To what extent do national wealth and expenditure on health explain worldwide variation in cancer survival?

*on behalf of the CONCORD Working Group*

Cancer Research UK Cancer Survival Group

CONCORD
Global surveillance of cancer survival

London School of Hygiene & Tropical Medicine

Cancer Research UK Cancer Survival Group

Charlotte
NAACCR 2015
JUNE 13-18, 2015, WESTIN CHARLOTTE
Global surveillance of cancer survival

Participants
- 279 cancer registries
- 67 countries

Long-term trends, 10 common cancers
- Patients diagnosed 1995-2009
- Follow-up to 2009
- Stomach, colon, rectum, liver, lung, breast (women), cervix, ovary, prostate, leukaemia
- Acute lymphoblastic leukaemia in children
<table>
<thead>
<tr>
<th>Region</th>
<th>Signed up</th>
<th>Submitted</th>
<th>Data sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>16</td>
<td>10</td>
<td>71</td>
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<tr>
<td>America C+S</td>
<td>31</td>
<td>27</td>
<td>187</td>
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<tr>
<td>America N</td>
<td>61</td>
<td>57</td>
<td>570</td>
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<td>Asia</td>
<td>59</td>
<td>50</td>
<td>472</td>
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<tr>
<td>Europe</td>
<td>132</td>
<td>128</td>
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<tr>
<td>Oceania</td>
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<td>70</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>306</strong></td>
<td><strong>279</strong></td>
<td><strong>2,527</strong></td>
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World – 279 registries, 67 countries

40 countries with national coverage
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</table>

28,685,445 25,676,887
Methods

Life tables: all-cause mortality rates by age, sex, (race), geographical area (country, state, region) and single calendar year

Net survival: Pohar Perme approach (stns)

Cohort approach 1995-99, 2000-04

Period approach 2005-09

Age-standardisation: International Cancer Survival Standard (ICSS) weights
Main findings

- World-wide differences in 5-year survival
- **Breast, colorectal**: increase in most developed countries, and in South America
- **Liver, lung**: still lethal in most countries
- **Stomach**: survival very high in south-east Asia
- **Prostate**: striking increases, still wide range
- **Cervix, ovary**: wide range, little improvement
- **Adult leukaemia**: low survival in Asian countries
- **Childhood ALL**: wide gap in 5-year survival
Breast cancer in 5,486,928 women (15-99 years): age-standardised 5-year net survival (%)

Allemani et al. Lancet 2015; 385: 977-1010
Breast cancer: age-standardised 5-year net survival (%) in Canada and the US, 2005-09

Midwest
- US registries
- Wisconsin
- Nebraska
- Iowa
- Michigan
- Detroit

Northeast
- New Hampshire
- Massachusetts
- Rhode Island
- Connecticut
- New York
- Pennsylvania
- New Jersey
- Florida
- Mississippi
- North Carolina
- Tennessee
- Delaware
- West Virginia
- Maryland
- Virginia
- Kentucky
- Louisiana

South
- Georgia
- South Carolina
- Texas
- Alabama
- Florida
- Oklahoma
- Texas

West
- Greater Bay Area
- Seattle
- Colorado
- Washington
- Oregon
- Hawaii
- Montana
- Idaho
- California
- Greater California
- Los Angeles
- Wyoming
- Utah
- New Mexico
- Alaska

Canada
- British Columbia
- New Brunswick
- Nova Scotia
- Yukon
- Ontario
- Alberta
- Manitoba
- Saskatchewan
- Québec
- Prince Edward Island
- Newfoundland
- Nunavut
- Northwest Territories
Breast cancer: 5-year age-standardised net survival in 228 cancer registries, continent and calendar period
Stomach cancer: 5-year age-standardised net survival in 213 cancer registries, continent and calendar period

<table>
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<tbody>
<tr>
<td>Africa</td>
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<td>0</td>
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</tr>
<tr>
<td>America (Central and South)</td>
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<td>6</td>
<td>7</td>
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<tr>
<td>America (North)</td>
<td>44</td>
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<td>50</td>
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<tr>
<td>Asia</td>
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<td>Oceania</td>
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Five-year age-standardised net survival (%)
Adult leukaemia: 5-year age-standardised net survival in 210 cancer registries, continent and calendar period
Breast cancer: 5-year net survival by GDP and calendar period

Five-year age standardised net survival

1995 GDP per capita
PPP constant international $

2000 GDP per capita
PPP constant international $

2005 GDP per capita
PPP constant international $

Africa • America C+S • America N • Asia • Europe • Oceania
Breast cancer: 5-year net survival by TNEH and calendar period

1995-1999

Five-year age standardised net survival (%)

1995 Expenditure on health % of GDP

2000-2004

2000 Expenditure on health % of GDP

2005-2009

2005 Expenditure on health % of GDP

Africa America C+S America N Asia Europe Oceania

ZAF BRA CHL COL CUB ECU CAN USA CHN IND ISR JPN MYS KOR THA TUR AUT BGR HRV CZE DNK EST FIN FRA DEU ISL IRL ITA LVA LTU MLT NLD NOR POL PRT SVK SVN ESP SWE CHE GBR
Breast cancer: 5-year net survival by GDP and calendar period: private vs. public health systems
Breast cancer, 5-year net survival by GDP and calendar period: private vs. public health systems
Breast cancer, 5-year net survival by TNEH and calendar period: private vs. public system
Breast cancer, 5-year net survival by TNEH and calendar period: private vs. public system

Expenditure on health (% of GDP)

5-yr age-std net survival

Calendar year

USA

CAN

Breast cancer, 5-year net survival by TNEH and calendar period: private vs. public system
Breast cancer: 5-year net survival by GDP and calendar period

Graph showing 5-year age-standardized net survival over calendar years for GDP per capita, PPP (current international $) for countries BRA, CHN, and IND.
Breast cancer: 5-year net survival by TNEH and calendar period
Points for discussion

- Wealthier countries spend more on health
- Increasing GDP and TNEH related to higher survival, but not a linear relationship

- US wealthier, spends more on health than Canada, but similar survival (private vs. universal)
- Canada, Sweden (universal vs. universal): similