breast cancer has reported lowest survival for metastasis and advance stage (19%).

## Conclusion

All these cancers have shown reasonable survival rate. This compares favorably with previously reported studies from Mumbai and other registries but inferior to that reported in the developed world particularly for breast cancer. The improvement in survival reflects enhanced awareness as well early detection, and provides a good indicator of the efficacy of treatment.

## A geographical pattern analysis of liver cancer incidence in Puglia with the Leroux model

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### Background

The Puglia cancer registry (RTP) covers a population of almost 4 million inhabitants distributed in 257 municipalities and its consistent database allows us to study small-area cancer incidence. Results are of great interest to the general population, patients, policy makers, healthcare managers, clinicians and researchers. In epidemiology CAR and BYM are the most frequently spatial-analysis models used. An alternative spatial model proposed by Leroux was fitted to the RTP data to estimate and visualize in a map of Puglia the hepatocellular carcinoma (HCC) incidence at the municipal level, in comparison with the more usual models.

### Methods

We extracted from the RTP database data relating to 2,961 cases of HCC diagnosed between 2014 and 2018 in adults aged 30 and over. We calculated SIR for each municipality and with the CARBayes function in R we estimated and mapped the smoothed SIR of each municipality, according to Leroux, CAR and BYM models and the posterior probability (PP) that this estimate is greater than 1. Model fit was assessed for the three models using Watanabe-Akaike Information Criterion (WAIC).

### Results

An area between the province of Barletta-Andria-Trani (BAT) and the northern part of the province of Bari shows liver cancer incidence significantly higher than the rest of the region. In this area, the three highest SIRs indicate an excess of HCC incidence between 46% and 66%. Based on the WAIC the Leroux model fits the data better than others (Leroux: 1237.47; BYM: 1241.48; CAR: 1243.24).

### Discussion and Conclusion

Data from the RTP area are accurate and allowed us to study the spatial distribution of a specific liver cancer type (HCC) associated with defined risk factors at municipal level. Our experience supports the utility of the Leroux model for spatial analysis.

## Project of an experimental Gastropanel®Screening for stomach cancer in a high incidence area of Italy

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### Background

Preventive strategies based on h pylori eradication and endoscopy are increasingly considered as effective strategies to prevent gastric cancer and have been introduced in high incidence countries in Asia. Few data are available on effective prevention strategies in European countries. Recently, the European Council recommended investigating gastric cancer screening strategies. The Umbria region (x inhabitants) is a high-risk pocket for gastric cancer with the highest incidence rate in Italy. We propose a pilot screening in the highest incidence local health district in Umbria to provide basic information needed to plan effective prevention strategies.

### Methods

An experimental screening is proposed to assess prevalence of H. pylori infection, atrophic gastritis and risk factors. Thirty-nine thousands persons aged 50-74 years will be invited to undergo GastroPanel testing (sensitivity 70%, specificity 93%) and to fill in a questionnaire on risk factors and familiarity.

### Results

Gastric cancer incidence standardized rates were 12.2 and 19.6 among males and 7.1 and 9.9 among females in Umbria and in the Alto Tevere Health district respectively (period 2015-19, st.pop. world). With a screening adherence of 30%, 2,357 are expected to undergo gastroscopy and tff3. Overall expected cases diagnosed at screening of cancer, dysplasia or atrophic gastritis are 1,568. Instead, with a screening adherence of 50%, 3,851 persons would undergo gastroscopy and tff3 and expected cases would be 2,614.

### Discussion and Conclusion

The pilot study will provide fundamental information for planning effective and sustainable intervention to prevent gastric cancer and choose among different prevention strategies in Italy and other European countries.

Theme: **Registry innovations, research, and health policy**

## Characteristics and survival of breast cancer patients in Japanese designated and non-designated cancer care hospitals

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### Background

In Japan, Designated Cancer Care Hospitals (DCCHs) were certified by the government as providing high quality cancer care. As breast cancer is the most common cancer in women in Japan, it is difficult to treat all patients at DCCHs. This study aimed to examine differences in patient characteristics and survival of breast cancer between those treated in DCCHs and non-DCCHs.

### Methods

In total, 175,166 cases were diagnosed in 2016 and 2017 using national cancer registry data.

Municipality-level areal index for deprivation and population density, age, stage (localized, regional, distant), detection route (screening, incidental detection, others (noticeable symptoms)), and treatment (surgery, hormone therapy, chemotherapy, other, non-therapy) were compared between patients treated in DCCHs and non-DCCHs. We also estimated 2-year net survival (NS) using the Pohar-Perme method and applied the excess hazard model. Multiple imputation was applied to missing data.

### Results

51.9% of cases received their main treatment at DCCHs. Less deprived area, younger and earlier stage patients were treated in DCCHs. NS was higher in DCCHs for all stages. In particular, a large difference was observed for regional and distant stage patients (regional: DCCHs: 96.9%, non-DCCHs: 85.1%, distant: DCCHs: 68.1%, non-DCCHs: 48.2%). In total, excess hazard ratio (EHR) of DCCHs was 0.73 (95%CI 0.68-0.79) by univariable analysis. After adjustment for confounding factors, EHR of DCCHs was 0.88 (95%CI 0.83-0.93).

### Discussion and Conclusions

For localized and patients, differences in NS between DCCHs and non-DCCHs were small, probably due to the short follow-up period. Among regional and distant patients, we found a higher proportion of older and non-therapy in non-DCCHs. Although EHR of non-DCCHs changed to null direction after controlling observed confounding factors, short-term prognosis was slightly better in DCCHs. We need further study to consider disease-subtypes and comorbidities using medical claims and other clinical database, and a longer follow-up period.

Theme: **Registry innovations, research, and health policy**

## Quality indicators for cancer screening using health insurance data in Japan

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### Background

Screening positive rate, attendance rate for further workup and cancer detection rate are the main quality control indicators routinely used in cancer screening in Japan. Although screening sensitivity, specificity and cancer prevalence are better indicators, those are not routinely used, because of difficulty to identify false negative cases. Population-based cancer registry can be used for this purpose, but timeliness may not be good. Health insurance claim data, although validity of cancer diagnosis should be checked, will be another alternative for identifying false negative cases, especially in occupational settings in Japan.

### Methods

We use data from one insurer, which covers approximately 4 million people lives mainly in Kansai area in Japan. It contains both health insurance claim data and colorectal cancer screening result data (positive or negative) in 2015-21. Using health claim data, we identified newly diagnosed cancer cases by the following definition: 1) cancer is included in disease code, and 2) cancer treatments (surgery, chemotherapy and radiotherapy) are included in treatment code. We also identified attendance status for further diagnostic workup by the following definition: 1) screening result is positive, and 2) medical examinations used as further diagnostic workup are included in medical examination code within 12 months from screening date.

### Results

Out of 8,759,267 cumulative number of persons attended to colorectal cancer screening (fecal occult blood test), 6,511 colorectal cancers were identified. Screening positive rate was 6.4%. Screening sensitivity, specificity, cancer prevalence was estimated to be 72.1%, 93.7% and 0.104% respectively. Attendance rate for further workup was estimated to be 23.2%, which was quite low.

### Discussion and Conclusion

Quality control of cancer screening in occupational settings can be much improved if health insurance claim data are used.

## Socioeconomic and rural-urban inequalities in HPV vaccination, screening uptake and cervical cancer outcomes in Japan

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### Background

Socioeconomic inequalities in cervical cancer outcomes have been reported, but research on related factors is still scarce. Following a difficult situation in Japan, temporally halted HPV vaccination recommendation and low uptake of screening, strategies to encourage citizens to attend screening and receive vaccination varied by municipality, and wide gap in uptake. In order to understand the impact of indicators related to risk factors and accessibility for preventive action, we investigated the association between municipality-level socioeconomic and urbanization indicators and preventive action and cervical cancer outcomes in Japan.

### Methods

The age-standardized mortality rate (ASMR) for 2015-2020 and age-standardized incidence rate (ASIR) for 2017-2018 were calculated for cervical cancer excluding intraepithelial cancer using Vital Statistics and National Cancer Registry. HPV vaccination coverage in 2020-2021 and the cervical cancer screening rate in 2016-2020 were calculated using reports from regional public health sectors. We calculated these by quintile of Area Deprivation Index (ADI) for each municipality as a socioeconomic indicator, and the percentage of the population living in Densely Inhabited Districts (DID) as an urbanization indicator. The Slope Index of Inequality (SII) and the Relative Index of Inequality (RII) were used to assess regional inequalities.

### Results

In total, the ASMR was 3.4, the ASIR was 17.1 per 100,000, the cervical cancer screening uptake was 15.9%, and the HPV vaccination coverage was 2.0%. In the more deprived areas, higher ASMRs and ASIRs were observed (SII: 0.8, 2.8, RII: 1.3, 1.2) and lower HPV vaccination coverage (SII: -0.4, RII: 0.8) was observed. Higher urbanicity was associated with higher ASIR and vaccination coverage (SII: 1.5, 0.5, RII 1.1, 1.3) and lower screening uptake (SII: -4.5, RII: 0.8).

### Discussion and Conclusion

Inequalities in preventive action and cervical cancer outcomes according to socioeconomic or urban status were observed. More detailed analysis related to other environmental factors is needed.

# Strengthening cervical cancer screening referral pathway and management; an implementation study of canSCREEN® in Kenya

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## Background

Cervical cancer is a major public health concern. In Kenya it is the second most common cancer among women, accounting for 5,236 new cases and 12.4% of all female cancers annually. Equitable access to quality screening and treatment services, robust and interoperable monitoring systems and tools, and clear patient referral pathways and management are critical for countries to deliver and measure progress towards achieving the WHO 90-70-90 strategy. Our study aim to assess current referral pathways and linkages between and among cervical cancer screening and management services, pilot test the canSCREEN® cervical cancer screening registry, test and evaluate a streamlined referral pathway that increases the number of women receiving appropriate treatment in selected health facilities in Nairobi.

## Methodology

This is a mixed methods observational study. Quantitative components entailed desktop reviews of existing data and administration of structured questionnaires. Linkage to the Nairobi Cancer Registry database will be done.

## Results

canSCREEN® data platform has been implemented in five of the seven targeted healthcare facilities in Nairobi. Enrollment of women is ongoing and will provide important data to evaluate the screening pathways. From the baseline data, knowledge on cervical cancer was high (91%), however only 43% attributed the disease to HPV infection. Majority (67%) of the participants were HIV+; 61% had been attending routine screening.

## Discussion

This study provides knowledge on the status of the referral pathway, women's experiences in accessing screening and management services, health care workers' and policy makers' perspectives on ways to improve the care pathway. The implementation of the canSCREEN® data platform has provided information on the usefulness and ways to improve the referral pathway and barriers to screening. The information is useful for the development of Kenya's action plan in response to the WHO call to action to eliminate cervical cancer as a public health problem.

# Unveiling Breast Cancer Patterns in Luxembourg: Insights from the RELIANCE – Breast Cancer Pilot Study

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## Background

The RELIANCE project aims to utilize data from Luxembourg's National Cancer Registry (RNC) for cancer epidemiology, prevention, and care research. Limited information from the RNC has been published, and no studies have been conducted using its data. The RELIANCE – Breast Cancer pilot study is the first to investigate breast cancer epidemiology in Luxembourg using RNC data, exploring methods, international comparisons, and additional datasets for studying health outcomes.

## Methods

The pilot study follows a two-step approach. Step ONE involves a retrospective analysis of the RNC female breast cancer cohort from 2013-2018. It aims to describe population characteristics, analyse diagnosis and treatment waiting times, and estimate trends in incidence, mortality, and survival rates. Step TWO is a cross-sectional prospective study utilizing an online self-administered questionnaire to collect additional data from breast cancer survivors visiting the public occupational health service (STM). This step aims to evaluate return-to-work outcomes after breast cancer diagnosis and treatment. Data from Step TWO will be linked to STM patient records and the RNC dataset for the 2013-2018 cohort.

## Results

This study will generate the first set of indicators on breast cancer in Luxembourg, improving data quality and usability. It will also provide international insights into the applications of population-based cancer registries for small developed countries.

## Discussion and Conclusion

The RELIANCE – Breast Cancer pilot study fills the gap in research utilizing RNC data and contributes to understanding breast cancer epidemiology in Luxembourg. The incorporation of additional datasets and international comparisons enhances the scope and impact of the study. The findings will support evidence-based decision-making for cancer prevention, diagnosis, and treatment, while also showcasing the value of population-based cancer registries for small developed countries.

## Cancer RADAR – mapping cancer by migration background in Europe: a call for collaboration

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### Background

The risk on cancers among migrants in Europe (approximately 87 million people) depends on the country-of-birth and the host-country of a migrant, and can deviate markedly from that of the host population. The epidemiological context of migrants may give rise to large health disparities concerning these cancers, yet detailed quantitative data on the magnitude of existing disparities in Europe are lacking.

### Aim

Cancer RADAR aims to provide a Europe-wide quantification of different types of cancer including stomach, liver, cervical and breast cancer, stratified by migration background. Cancer RADAR is a collaborative initiative led by IARC/WHO and we are currently seeking cancer registries interested in setting up a working group for this project.

### Methods

Together with cancer registries in Europe we aim to collect data on cancer stratified by migration background. Migrant is defined as a person living in another country than where he/she is born in. We will send a questionnaire to cancer registries in Europe to map which cancer registries have data on cancer by country-of-birth. Data collection will be done over the three most recent CI5 publication periods (2003-2017). To also include cancer registries for which the data on the size of the population-at-risk by country-of-birth is not available, proportional incidence ratios will be used to estimate the risk on cancer among migrants compared to the general population. The collected data will be entered in a template excel-file and processed using a provided R script to generate aggregated effect measures. No individual level data will be shared and the processed data will only contain aggregated estimates. This process facilitates the collection of data in a harmonized and standardized way.

### Discussion

Cancer RADAR's long-term goal is to reduce the burden of cancer among individuals with a migration background in Europe by mapping current and future disparities.

## FAIR PETs and DARWINistic SPIDERs – Cancer Registries in the European Health Data Space

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### Background

The proposed European Health Data Space (EHDS) regulation aims to improve the use of digital health data for research and innovation. The introduction of EHDS will impact the operations of cancer registries and may become a friend or a foe.

### Methods

In several national and European projects, the implementation of data spaces for cancer is being tested. The introduction of novel technology, new governance models and new legislation are aimed to eventually create ‘a real-time state of play of cancers across the EU’. To this end, machine learning models are applied to patient records to support patient identification and registration. We adhere to the principles, to facilitate data discovery, analysis and the interpretability of results. The adoption of Privacy Enhancing Technologies (PETs) is explored to facilitate access and usage to data, while adhering to the various interpretations of GDPR. To support linkage, tools such as SPIDER are applied to identify patients across hospitals and borders. The impact for European population-based and clinical registries is studied.

### Results

Design and architecture for federated, privacy-by-design data networks for cancer are created, adhering to FAIR data standards. In these networks, the adoption of new technologies enable data governance and legal frameworks that foster collaboration and data reuse, according to EHDS standards. Machine learning is applied to identify patients and collect data directly from the patient records in the hospital. Adherence to a common data model allows registries to act as a ‘data access body’ in partnerships with private and public stakeholders, including the European Medicine Agency via the DARWIN EU network.

### Discussion and Conclusion

Through active participation in European and national initiatives around EHDS implementation, the European cancer registry community has the opportunity to shape the future of cancer research and surveillance in Europe, and further increase its impact.

Theme: **Registry innovations, research, and health policy**

## The Dutch Cancer Atlas: geographical variation of cancer incidence in The Netherlands

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### Background

Cancer incidence rates may vary geographically. Understanding the extent of this variation is crucial for identifying its causes, developing prevention strategies, and promoting healthier lifestyle behaviors related to cancer. This project aimed to assess the geographical variation in cancer incidence across small areas in the Netherlands and visualize the results in a publicly accessible interactive application.

### Methods

For the analyses and visualization we adopted the methodology used by the established Australian Cancer Atlas. The Netherlands was divided into small areas based on the first three digits of their zip codes. Patient data from the Netherlands Cancer Registry and population data from Statistics Netherlands, registered between 2011 and 2020, were used. Per area, data was aggregated over this ten-year period and overall and sex-specific Standardized Incidence Ratios were calculated for 24 cancer types and all invasive cancers combined. To enhance statistical stability and preserve privacy, estimates were smoothed using Bayesian spatial models.

### Results

The online application called 'The Dutch Cancer Atlas' was launched January 2023 (https://www.canceratlas.nl/). This publicly available atlas displays estimates of cancer incidence, along with level of uncertainty, for each small area in the Netherlands. It also provides information on the types of cancer, their patterns, and potential underlying causes. The atlas reveals variations in geographical distribution that differ across different cancer types. For example, lung and skin cancer incidence show clear geographical variation, whereas variation in breast cancer incidence is less pronounced.

### Discussion and Conclusion

The Dutch Cancer Atlas shows that cancer incidence in the Netherlands varies geographically. With its publication we reached a large audience and raised awareness amongst for instance regional policy makers and health professionals, stimulating several initiatives (ranging from pathology reviews to local prevention campaigns). We hope to further encourage research into causes of geographical variation and encourage implementation of targeted prevention strategies.

## Socio-economic impact of The Netherlands Cancer Registry: results of a business case

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### Background

A national cancer registry holds many advantages for research and clinical practice. The Netherlands Cancer Registry (NCR), embedded in the Netherlands Comprehensive Cancer Organization (IKNL), provides an amplitude of epidemiological and clinical data, including stage and treatment, of nearly all (>95%) cancer patients. Over 2,000 peer-reviewed articles were published in the past decade using data from the NCR. The magnitude of the socio-economic impact of the NCR and subsequent activities is, however, unknown.

### Methods

An independent consultancy agency, specialized in calculating socio-economic impact, performed an impact analysis. The agency interviewed 29 stakeholders and reviewed relevant documents like annual reports. For three of the main objectives of the NCR, the impact was calculated. This calculation was based on international literature and validated methods, like Quality Adjusted Life Years (QALY) and Return Of Investment (ROI). A conservative approach of the estimates was applied.

### Results

The socio-economic impact of data collection (NCR) and interpretation (IKNL) was estimated at nearly €600 million annually. This covers the main objectives, i.e. 1] facilitating and conducting scientific research (~ €80 million), 2] improving quality, organization and efficiency of clinical care (~ €90 million) and 3] influencing policy making regarding prevention and population-based cancer screening (~ €410 million). It was suggested that the impact could be increased by expending the NCR with additional data, for example costs, automatization of the data collection, and international sharing of data.

### Discussion

The estimated impact of data collection and interpretation exceeds the allocated budget of IKNL more than tenfold, stressing the importance and relevance of a nationwide cancer registry. Data interpretation by researchers and an active policy to distribute the results are crucial to achieve this impact.

## New approach in cancer data collection e-KRN+ in Polish Regional Cancer Registries (PRCR)

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### Background

Till March 2023, when new law and IT platform e-KRN+ was launched in Poland, completeness of data in PRCR was related to reliable reporting of cancer by physicians. It could be done in three ways: on paper form, via web application or electronic form implemented in hospital information system (HIS). Regardless of the chosen form of notification, the physician was always involved in the process. e-KRN+ is supposed to make this process 'physician-free' and collect more items.

### Methods

The current and expired legal acts regulating cancer registration in Poland (including standard dataset on cancer cases), e-KRN+ platform specification, and data management statistics from Greater Poland Cancer Registry (GPCR) were reviewed and analyzed.

### Results

In 2022 almost 22000 electronic or paper cancer notification forms were sent to GPCR. The lack of crucial data in these forms was still a significant problem and too often registrars needed to call for additional information to hospital units. The main innovation that was introduced by e-KRN+ is the possibility to integrate with every HIS and periodically transfer specific cancer patient's medical records that would help to fulfill cancer case form by CRs. According to new legislation PRCR will collect data on additional fields, e.g. biomarkers, (y)pTNM separately from cTNM, or ECOG. Most of new and updated ENCR recommendations and rules have been taken into account in data validators implemented in e-KRN+.

### Discussion and Conclusion

'e-KRN+' created by Polish National Cancer Registry is ready to be integrated with HIS and receive selected parts of patient's medical records that will be the basis for cancer case coding by well-trained registrars. This linkage will make possible to collect more complete and accurate cancer case data on morphology, TNM, stage, biomarkers, recurrence and treatment, so they could be successfully used by clinicians, law makers or patient advocacy groups.

## Uterine cervix and lung cancer alterations in South Portugal (1998-2019) and implemented preventive measures

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### Background

Portugal has implemented several programs against cancer, namely uterine cervix and lung cancers.

### Methods

Incidence, mortality and survival of those site cancers between 1998 and 2019, time variation and relations to executed programs in three geographic regions covered by South Portugal Cancer Registry, were studied using average annual percent changes (AAPC) and Kaplan Meier.

### Results

Cervix uteri tendency: stable crude rate until 2009 and high decrease since then; average annual percent change (AAPC) of -0.85%, explained by 2009 initiated screening program with complete performance after 2017. A peak incidence during 2009 was related to a single institution screening action.

Tendencies by region: Lisbon accompanies the global regions rate; Alentejo shows an increase rate from 2008, year of local screening program implementation. Despite the overall AAPC negative, Alentejo AAPC increased 5.61%; Algarve has a recent decreased tendency. By age groups: highest incidence on 45-54 y-o group and lowest until 25 years-old. AAPC: highest for 25-34 y-o group, key target population for screening and vaccination; highest decrease: the 65-74 group. Progress by tumour stage: metastatic cases had an AAPC of 3.47%, contrasting with local/regional cases (increase of 0.61%), most probably related to missing information (AAPC of -7.83%) lowering since 2013.

Lung cancer, incidence and mortality show a non-stop increase, with incidence AAPC of 2.59%, more accentuated in women (♀AAPC = 6.48%; ♂AAPC = 1.68%), much higher in Alentejo females (15.56%), followed by Algarve ones (9.42%). Disease presenting stages evolution: high decrease until 2013 and slower declining afterwards, with higher rise for metastatic tumours (AAPC: 6.80%); regional tumour cases also increased (AAPC of 5.72%). Nevertheless, survival is also increasing.

### Discussion and Conclusions

Cervix uteri cancer panorama improved thanks to screening and vaccines programs, with need of better implementation in medically more unprotected regions. Lung cancer is in line with international perception of disease evolution.

Theme: **Registry innovations, research, and health policy**

## First steps of the organized breast cancer screening program in North-Western Region of Romania

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### Background

With 12,085 breast cancer cases in 2020 (66.8%ooo), Romania do not have one of the most high incidence among other European countries, nevertheless the specific mortality 17.4%ooo (3,918 deaths) represent an important burden, being one of the highest in Europe. Beside one pilot screening program enrolled in North-Western Region (2014-2017) through an EEA Grant, Romania is late in organizing breast cancer screening programs. Two other European funded projects were obtained, by the institute, in 2018, one for setting up the regional screening network and second, for carrying out organized screening activities, focused on disadvantage population (>50%), with a maximum of 27,000 beneficiaries (financial constraints).

### Methods

In North-Western Region total population at risk (50-69) is 36,8410 women, 14,8338 being in rural areas. In the first phase, a screening center was organized in a rural setting and a mobile unit was purchased for remote areas. Due to COVID pandemic digital mammograms, with double reading and arbitrage, started only in October 2021. The program is monitored and evaluated through Regional screening registry and Regional Cancer Registry from Cluj.

### Results

Up to date, 13,151 women received mammograms – 49% of target – 822 having positive results (6.2%). Arbitrage rate was 8.73% and the recall rate 6.44%. From 624 women (4.7%), who performed additional evaluation, 173 (27%) had positive results. After additional evaluation, the percentage of biopsies undertaken was 20%. From 127 biopsies performed, 85 (67%) were positive (in situ or invasive). Breast cancer detection rate is 0.58% and Invasive Breast cancer detection rate is 0.47%.

### Discussion and Conclusion

The goal of screening is to detect breast cancers when still curable to decrease breast cancer-specific mortality. Breast-cancer outcomes in Romania must be improved through practical interventions that are realistic and cost-effective. Early breast-cancer detection and appropriate comprehensive cancer treatment play synergistic roles in this.

Theme: **Registry innovations, research, and health policy**

## Innovations in cancer registration with electronic medical information: Integration of Rwanda Cancer Registry into DHIS2

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### Background

Population-based cancer registries play an essential role in providing reliable data on cancer incidence and mortality. Most registries in low- and middle-income countries use cancer registrars travelling to various sources of information for data collection using paper forms and data entry in a centralized office, posing sustainability challenges with limited funding for staff and travel costs. Rwanda's Ministry of Health has integrated the cancer registry into the existing health surveillance system, DHIS2, to ensure sustainability.

### Methods

Historically since 2010, in Rwanda, cancer registration was paper based and data entry into a centralized canreg5 software. DHIS2 was first introduced in Rwanda in 2011 for reporting routine health aggregate data and later upgraded to host individual records with TB, HIV, Immunization et c. Since 2019, the cancer registry was also integrated into DHIS2 according to international standards of cancer registration as defined by IARC to ensure sustainability. The interoperability between DHIS2 and Canreg5 was done to ensure data exchange and advanced analysis with Canreg 5.

### Results

The oncology module of the DHIS2 cancer registry has nationwide coverage. 90 focal persons from 73 information sources, including hospitals, clinics, laboratories and mortality databases, have been trained in cancer registration within their respective institutions, under the coordination of the Rwanda Biomedical Centre (RBC) cancer registration office. A total of 35,132 cases from 2007 to 2021 are recorded in the DHIS2 database. We analyzed data for the last 5 years (2016 to 2020) ($n = 17,290$ ). Prostate cancer was the main cancer in men (36.6%), followed by stomach cancer (8.6%). In women, the main cancers were cervical cancer (22.2%) and breast cancer (22.4%).

### Conclusion

Integrating the cancer registry into existing health surveillance system including electronic health information system such as DHIS2 for automated data management, is the cornerstone of the cancer registry's sustainability.

# Correction of prevalence in the Slovenian Cancer Registry with incidence data as early as 1950

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## Background

The population-based Slovenian Cancer Registry (SCR) has been collecting epidemiological data on cancer incidence since its establishment in 1950. Slovenian cancer prevalence can be obtained from the open and freely accessible website SLORA, where prevalence is calculated from SCR data by counting all cancer patients known to be alive at the end of the calendar year in question. Cancer prevalence is an important indicator for national cancer control and planning. The objective of our study was to estimate the cancer prevalence for earlier periods, for which the counting method cannot provide reliable estimates.

## Methods

To estimate complete cancer prevalence for each calendar year, we used two methods: the completeness index method and the counting method adjusted for patients lost to follow-up by estimating the expected number of survivors among them. Limited-duration prevalence was calculated by counting persons diagnosed with cancer in the past who are known to be alive at the end of the specified calendar year since 1985, when personal identification number was started to be used on population level. Results were stratified by sex, calendar year, 5-year age groups and cancer site.

## Results

Cancer prevalence in Slovenia has increased over time from 1.3% of Slovenian population in 1985 to 5.8% in 2019. The complete prevalence estimate for 1985 is 1.4%. The prevalence estimate for 2019 obtained with the counting method did not change statistically significantly when we have adjusted it for patients lost to follow-up.

## Conclusion

SCR has been collecting epidemiological data on cancer for more than 70 years and is one of the oldest population-based cancer registries in the world with internationally recognized data quality. For calendar year 2019, the complete prevalence corresponds to the unadjusted prevalence obtained using the counting method.

Theme: **Registry innovations, research, and health policy**

## Impact of ecological fallacy in analysis on socioeconomic inequalities in cancer incidence: a multilevel analysis

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### Background

When using area-based socioeconomic measures, ecological fallacy can have and impact in the analyses of socioeconomic cancer inequalities. This study examined the extent of changes in socioeconomic inequalities in cancer incidence when comparing individual and area-based socioeconomic measures.

### Methods

Population-based Slovenian Cancer Registry incidence data from 2011 to 2013 (n = 27,331) and individuals' data from Census in 2011 (n = 1,739,865) aged 16 years and older were used. The Slovenian version of European Deprivation Index at aggregated level of polling stations was calculated and additionally at the individual level. Poisson regression modelling was performed for individual and aggregated level and also in multilevel analysis for examining the impact of the socio-economic status on the cancer incidence at the same time at the individual and at the aggregated level.

### Results

A total of 27,331 cancer cases categorised into 17 cancer sites were analysed. When comparing the results from individual and aggregated level of polling stations, altogether fifteen out of seventeen comparisons were consistent. When comparing the results of individual level coefficients and multilevel approach also fifteen out of seventeen comparisons agreed. And when comparing the results of the aggregated coefficients and multilevel approach all seventeen comparisons agreed.

### Discussion and Conclusion

When exploring the association of socio-economic status and cancer incidence in the Slovenian population on aggregated data, the ecological fallacy did not significantly affect the final outcomes. Comparisons of individual and aggregated socio-economic measures showed a sufficient agreement. Although the association of cancer incidence and socio-economic deprivation at individual and aggregated levels was not the same for all cancer sites, the results were similar for the majority of them. It is possible to adequately substitute deprivation indices at the individual level when analysing socio-economic health inequalities in the Slovenian population with the aggregated indices at the level of polling stations.

## 60-year time trends and cohort effect on mesothelioma incidence in Slovenia

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### Background

Malignant mesothelioma is a rare and aggressive cancer of the lung, pleura, and several other internal organs, strongly associated with asbestos exposure. Incidence rates of mesothelioma have increased since the 1960s. In Slovenia, the production and marketing of asbestos has been completely banned since 1998. The aim of this study is to assess 60-year trends in mesothelioma incidence and possible cohort, age, and period effects.

### Methods

Data on mesothelioma incidence was obtained from the population-based Slovenian Cancer Registry for the period 1962-2021, divided into 5-year intervals. Age-standardized incidence rates were calculated, and the time trends were analysed using log-linear joinpoint regression, with results expressed as annual percent change (APC). The effects of age, time of diagnosis (5-year periods), and 5-year birth cohort were assessed using age-period-cohort models.

### Results

An overall decrease in the age-standardized incidence rate of mesothelioma over the past 10 years was observed (APC with 5-year moving average -1.6%). The age-standardized rate (5-year moving average) peaked in 2016 (1.7) and has been declining since (below 1.5 in 2021). According to the age-drift-period-cohort model, the birth cohorts most affected by mesothelioma were those born in 1932-1936, with the highest relative risk (5.9). The period during which asbestos production increased coincided with these cohorts entering the workforce. Relative risk has decreased for cohorts born after 1946.

### Conclusions

Our results suggest that the peak of mesothelioma incidence in the country has already passed and that we are now experiencing a further but slower decline in mesothelioma incidence. Wide confidence intervals indicate some uncertainty in these estimates, mainly due to the small number of cases. These results support the effectiveness of the asbestos ban in reducing mesothelioma cases and underscore the importance of continued surveillance and preventive measures to mitigate the long-term effects of asbestos exposure.

## Sustainable accessibility of cancer registry data: E-ARK specification eHealth2

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### Background

The European Commission supported development of the eHealth2 specification as part of the eArchiving Building Block activities, which supports the long-term preservation of cancer registry export data. The first version of the specification was developed in collaboration between the Archives of the Republic of Slovenia and the Slovenian Cancer Registry. Cancer registry exports are used for research and as data input to international aggregators and thus influence health policy. Such exports are unique and may not be replicated due to the nature of the cancer registry information system, so it is important to preserve at least some of them.

### Methods

We developed a specification based on exports generated for the international aggregators ENCR-JRC and CONCORD. In developing the specification, we considered the entire process of exporting cancer data: from the call for data to confirmation of successful export by the data aggregator. In addition to the actual data exported from the cancer registry database, we considered all records, used or generated during the export process as potentially worthy of long-term preservation.

### Results

Cancer registries, aggregators and other stakeholders who wish to preserve and provide permanent access to information about exports can use two documents: eHealth2 specifications and guidelines. The content and organization of the information that needs to be preserved is described and defined by the concept of the information package, as defined in ISO 14721 OAIS. Since eHealth2 is a low-level specification, for successful implementation, users should first consult the high-level E-ARK specifications, namely the Common Specification for Information Packages and E-ARK SIP (submission information package) specification.

### Discussion and Conclusion

The E-ARK Consortium, which operates under the eArchiving Initiative, provides support for the implementation of the specifications. The eHealth2 specification also has the potential to be further developed according to the needs of cancer registries.

Theme: **Registry innovations, research, and health policy**

## Innovative use of the population-based cancer registry-a challenge with some advantages in a rural setting

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### Background

Population-based cancer registries have a vital role in cancer epidemiology. They are the safekeeping place of cancer data, sometimes called cancer intelligence sources. However, with extended functions, cancer registries have several epidemiology uses, including follow-up studies. Since 2012, the Eastern Cape Cancer Registry (ECCR) has started to check for the vital status of all cases in the database. The ECCR uses different methods to complete vital status information. Only one method and its advantages will be explored and discussed.

### Methods

Once a year, a sample of identifiable patients is retrieved whose vital status cannot be verified by other methods used by the ECCR. The list is distributed to the oncology-trained nurses for tracing the patients in their respective areas through home visits. Feedback on each patient listed is expected every month. Information received on each patient's vital status updates the database.

### Results

Ninety-eight percent of patients on the list get their vital statuses verified. This translates to the validity of patients reported by the ECCR. Relationship between the caring health facilities and the patients is maintained and strengthened through these home visits. Some post-treatment complications are identified and addressed accordingly. Out of the remaining two percent that cannot be verified, some patients are unknown in the address recorded, or their homes are not easily accessible. The patients sometimes deny the cancer diagnosis.

### Discussion and conclusion

Cancer registries operate on a limited budget. Home visits burden this meager budget as nurses who follow up on these patients must be paid. However, this study strengthens patient-health professional relationships. It also strengthens the importance of health research. Further, more funding to expand the ECCR work can be sourced based on this exercise's positive outcome.

Theme: **Registry innovations, research, and health policy**

## EOSC4Cancer: Federated discovery for secondary use of cancer registry data

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### Background

One bottleneck in cancer research is the availability of large volumes of patient data. EOSC4Cancer is a Horizon Europe project aimed to provide a federated research infrastructure for accessing and analyzing well-curated datasets. EOSC4Cancer relies on different use cases covering the whole patient journey, from prevention and screening to diagnosis and treatment. Cancer Registries, epidemiological, environmental data and screening programs are essential data sources with high potential for modeling AI technologies for cancer prevention and early detection. The consortium has not identified existing solutions to make this data findable. One of the EOSC4Cancer aims is to pilot the assembly of such data types while exploring the implementation of secure federated discoverability tools for secondary data re-use.

### Methods

Analysis of registry data landscape: data from cancer registries needs to be obtained at the appropriate granularity, while ensuring standardization and quality. After definition of data standards and operating procedures for harmonization, data can be assembled for discoverability within the GA4GH Beacon framework (extended to cancer registries and screening models). GA4GH Beacon is a federated discovery protocol that allows searching data without jeopardizing patients' privacy.

### Results

The result of this pilot could be the creation of a beacon network of secure discoverable cancer registry-related data. Sensitive data contained at cancer registries will remain at site while translational cancer researchers can explore the datasets by querying for their cohort of interest and obtaining aggregated data responses that ensure patients privacy. With this approach, in a later stage, the researcher could negotiate federated access to data or collaboration for their research of interest.

### Discussion and Conclusions

Cancer registries, epidemiological data and screening programs are data sources that can be assembled for federated discoverability enhancing its potential of being re-use for the development of AI in order to improve cancer prevention and early detection technologies.

# Register of neoplasia in kidney living donors and their recipients

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## Background

The incidence of tumours in Kidney Transplant Recipients is higher than general population due to immunosuppression. Those cancers can be new incidences, recurrences or transmitted by donors(rarely). The assessment of living donors must be rigorous and sustained to minimise risks to both donors and recipients and the follow-up must be comprehensive.

We propose a retrospective study on living donors and recipients to understand the incidence and evolution of neoplasia.

## Method

Our living donors register(n=111), along with recipients, were tabulated as per demographics, kinship, neoplasia history, and survival. The Donors' median age is 50.9±9.5 and Recipients' 42.9±13.7. Female donors were 67.6% (n = 75) and male recipients were 62,2% (n = 69), by frequency parents, then siblings and partners. The mean follow-up period was 115 months.

## Results

A history of previous neoplasia was present in 2.7% (n = 3) of donors and 4.5% (n = 5) in recipients. After surgery, we registered neoplasia in donors (7.4%)(n = 8)) and recipients (8.3%) (n = 9)).

After nephrectomy, the types of neoplasia detected in the donors were: *(i)* Lung: 3, diagnosed at months 28, 60 and 156; *(ii)* Breast: 1 at month 48; *(iii)* Colon: 1 at month 35; *(iv)* Brain Glioblastomas: 2 at months 42 and 96; *(v)* Bladder: 1 at month 156. One of the lung cancer patients and two glioblastomas expired within 12 month. In the recipients the types were: Infiltrating squamous cell (4), lung (1), bladder (1), duodenal (1), native kidney (1), lymphoma (1). Three recipients are deceased. To date there are no cases of recurrence or for received-from-donors.

## Conclusions

While the incidence of neoplasia diagnosis is greater in recipients than living donors, a comparison of the latter with general population or cadaver donors needs established. A specific register of tumour diagnosis in both recipients and living donors is needed for longitudinal studies that inform screening methods and early interventions.

## Cancer Surveillance System: Interoperability, Homogenization and Integration in a Spanish Region

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### Background

Chronic disease surveillance at national level in Spain is a pending subject. We are currently working on the implementation of a cancer surveillance system that allows to know the risk, control and prognosis of cancer at population level. The aim is to analyse the epidemiological surveillance of cancer in the Region of Murcia.

### Methods

The Cancer Registry of Murcia Region has been monitoring cancer incidence since 1983 systematically and continuously. As an innovative experience, it is integrated into the health system database and shares socio-demographic information with the different surveillance systems (Communicable Diseases, Vaccinations, Screening).

A functional analysis of the Registry has been realized analysing its strengths (S) and weaknesses (W). New tools are being implemented to increase integration, homogenization and interoperability, in order to increase operability, timeliness, cooperation, quality and dissemination.

### Results

Integration: S. Integrated system in Public Health Surveillance, included in CIFC. W. No national system; Homogenization: S. Follow the international rules (IARC, ENCR) for registration (ICDO). W. It does not have a Standard Operating Procedures (SOP), some heterogeneity in the registry; Interoperability: S. Connection with hospital discharge administrative data, electronic medical records and pathological reports. W. Pending SNOMED, linkage with National Death Index, cause of death. Future: capture of cases from sources automatically and implement semi-automatic coding of cases, as well as in the automatic and systematized publication of results (similar to mortality statistics).

### Discussion

The functional analysis of the registry as a cancer surveillance system shows as the main strength the integration in the public health surveillance system, and as weaknesses the no availability of SOP and the lack of timeliness. The homogenization with the cancer surveillance system at the national level, will enhance functionalities and allow to know the epidemiological state of cancer in Spain, with incidence and survival indicators in a timely way.

## The Population Cancer Registry of Andalucia: development process and first results

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The Andalusian Public Health System has a large population base of 8.5 million users and a complete computerized clinical history with coded diagnostic records. Cancer Registries in Andalusia began in 1985, promoted by the Andalusian Regional Ministry of Health through the Andalusian School of Public Health in Granada. The Andalusian Cancer Registry, attached to the General Directorate of Public Health, was created by Decree in 2007. Later, in 2019, another Decree introduced improvements in the management and organization of the registry for all Andalusian provinces. From there on, the implementation of a highly complex technological application started to unify in an automated way the different database sources: the Population Database; the latter Provincial Cancer Registries; the Mortality Registry of Andalusia, the screening records, and the Pathological Anatomy Information Systems. It was crucial to carry out different sets of improvements in the quality of the information that was being collected from each of the eight provinces and to solve several gaps in the data retrieval. At present, work is being done to consolidate the way to gather the different sources of data. The Andalusian Cancer Registry is intended to provide both an annual data exploitation module and a data quality control module, adjusted to the international criteria of the International Agency for Research on Cancer and the European Network of Cancer Registries.

The presentation will describe the laborious development process of all this work, the challenges already overcome, the pending difficulties and the first results already obtained.

## DHIS2 Oncology Module: the Caribbean experience

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Improvements in information technology benefit cancer registries worldwide. In the Caribbean, a system allowing remote data reporting to a centralized database is needed. The IARC Caribbean Cancer Registry Hub, Caribbean Public Health Agency (CARPHA), together with multiple international partners, formed the E-nnovate project which began in 2020 and aims to develop a data collection tool for use by population-based cancer registries that can be made globally available.

The Rwanda National Cancer Registry developed an oncology module using District Health Information Software version 2 (DHIS2). The module allows users to enter oncology-related patient data including patient information, tumour diagnosis and treatment information, using a web browser.

Exploring the use of this module in the Caribbean is appropriate and timely. DHIS2 is open-source and therefore, implementation is relatively low-cost. The module meets the identified needs of the region allowing for remote, secure data collection. Recognizing the historical use of CanReg5 in the region, a data transfer API is available to upload data collected using the module into CanReg5, allowing registries to take advantage of legacy systems and the analysis and reporting capabilities of CanReg5. Finally, DHIS2 is used for public health surveillance at CARPHA, and technical expertise and resources exist to support its operation in the region.

Results of two pilots of the DHIS2 Oncology Module in the Caribbean will be presented. The module was first tested at CARPHA from March to October 2022. The DHIS2 Metadata files were imported onto a CARPHA server, and the variable list was customized to the core dataset recommended for Caribbean cancer registries. Usability testing to assess fit for purpose and ease of use was completed. This customized module will be installed and tested to enable population-wide reporting on cancer by the National Cancer Registry of Jamaica. This work is scheduled to begin in July 2023.

## Breast cancer risk assessment in a screening program with and without diagnosis of breast cancer

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### Background

Despite breast cancer is most prevalent cancer among women in Turkey, crude rate for 50-69 age group is approximately half that of Western European countries. Early detection through screening programs plays crucial role in reducing breast cancer-related mortality. An opportunistic mammography screening program has been implemented in Türkiye. Nevertheless, the program's effectiveness is uncertain due to the relatively low incidence and could be enhanced by identifying women with a higher risk of developing breast cancer. In order to lead a risk-stratified screening program. We aimed to evaluate relevance of breast cancer risk assessment models for our society to lead to a risk-stratified screening program.

### Methods

A nested case-control study was conducted at the cohort consisting of women who attended mammography screening between 01 August 2021 – 31 January 2023 in Balıkesir Province. The sample included 57 women diagnosed with breast cancer (cases) and 228 women without a breast cancer diagnosis (controls), resulting in 51 cases and 162 control group participants. Univariate analyses employed Fisher Exact Test, Yates Test, Pearson Chi-square Tests, and Odds Ratio, while further analyses utilized Binary Logistic Regression. The difference in breast cancer risk scores between the case and control groups was assessed using the Man-Whitney U test. ROC analysis was conducted to determine the suitability of risk measurement tools for our society, with a significance level set at $p < 0.05$.

### Results

While the Gail Model failed in discriminating cases and controls, ROC analysis indicated that both the Ministry of Health tool and Tyrer Cuzick's breast cancer risk measurement tool were suitable for our society ($p < 0.05$).

### Discussion and Conclusion

This suggests that these risk assessment tools may effectively evaluate breast cancer risk in our population. Further research is warranted to explore additional risk factors and refine the risk assessment models to enhance breast cancer screening programs' effectiveness.

# Rapid cancer registration data: A response to the Covid-19 pandemic with long-term benefits

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## Background

National cancer registration data (NCRD) in England relies on a large number of data sources, enhanced follow-up with hospital trusts and expert processing by cancer registration officers. This work takes time, meaning the latest data published is often from around 2 years ago. The Covid-19 pandemic highlighted a need for quicker cancer registration data, to help understand the pandemic's impact on cancer diagnosis and care, and to monitor recovery of services.

## Methods

We developed a new 'Rapid Cancer Registration Dataset' (RCRD), to provide a quicker but simplified cancer registration dataset. The data is compiled algorithmically, with automatic, coded processing of data from a few key data sources. It contains the most widely useful data items, including patient details, ICD-10 code (to 3 digits), diagnosis date and stage (for approximately three quarters of malignant tumours), among others. Associated treatment data is also available. The data is updated monthly, with refinements to the algorithm made regularly.

## Results

RCRD data has been derived for cancer diagnoses from January 2018 onwards. For a period where both are available, comparison shows that RCRD provides a good proxy for NCRD, identifying 88.7% of fully registered cases, although also creating some records which can't be matched to NCRD (6.1%). Trends over time appear well reflected in RCRD, and there is good, although slightly variable, coverage by tumour group, age and other factors.

## Discussion and Conclusion

Information from RCRD is regularly published, typically within 4 months of diagnosis, and is being used by a range of users. RCRD provides a quicker, indicative source of cancer data, which we consider suitable for service monitoring, planning and improvement, although not for most epidemiological research. We're undertaking further work to quantify potential limitations or biases within the RCRD stage data and provide guidance for how this data can be used.

## Quality data and quality of life; impacts on the remote cancer registry workforce

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### Background

The option to work remotely existed prior to COVID-19, but its onset in 2020 made working from home the mainstream for many cancer registrars. This growing work dynamic delivered positive outcomes, like increased productivity, work-life balance, but also challenges with hiring/managing remote staff, and social isolation. NCRA conducted a survey in 2023 to quantify growth in remote work and to understand its impact on the profession.

### Methods

In 2018, NCRA conducted a member needs assessment to develop its Strategic Management Plan. In 2023, three questions from that needs assessment were included in a 10-question electronic survey on remote work sent to 5,657 NCRA member contacts over a three-week period February-March 2023 (7.4% response rate [n=417]).

### Results

The 2023 survey showed a change in primary work setting for registrars (contracting companies 12.7% in 2023 [+4.6%] vs 8.1% in 2018; central/state/provincial registries 6.47% [-2.33%] in 2013 vs 8.8% in 2018, and hospital-based registries 72.42% in 2023 vs 72.9% in 2018). The most prominent increase (+28.54%) was offering work-from-home options to registrars (in 2018 [70.5%]; 2023 [99.04%]). In 2018, 54.2% of registrars worked from home more than 75% of the time; in 2023, this increased to 85.44%. Of the 417 respondents,174 (42%) provided qualitative feedback on work-life balance, increased productivity and job flexibility, and the challenges of working fully remote (*i.e.*, IT support, face-to-face networking, etc.).

### Discussion/Conclusion

A noticeable move to more remote work for registrars occurred, with more employers offering this option three years after the pandemic. Registrars reported this new work-from-home construct provided flexibility, increased employment opportunities, and positively impacted achieving a work-life balance. Less interruptions and effective communication also supported production of quality data. Limited or no interaction with peers, the inability to train new registrars face-to-face, and lack of in-person education were universal concerns.

## CR-Scan: the potential of heatmap visualization for quality control in cancer registry data

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### Introduction

Accurately understanding cancer registry (CR) coding practices is essential for effective analysis and ensuring high-quality data. To address these objectives, we propose CR-Scan, a simple yet powerful heatmap-based visualization method that utilizes 2-D image plots to present CR data.

### Methods

To represent CR data as a color-coded map, we employ a matrix of 3-digit topographic and morphological codes on the x-y plane, where each cell's colour is based on the ratio between observed and total frequencies, either by row (morphology-driven) or by column (topography-driven). Our analysis utilizes microscopically verified data from two provinces within the Puglia Region (CR1 and CR2), with the entire CR of the region (4 million inhabitants) serving as the reference distribution. We analysed differences between two maps (CR1/CR2 vs reference) by plotting in each cell the complement of the p-value from the Fisher exact test. We used a simple Gnuplot script for data visualization.

### Results

We generated image plots for CR1, successfully identifying significant clusters of coding aggregations and comparing them with CR2, uncovering notable differences. By fine-tuning the sensitivity of colours and intensities, we highlighted the most relevant clusters. Additionally, the image plot comparing the differences enabled the identification of significant coding distortions in serous tumours, an excessive occurrence of extranodal lymphomas and germ cell tumours in the brain, as well as an elevated prevalence of microinvasive squamous cells carcinomas.

### Discussion and Conclusions

Our heatmap visualization approach empowers users to gain valuable insights into coding practices. Leveraging CR-Scans, researchers can identify significant deviations from the expected standard, facilitating targeted interventions to improve coding accuracy. In summary, the CR-Scan visualization is a useful method for analysing and visualizing CR data, making it a valuable asset for researchers involved in cancer registry analysis and interpretation.

## Improving access to trials: a rapid case ascertainment tool used to identify patients for recruitment

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### Background

The Victorian Cancer Registry (VCR) conducted a project to assess the efficacy of using artificial intelligence (AI) applied to pathology reports to identify potential cancer cases for clinical trials. This initiative aimed to enhance clinical trial accessibility in Victoria, Australia.

### Methods

VCR used the Rapid Case Ascertainment (RCA) module in the document processing system (E-Path Plus- an Inspirata© product). The RCA module targeted cases reported by Monash Pathology fulfilling the selection criteria for three phase three randomised controlled clinical trials at Monash Health (MH) which employed genetic markers as eligibility criteria. The AI engine extracted terms pertaining to topography and specific genetic tests from pathology reports. The identified cases were forwarded by VCR to MH for eligibility screening. The RCA's performance was evaluated against manually reviewed cases.

### Results

Between June 2022 and May 2023, 302 cases across the three studies were identified and forwarded to MH for screening. Of these, 7 were eligible to approach (0/48 in study 1, 6/19 in study 2 and 1/235 in study 3). The main reasons for ineligibility after screening were lack of tumour staging (174/295-59%) and normal genetic test results (96/295 = 33%). The RCA tool contributed 5 eligible cases to MH's selection. The RCA module accurately determined eligibility in 93% of pathology reports, achieving an F1 score of 0.93. The false positive rate was 4% and the false negative rate was 3%.

### Discussion and Conclusion

The RCA tool exhibits strong predictive capabilities for pathology selection to the 3 selected clinical trials. However, work is required to capture more granular data with confidence so as to reduce the burden of manual screening by minimising false negatives rates. This study was conducted in only one site. It may be that the tool would be more effective when applied in medical environments without extensive clinical trials infrastructure.

## Data integration as a strategy to improve quality in cancer registries: don't miss the chance

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### Background

Death certificate only (DCO) cases are a thorn in Cancer Registries' side. The proportion of cases registered as DCO is often taken as an indicator of the quality of the registration process. Historically, a proportion lower than 10% of DCO cases is generally considered an acceptable index. Source of DCO cases may include cases with multiple identification, misspelled identification fields (Name, Mother's name and birth date), incident cases occurring outside coverage area and dying inside, notification and codification errors in death certificate, as well as failure to identify and register the case from available sources.

### Methods

The complete database of the Population Based Cancer Registry (PBCR) of Belo Horizonte (2000-2018) was crosschecked with the complete database of 38 Hospital Cancer Registries (HCR) covering all the State of Minas Gerais. R software was used for data verification. Name and date of birth were used as linkage fields between databases.

### Results

Overall, 173,780 definitive PBCR cases were analysed. Cases with a survival of zero represented 10.6% (n = 18,499). The HCR database consisted of 635,282 entries. Crosschecking identified 2,372 HCR registries as possible source of information to PBCR cases. To the present, an individual analysis of 999 such cases was undertaken, resulting in a PBCR database with 173,602 definitive cases (-178 cases, 0.1%) and 18,085 cases with a survival of zero (-414 cases, 2.2%).

### Discussion and Conclusion

DCO cases dishearten registries staff. Strategies to improve proportion of DCO cases include not only verification of diagnosis, but also confirming identification data and place of residence. The integration between different databases, whenever available, can represent an important shortcut, sometimes allowing the resolution of these cases in the registry.

## Global, regional, and national effect of cancer on life expectancy in 2020

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### Background

Cancer is a disease threatening global health, among which gastrointestinal (GI) cancers including esophageal, gastric, liver, colorectal, and pancreatic cancers, account for 1/4 of cancer cases and 1/3 of cancer deaths. Here we estimated the global, regional, and national effects of cancer on life expectancy at birth to inform future cancer control plan.

### Methods

We obtained estimates of sex- and age-specific cancer incidence rates from GLOBOCAN for 185 countries in 2020, alongside all-cause mortality and population data from the United Nations (Population Prospects 2019). Countries were categorized into quartiles of the Human Development Index (HDI). We used the period life table method to estimate the years of life expectancy at birth would have gain if excluding deaths caused by cancer.

### Results

We estimated that if excluding deaths from cancer, the global average life expectancy at birth would have been 2.10 years greater (2.21 years in males and 1.97 years in females), with the largest gain in Poland (3.48 years) and lowest in Republic of Congo (0.75 years). The estimated life expectancy change increased with the level of HDI, with the largest effect in very high HDI countries (2.55 years) and the smallest in low HDI countries (1.19 years). GI cancers contributed the most (1/3) to the life expectancy loss globally. If excluding deaths caused by GI cancers, the average life expectancy change would have been 0.70 years worldwide, with the largest gain in males from high HDI countries (1.21 years) and lowest in females from low HDI countries (0.26 years).

### Discussion and Conclusion

In 2020, an average of 2.10 years of life expectancy loss was attributable to cancer worldwide, among which 33% were caused by GI cancers. The identified potential life expectancy gain by cancer control policy is informative for targeted cancer control and health systems planning across countries.

Theme: **Registry innovations, research, and health policy**

## A Framework to Achieve Full Coverage of Population-based Cancer Registration in Limited-resource Settings from China

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### Background

National Healthy China Policy calls for full coverage of cancer registration by 2022. Establishment of a government-led cancer registration framework may help achieve full coverage of this goal in areas with limited-resource settings.

### Methods

We selected the economically underdeveloped region of Hunan Province, China as the study field. The Hunan Provincial Health Commission guided the establishment of Hunan Cancer Prevention and Control Center to coordinate the cancer registration in the province. Health administrative bureaus at the municipality/county level authorized the establishment of population-based cancer registries, which were responsible for data collection, coding, and quality control. Community health workers at township level performed the routine active follow-up of the cancer patients. Furthermore, the health administration bureaus at the municipality/county level further coordinated the statistics bureaus, medical insurance bureaus, medical institutions, department of vital statistics, public security bureaus, and civil affairs bureaus to provide cancer and demographic information.

### Results

The number of population-based cancer registries increased from 29 in 2018 to 122 in 2021, with the population coverage increasing from 17,640,000 to 72,460,000. Moreover, the quality of data improved substantially and we submitted 23 cancer registries' data to Cancer Incidence in Five Continents-VolumeXII. By linking information with electronic medical records at provincial level, we may not only supplement missing cancer cases, but also be able to collect high-resolution data including stage at diagnosis and stage-specific survival.

### Discussion and Conclusions

Government-led and multi-source data link are the key to fulfill the full coverage of population-based cancer registration in areas with limited-resource settings.

## Socioeconomic conditions and cervical cancer survival in Pasto-Colombia 1998-2017

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### Background

Despite the fact that survival is the main indicator of the effectiveness of the health system and the provision of cancer services, there is a lack of population information about cervical cancer survival and its determinants.

### Methods

An analytical observational study was carried out, with a 5-year follow-up to all the women resident in Pasto-Colombia, diagnosed with malignant cervical cancer during 1998-2017 (N = 946). The information were proccesed by the Cancer Registry of Pasto to explore the relationship between clinical, demographic and socioeconomic conditions and survival using Kaplan Meier and Cox proportional hazards models.

### Results

During the 5 years of follow-up, 456 women died; overall observed survival rate was 51.8% (95%CI 51.1-53.4). The adjusted risk of death was lower in women diagnosed late with tumor stages II (AHR adjusted = 3.58 95%CI 2.34; 5.49), III (AHR adjusted = 9.71 95%CI 6.50; 14.52) and IV (AHR adjusted = 20.61 95%CI 13.63; 31.14) compared with women who were diagnosed with stage I. It was also observed that older women (65 years and over) at the time of diagnosis of cervical cancer have a higher adjusted risk of death (AHR adjusted = 1.84 95%CI 1.47; 2.31) than those young women (15-49 years). Finally, women resident in rural areas have a higher risk of death (HR adjusted = 1.29 IC95% 1.04; 1.61) than those living in urban areas.

### Discussion and Conclusion

Public health plans to control the impact of cervical cancer and its outcomes should consider prioritizing their actions in vulnerable populations that have barriers in access to screeening, early diagnosis and timely treatment.

Theme: **Registry innovations, research, and health policy**

## Sexual health problems and discussion in breast cancer patients 2 years after diagnosis

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### Background

Breast cancer may have specific treatment-induced psychological, psychosexual, physical, physiological, and relational consequences on sexual health. We proposed to assess sexual health in breast cancer patients and discussion about sexuality, 2 years after diagnosis.

### Methods

We selected all breast cancer patients of the VICAN 2 longitudinal study. Data sources included patient questionnaires, medical questionnaires, and medico-administrative databases.

Main outcomes are Sexual health (through the Relationship and Sexuality Scale) and Discussion about sexuality with healthcare providers (yes/no question).

### Results

Among the 1,350 respondent women, 60.2% reported a decrease in sexual desire, 61.4% a decrease in frequency of intercourse, and 49.5% a decrease in the possibility to reach an orgasm. However, 64.8% reported having at least a sexual intercourse during the last two weeks, 89.5% were ‘Somewhat’ to ‘Very much’ satisfied with the frequency of hugs and kisses with their partner, and 81.6% with the frequency of intercourse. Regarding discussion, only 15% of participants reported to have discussed about sexuality with the medical team. Factors independently associated with more discussion about sexuality with medical team were age < 50 (OR = 1.90 [1.28; 2.82], p = .001), being partnered (OR = 2.53 [1.28; 2.82], p = .003), having a monthly income > 1,500 euros (OR = 1.73 [1.15; 2.60], p = .009) or not having diabetes (OR = 6.11 [1.39; 26.93], p = .017).

### Discussion

Main highlights are the need for continuing education in oncosexology and dedicated interventions for breast cancer women, including a holistic approach according to age, treatments, couple status and diabetic type.

Strengths are the sample size, the national representativeness, and data reliability. Limits are the potential memory or social desirability bias due to the cross-sectional design.

### Conclusions

Results show persistent sexual disorders 2 years after diagnosis, a lack of communication about sexuality and a need for specific sexual health interventions, especially for single women, seniors, or diabetic patients.

## Stakeholder’s Perspectives on the Barriers and Facilitators of Childhood Cancer Care in India

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### Background

Childhood cancers are a leading cause of childhood diseases globally, and many children at risk of cancer reside in low-income and middle-income countries (LMICs). The low survival rate of childhood cancers is mainly attributed to weak health systems in LMICs’. Understanding the challenges in providing childhood cancer care is crucial to evaluate and scale up childhood-related programmatic interventions and policies. The present article describes the perceived barriers and facilitators from essential stakeholders involved in childhood cancer care in India. The impact of the COVID-19 pandemic on childhood cancer care delivery was also explored.

### Methodology

The cross-sectional study included 137 tertiary-level hospitals, 92 secondary-level hospitals, 16 state NCD programme officers and nine civil society organizations/non-governmental organizations in 26 states and four union territories. The study proforma was administered through an online portal, and descriptive statistics were used for data analysis.

### Results

Over 80% of the public tertiary and secondary hospitals faced shortages of specialized human resources and beds. The most familiar barriers to the diagnosis of childhood cancers comprised a lack of specialized diagnostic facilities, expertise in diagnosis among frontline workers and awareness among caregivers regarding suggestive symptoms and signs. Treatment denial and abandonment were the most frequent barriers to childhood cancer care treatment completion. The impact of the COVID-19 pandemic on childhood cancer care delivery was evident through a decrease in new pediatric cancer diagnoses, a reduction in surgical procedures and an increase in telemedicine use. The commonest recommendations for childhood cancer care enhancement included improving and strengthening diagnostic facilities, capacity building of primary health workers and increasing the availability of childhood cancer treating free drugs through government funds.

### Conclusion

Childhood cancer is an emerging area that requires urgent intervention. There is a dire need to strengthen childhood cancer care services and develop programmatic interventions and policies for childhood cancer.

# Unveiling cancer incidence trends in India: a comparative study of Age-Period-Cohort and joinpoint analyses

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## Background

India is undergoing an aging transition. The trends in age-specific incidence rates from leading cancer sites remain unknown, and a number of studies have not distinguished the age, period, and cohort effects simultaneously. According to the latest PBCR data, among males, the leading cancer sites are lung, mouth, oesophagus, stomach, and hypopharynx cancer, and for females, the leading cancer sites are breast, cervix uteri, ovary, and oesophagus and lung cancer. This study aimed to report the time trends in cancer incidence of leading cancer using Joinpoint regression as well as the Age-Period-Cohort (APC) model from Population Based Cancer Registries (PBCRs) in India.

## Methods

A joinpoint regression analysis and age-period-cohort model based on the intrinsic estimator were used to execute a descriptive study. Age-specific incidence rates of leading cancer sites were collected by gender. The use of joinpoint Poisson regression and the APC model, respectively, allowed for the identification of the average annual percentage change and relative risks in the trend.

## Results

Joinpoint regression analysis showed that the rates declined in the younger age groups (men over 75 and women over 80). According to the APC model, rates increased with age and time period but decreased with birth cohorts. Among females, a significant increase was noted in breast cancer in all PBCRs while a significant decrease in cervical cancer from all the PBCRs. In subsequent birth cohorts across all PBCRs, male RR estimates for stomach cancer showed a declining trend whereas those for lung cancer showed an increasing trend.

## Discussion and Conclusion

A significant age, cohort, and period effect were noted in Bangalore, Chennai, and Delhi. While the older age groups exhibit an increasing tendency, the younger age groups exhibit a decreasing trend. The elderly and older cohorts at high risk should be prioritized more for cost-effective prevention and control.

Theme: **Registry innovations, research, and health policy**

# Cancer incidence and mortality of cervical cancer in urban registries of Maharashtra, India

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## Background

Cancer is a growing public health concern. Worldwide, cervical cancer (CC) is fourth commonest cancer. In India, CC is second leading cancer and also common cause of cancer mortality. In this study, authors aim to evaluate the burden of CC in urban cancer registries of Maharashtra.

## Methods

This study is based on CC patients registered in the year 2017 in Mumbai, Pune, Nagpur and Aurangabad registry. We have calculated, age-adjusted rate (AARs) of incidence and mortality, the cumulative risk of developing CC, and the average age at diagnosis, and compared with other registries.

## Results

In year 2017, 906 cases, and 337 mortalities due to CC were registered. CC is second leading cancer in each registry. CC has reported AAR of incidence in Mumbai (7.5), Pune (8.8), Nagpur (8.6), and Aurangabad (13.7) per 100,000 female population. The median age of CC diagnosis in Mumbai is in range of 50-55 years. CC incidence is decreasing in each registry. However, the Aurangabad registry has shown an increasing trend in incidence rate for last few years. CC is reported as commonest cause of death in Mumbai and other registries. The AAR of incidence in India is ranging from 4.8 to 27.7 per 100,000 women. Globally, India and China, together contributing highest number of cases (35%).

## Conclusion

Globally India is leading contributor of CC burden. In India, although many urban registries have shown a decreasing incidence rate, yet continue to be a public health concern. The registry data is important to evaluate burden of cancer and this study data could help to facilitate and shape cancer control activities in India and contribute to global initiative of eliminating cervical cancer.

## Prostate cancer incidence and mortality in Uasin Gishu County 2016 to 2020

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### Background

Prostate cancer is the second most commonly diagnosed cancer and the fifth leading cause of death among men worldwide, with an estimated 1,414,000 new cancer cases and 375,304 deaths in 2020. In Kenya, prostate cancer is the most common cancer among males and accounts for 17.3% of all male cancers and 10.2% of all the other cancers. The Eldoret cancer registry (ECR) is a population based cancer registry that covers a population of 1,163,186; 49.9%Males and 50.1% females. The aim of this study was to determine the prostate cancer incidence and mortality in the county of Uasin Gishu.

### Methods

Trained cancer registrars were involved in active case findings and data collection of cancer cases in health facilities and vital statistics within Uasin Gishu population. Confirmed cancer cases were abstracted and filled in the case notification form. Coding was done using the International Classification of Disease for Oncology (ICDO-3). Data quality checks, data entry, analysis was done using CanReg-5.

### Results

A total of 1,487 male cancers were collected, 270 being prostate cancer cases accounting for 18.5% of all male cancers. Prostate cancer was the most common diagnosed malignancy in males with an Age Standardized Rate (ASR) of 23.4. Majority of the cases were diagnosed at stage IV (45.2%), stage III (1.1%), stage II and I (0.8%), while unknown stage accounted for 52.9%. Of all the cases reported 60.7% were alive, 38.9% were deceased.

### Discussion and Conclusion

Uasin Gishu County, with highest incidence noted at the ages of 64-75 years, notably majority of cases was diagnosed at late stage. More awareness campaign should be done on prostate cancer. Screening should be made available for the residents of Uasin Gishu which can help in early detection and reduce late stage diagnosis thus improve prostate cancer survival.

Theme: **Registry innovations, research, and health policy**

## Childhood leukemia georeferencing HBCR cases and environmental carcinogens: localized spatial cluster digital innovations in Mexico

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### Background

Acute Lymphoblastic Leukemia (ALL) etiology remains largely unknown; incidence patterns by age, sex, or geography distribution suggest a potential environmental role. Aim. To identify ALL clusters from four contrasting urban areas of Mexico and characterize the sources of environmental carcinogens.

### Methods

Hospital-based-ALL cases ($n = 443$) diagnosed in children < 19 age from Mexico State, metropolitan zones of Merida, San Luis Potosi, and Tijuana city were analyzed (2015-2020). Cancer data was coded by International Classification of Diseases for Oncology (ICD-O3.2). Clusters of ALL were identified, and excess risk was estimated. Particulate matter ≤ 2.5 (PM2.5) concentrations from community-monitoring stations was analyzed. Geocoded datasets of benzene, polycyclic aromatic hydrocarbons (PAHs) and PM2.5 sources were analyzed to identify patterns in ALL-clusters.

### Results

Seven ALL-clusters with excess risk (RR1.4-2.5; $p < 0.05$) were identified. PM2.5 levels ranged from 15 to 29 µg/m3 among cities. Survival rate for ALL ranged from 61-78%. The carcinogens sources included artisanal brick kilns, gas stations, cement production factories, carpenter shops, paint, and chemical manufacturing facilities.

### Conclusion

An unusual number of ALL cases was identified in these urban communities. Excess risk could be explained by clustered environmental carcinogenic sources. Levels of PM2.5 in outdoor air ranged from 3 to 6 times above WHO air-quality guide. Syndromic cancer surveillance programs must be conducted in these areas; cancer control and prevention strategies must be steered from a multi-sectoral and multi-actions perspective to protect children's health.

Theme: **Registry innovations, research, and health policy**

## Lessons learned from five cancer registries: Mapping of ICD-O-3 codes to OMOP-Common Data Model Concepts

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### Background

To best map population-based cancer registry (PBCR) data to the Observational Medical Outcomes Partnership-Common Data Model (OMOP-CDM), PBCRs from Vaud, Geneva, Luxembourg, The Netherlands and Norway joined forces while working under the umbrella of the European Health Data & Evidence Network (EHDEN)(1). All five PBCRs represent rich cancer data that are exhaustively collected and rigorously coded according to international standards such as ICD-O-3. Here, we investigated how many ICD-O-3 codes in the PBCR data could not be mapped to the OMOP ICDO3 vocabulary (OMOP-ICDO3), and propose improvements of OMOP-ICDO3 to increase coverage.

### Methods

We compared the ICD-O-3 codes for invasive cancers in the five PBCRs, OMOP-ICDO3, and a list of all possible ICD-O-3 codes, *i.e.* codes with valid histology and valid topography.

### Results

Of all possible ICD-O-3 codes, 82% was absent in OMOP-ICDO3. Within the PBCRs, 2-14% of the ICDO3 codes could not be mapped to OMOP-ICDO3, corresponding to ~1% of cancer diagnoses. For specific subtypes of cancers, such as leiomyosarcomas and angiosarcomas, these numbers were significantly higher. Instead of adding all missing ICD-O-3 concepts, we recommend adding all ICD-O-3 codes to OMOP-ICDO3 that are present in at least one PBCR. We furthermore recommend identifying other data sources with cancer data and collecting missing codes from those as well.

### Discussion and Conclusions

Less common cancer types are underrepresented in OMOP-ICDO3. Although, the number of diagnoses that cannot be mapped is small, this will have a disproportionally large impact on studies on rare cancers. Thus, there is a clear need to expand OMOP-ICDO3 with the recommended set of ICD-O-3 codes to allow for studies on specific patient subpopulations.

*(1) The European Health Data & Evidence Network (EHDEN), having received funding from the Innovative Medicines Initiative 2 (IMI2) Joint Undertaking (JU) under grant agreement No 806968, supports the data conversion process.*

## Cross-population evaluation of prediction algorithms for more personalized cervical cancer prevention

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### Background

Screening programs for cervical cancer prevention, implemented in European countries, recommend routine examinations at regular intervals to detect precancerous lesions. As these guidelines are designed for the general screening population and do not account for individual variations in risk, the use of personalized risk prediction algorithms can enhance cervical cancer prevention by enabling more targeted screening. Algorithms developed for cervical cancer risk prediction have shown promising performance in internal validation on more homogeneous populations. However, their ability to generalize to external populations remains to be assessed.

### Methods

We conducted a cross-population comparative study of prediction algorithms for more personalized cervical cancer screening. The prediction algorithms are based on hidden Markov models, matrix factorization, and a neural network. We internally validated the algorithms using data from the Norwegian population and externally validated them using data from the Estonian population to examine their potential biases and limitations. The prediction task was to detect progression from low-grade precancerous cervical lesions, simulating a clinically relevant application of more personalized risk stratification.

### Results

As anticipated, the internal validation performance on the Norwegian data exceeded the external validation performance on the Estonian data in numerical experiments. Still, the algorithms demonstrated strong generalization capacity from the Norwegian to the Estonian population. For both the Norwegian and Estonian datasets, the leading algorithms attained a risk prediction accuracy of approximately 70%. Kaplan-Meier curves derived from algorithm predictions and hold-out data exhibit a close visual resemblance, demonstrating that the algorithms accurately capture the time-varying patterns observed in the data.

### Discussion and Conclusion

Our results demonstrate the potential for generalizing risk prediction algorithms developed for the Norwegian cervical cancer screening population to the Estonian population. These findings emphasize the importance of considering population diversity when developing risk prediction algorithms.

## Rwanda Cancer Registry (RCR): five year report on cancer incidence, diagnosis, and implications for interventions

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### Background

Rwanda, situated in East Africa, covering an area of 26,338 km2 with a population of 13.8M inhabitants (NISR,2022). RCR, has faced numerous challenges throughout its history, including limited coverage and funding constraints. However, since 2018, the Rwandan Ministry of Health through Rwanda Biomedical Center (RBC), in collaboration with various partners, has taken significant steps to enhance the registry's sustainability.

### Methodology

The registry is housed within the RBC and includes a director, coordinator, cancer registrar volunteer, and focal persons from hospitals and private clinics. Source of information are five cancer diagnostic and treatment centers, 45 district hospitals, 25 private facilities, and CRVS. Cancer registrars, with the support of focal persons, conduct passive and active data abstraction, coding, and entry. Integration into the District Health Information System 2 (DHIS2) in 2019 has streamlined data entry. The registry routinely collects information on the stage at cancer diagnosis, with registrars receiving training in essential staging courses. Cancer registry focal persons at the hospital level conduct regular patient follow-up, updating patient statuses in DHIS2.

### Results

Analysis of the five year report (2016-2020) reveals notable trends in cancer incidence in Rwanda. Prostate cancer (36.6%) emerged as the topmost cancer among males, followed by stomach cancer (8.6%). Among females, breast cancer (22.4%) topped the list, followed by cervical cancer (22.2%). A higher increase in cancer cases was observed among young women compared to men in the same age.

### Discussion and Conclusion

The documented increase in cancer cases over five years can be attributed to improved diagnostic capabilities within Rwanda. Training programs on essential TNM staging and raising awareness among healthcare workers have positively influenced stage documentation and reporting. This report serves as a valuable resource for planning effective cancer-related health interventions, providing insights and data to guide in addressing the growing burden of cancer in Rwanda.

## Development of machine learning models for breast cancer prognosis using cancer registry data

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### Background

Breast cancer prognostic models are limited due to restrictive assumptions, censored and missing data, and large number of predictors. Effective predictive models can classify patients into risk groups, estimate overall survival, and provide personalized information for better treatment.

### Aim

To develop and validate machine learning-based predictive models for breast cancer prognosis and to compare their performance to Cox regression and competing risk models.

### Methods

We used data of breast cancer cases recorded in the population-based Geneva cancer registry between 1970 to 2017, including patient, tumor and treatment characteristics.

We compared the performance of Cox regression, Competitive risks, XGBoost, and Neural Network approaches in predicting 10-year overall survival for the full cohort, by stage and by period (diagnosed before or after 1995). Harrel's C index evaluated the discriminative ability of each model.

### Results

The dataset included 12,688 breast cancer patients and 2,557 deaths after 10 years. The accuracy (Harrell's C) of Cox regression and competing risk models in predicting 10-year survival was 0.713 and 0.729, respectively. Machine learning with XGBoost and neural network achieved accuracy of 0.745 and 0.764, respectively. Results of sub-cohorts models showed that machine learning outperformed classical approaches for stages 1, 2, and 3 breast cancer and for patients diagnosed after 1995.

### Conclusion

Machine learning-based models outperform classical approaches for breast cancer prognosis using cancer registry data. These models can be integrated into clinical practice to provide personalized treatment options and improve disease management strategies. Harmonization of cancer registry data enhances a valuable resource for machine learning model development and validation.

Theme: **Registry innovations, research, and health policy**

## Exploring the use of cancer registry data in the Caribbean: a scoping review

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### Background

Cancer registries collect data to generate key cancer statistics including incidence, mortality, survival, and prevalence. Quality of life, cancer risk factors, treatment, and screening information may also be collected as part of special studies and may include linkage with other data sources. Understanding the public health and research utility of data generated by Caribbean cancer registries can help identify impact, reach, and gaps, as well as generate new ideas regarding the use and dissemination of this information.

### Methods

A scoping review is underway to explore and characterize reports in the scientific literature that used Caribbean cancer registry data. We searched CINAHL Plus, Embase, LILACS/BIREME, PubMed, Scopus, and Web of Science: Core and SciELO databases for articles published between 2003-2023 in Dutch, English, French, and Spanish. Original research articles were included if they presented data from at least one cancer registry housed in a Caribbean country as a primary data source.

Two (out of a team of six) reviewers independently screened first the titles and abstracts and then the full text using pre-defined eligibility criteria in Covidence. Country, cancer registry type and other key characteristics will be extracted by two reviewers from each included article. Inclusion/exclusion conflicts between any two reviewers were resolved by a committee.

### Results

Over the 20-year period, 1001 records were retrieved of which 455 were unique. 235 were excluded after title/abstract review, and 210 proceeded to full text screening. Data collection is ongoing.

### Discussion

Cancer registry data is essential for our understanding of and response to the regional burden of cancer, and health policy should prioritize these activities. The findings of this scoping review will help quantify the impact of Caribbean cancer registries and their important role in public health and research activities.

Theme: **Registry innovations, research, and health policy**

## Design and development of a lymphoma registry in Groote Schuur Hospital, Cape Town

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### Background

Lymphomas are a common cancer in South Africa, with an increased prevalence in the setting of the Human Immunodeficiency Virus (HIV) and in ageing populations. Poorly maintained or inadequate cancer registries in South Africa result in reporting deficiencies. We developed a lymphoma registry using a hierarchical approach to lymphoma diagnosis, enabling both accurate reporting and a coherent adaptation to new classification systems.

### Methods

This was an observational retrospective review study set in Groote Schuur Hospital, the main clinical referral centre of the University of Cape Town, South Africa. The study population included HIV-positive and HIV-negative patients (aged $\geq$ 13 years) diagnosed with lymphoma from 2005 to 2020. A registry for lymphoma was designed with secure online access and developed to capture patient information encompassing demographic, diagnostic, treatment and outcome data. This required a multidisciplinary team of pathologists, haematologists, database developers and data capturers. This study reports on the design and implementation and addresses the challenges of developing a functional robust lymphoma registry.

### Results

New lymphoma cases recorded included more than 50 subtypes ($n = 2353$, 33% HIV-positive). Challenges that arose during registry development and approaches to overcome them are described, including using the registry as a source of data for research.

### Discussion and Conclusion

The lymphoma registry was created to inform and benchmark clinical practice. It serves as a model for the generation and analysis of disaggregated descriptive data and practice for lymphoma patients in a middle income country, incorporating available diagnostic techniques. Retrospective research using this registry can be used to inform prospective patient management and monitoring of therapeutic changes. Additionally, the registry serves as a research platform for clinical trials and to inform lymphoma healthcare policies for South Africa and sub-Saharan Africa, and has the capacity to be expanded to a national database.

Theme: **Registry innovations, research, and health policy**

## Scaling-up training for cancer registries: the experience of the National Cancer Institute of Colombia

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### Background

Training is one of the core activities to support cancer registries. The currently existing network of GICR trainers covering different specific areas of interest in cancer registration constitutes a valuable resource. Collaboration with local institutions in the different regions is an essential component of the GICR model in less developed settings.

### Methods

The National Cancer Institute of Colombia (INCCOL) signed an agreement in 2015 for collaboration with GICR including amongst others scaling up of the existing INC annual training programme to include also other cancer registries in the region. We report hereby the activities for the 2017-2022 period.

### Results

A total of 6 training courses in Spanish were delivered in the region, four of them in coordination with GICR. Involving GICRNet trainers, a total of 558 participants (registries personnel) from 15 Spanish speaking LAC countries, 67 population-based cancer registries and 52 hospital-based cancer registries were trained. In addition, we had 26 participants from Spain, for a total of 584 participants in the period. All courses were virtual with three courses combining also in-person training for the Colombian registries. No training was delivered in 2020. The topics covered were basic registration, coding, staging and CanReg5.

### Discussion and Conclusions

The collaboration of INCCOL and GICR, and the virtual training modality has undoubtedly permitted scaling-up training activities to the region with expansion to many countries. The courses that combined in-person attendance with online participants were not ideal. Though virtuality has a lower cost to deliver training the potential of distraction might be bigger. It is worth to explore mixed alternatives where, for a same course, all trainees participate sequentially in both in-person and virtual training modality.

*Keywords:*
*Training, cancer registries, Colombia, Latin America.*

## Closing Cancer Care Gap in Rural India · The 'STITCH' strategy of Raj©

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### Background

Data from Dindigul Ambillikai Cancer Registry DACR. Reduction of Cervical Cancer Incidence by 25% and Mortality due to Cervical Cancer by 35%, in a period of 5 years (1).

### Methodology

The author proposes a strategy 'STITCH' for sustainable achievements, in prevention, control of Cancer, and, to close the Care Gap, in rural India, a Policy Advocacy.

Screening should be of full coverage, available, applicable, acceptable, affordable, answerable and should give assurance of efficacy.

Treatment of Pre-cancers, should be highly effective and the outcome should be adequately monitored with Follow up Biopsies, till a status of 'Cure', is achieved.

Immunization of the adolescent girls with adequate coverage, should be achieved by HPV vaccination programs, through 'Information, Motivation and Action'.

Translation research, the strategies, technologies, manpower and other resources, should flow from high to low resource settings.

Continuum care, the Cancer Organization, should be trustworthy, transparent, dependable, reliable and should win the confidence and mandate of the community, from screening till cure.

Health policy, to prioritize primordial, primary, secondary, and territory prevention measures, at all levels of health care.

### Result

The Cervical Cancer screening program of IASRC achieved a Reduction in the Incidence rate by 25% and Mortality rate due to Cervical Cancer by 35% in a period of 5 years.

The screening tool was VIA and the service providers were the Trained Female Health Nurses. All the above strategies led to the success.

### Discussion

The Author advocates the 'STITCH' strategy, which played an important role in the success of the referred 'Proof of Concept' project of WHO.

### Conclusion

A 'STITCH' in time, saves nine, and, it would effectively 'Close the Cancer Care Gap'.

***Keywords:***
*Screening, Treatment, HPV Vaccination, Policy*

***Reference:***

*https://www.thelancet.com/journals/lancet/article/PIIS0140673607611957/fulltext*

Theme: **Registry innovations, research, and health policy**

## Interactive visualization of cancer trends · Based on Regional Registry Data in Northwest Russia (RUSCAN)

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### Background

Amid the COVID-19 pandemic, interactive visualization tools became extremely popular and informed society about SARS-CoV-2's spread. Long before the pandemic, interactive cancer epidemiology tools like GLOBOCAN and NORDCAN helped explore cancer statistics. At the same time, despite the sufficient quality, population-based cancer registry data (PBCR) in many Russian regions are rarely used to inform professionals and policymakers. We aimed to develop an interactive visualization based on PBCR data in Northwest Russia.

### Methods

PBCR data were used to estimate incidence from 2000 to 2021. Data were processed and converted to ICD-O-3/ICD-10 using IARC tools software. Cancer-specific mortality and population data (stratified by cause of death (ICD-10 up to third digit), regions, age, and sex) were acquired from the International Laboratory for Population and Health database of the Higher School of Economics. An absolute number of cases and deaths, age-standardized rates (Segi-Doll 1960), and relative survival (Pohar-Perme) were calculated and then visualized using R and Recharts.

### Results

Ruscan is a comprehensive and easy-to-use descriptive cancer epidemiology tool that provides interactive tabulations and graphs. As an example, a visual representation of trends demonstrated the effect of the pandemic on incidence rates in 2020, with a decline for cancer types that depend on diagnostic activities. With a population of about 14 million, Northwest Russia regions registered 69,159 cases in 2019 and 57,948 in 2020, with the subsequent rise only to 58,160 cases in 2021. The changes in mortality were less pronounced.

### Discussion and Conclusion

Visualization tools based on PBCR data introduce cancer epidemiology to professionals and policymakers and can be used to promote registration as an essential part of cancer control activities.

## Organization of a regular validation procedure of RF territorial CSR data against international standards

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### Relevance

The coding standard for cancers worldwide is the ICD-O-3 classification. The comparative estimation of the national standards of cancer registration in the Russian Federation has shown that in general they coincide with the international ones.

### Purpose and Methods

In order to organize regular procedure of validation of territorial cancer registries data according to accepted international standards on the basis of Samara cancer registry with the help of special software IARCcrgTool we recoded 1,906,210 diagnoses of STDs from 11 cancer registries of Russia as of 01.01.2022.

### Results

Only 1,450,269 records, or 76.1% were recoded originally. In the structure of detected errors the 1st place belonged to the defects of coding morphological part of the diagnosis – 383,673 cases (86.3%), the 2nd place – to the mismatch of codes of morphology and topography – 35,114 cases (7.9%), and the 3rd – to the defects of coding topography part of the diagnosis – 25,713 cases (5.8%). After correcting the databases in ‘automatic’ and ‘manual’ modes, only a part of errors could be eliminated. As a result, the data validation rate was 82.3% (1,450,269 records out of 1,906,210), including: Saratov cancer registry - 97.3%, Orenburg - 93.7%, Samara - 92.7%, Kirov - 78.2%, Penza - 77.5%, Ulyanovsk - 73.5%; in cancer registries of Bashkortostan, Udmurtia, Mordovia, Mari El and Chuvashia - 75.8%, 74.6%, 72.5%, 72.0% and 67.0% respectively.

### Conclusions

The performed procedure of validation of the territorial cancer registers of the Russian Federation showed the necessity of its annual repetition with correction of errors directly in the databases, as well as further improvement of its algorithm with mandatory involvement of programmers - developers of the cancer registry software in the process.

# Evaluation of breast cancer data quality at the Cancer Registry of the Central Tunisia

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## Background

The purpose of population-based cancer registration is monitoring, epidemiological research, and health policy making. Cancer statistics depend on the quality of data assessed in cancer registries, a good data quality is essential.

The present study aims to provide an overview of the four main data quality indicators for the Cancer Registry of Central Tunisia for the period of 1997 until 2015, regarding breast cancer.

## Methods

Data of all breast cancer cases diagnosed between 1997 and 2015 in the central region of Tunisia were extracted.

The cancer registry receives notifications from pathology laboratories, hospitals, and physicians. Data include personal information and tumour characteristics. Vital status follow-up was noted.

In our study, we used the following indicators: comparability, validity, timeliness, and completeness. We used several methods like the proportion of morphologically verified cases and the proportion of death-certificate notificationcases.

## Results

The Cancer Registry records the first occurrence of allmalignanttumours and some early forms (in situ). All cancer cases are recorded and coded according to international standards (ICD-9 then ICD-10, and ICD-O2 then ICD-O-3).The tumour stages are coded according to the TNM system of the UICC (TNM 4 to TNM 7).

Incidence dates are defined according to the recommendations of the ENCR. The date of histological confirmation has the highest priority. Increasing incidence trends were observed for breast cancer between 1997 and 2015.

Morphologically verified cases were between 99.2% and 100%. About 55% of all cases were registered 3 years later than intended.

Patient follow-up was noted in about 25% of cases in the 1990s and in 69% of cases in the 2010s.

## Conclusion

According to the methods presented in this study, the data quality of the Cancer Registry Central Tunisia was acceptable. Overall, the access to data is relatively good. The adherence to international standards is good.

Theme: **Registry innovations, research, and health policy**

## The effect of Population Based Cancer Registries in Tanzania; a case of the Dar-es-Salaam registry

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### Background

Population-based Cancer Registries (PBCRs) are important tools for cancer control and planning. They give direction for conducting research, planning and implementation of cancer control programs. Cancer registration though crucial, is often paid little attention owing to competing demands for resources in healthcare. The Ministry of Health of Tanzania (MoHCDGEC) in collaboration with implementing partners led to the establishment of PBCRs in 2018.The aim of this study was to establish the impact of PBCRs by determining the incidence of cancer in Dar-es-Salaam in order to provide data for research and education; and generate data for cancer control and planning.

### Methods

The African Cancer Registries Network (AFCRN) conducted trainings and sensitization for cancer registrars and MOH staff. Standardized data collection methods were used, data Coding was done using ICDO-O-3 and CanReg5 software was used data entry, quality control and data management. All data sources sources for the catchment population were visited.

### Results

The Dar-es-Salaam PBCR collected 9584 cancer cases for the period 2014 to 2022, of this 3427 were males and 6157 were females. The most affected ages in females were 30-60 years & 50+ for males. The most common cancers in males were prostate with an ASR of 18.4, esophagus 6.5, Mouth & pharynx 4.0, colon-rectum 3.8 and Stomach 2.9 In females the most common cancers were cervix 27.3, Breast 10.4, esophagus 4.5, colon-rectal 3.6, Mouth and Pharynx 2.9 with an ASR.

### Conclusion

Despite of some challenges such as transport, lack of unique identifiers and limited utilization of electronic medical records, the pre-existence of a National Cancer Control Strategy, paved the way for adoption of strategies complementing national priorities. Strengthening and maintaining a PBCR in Dar-es-salaam will be useful in guiding epidemiological studies, cancer control planning and research.

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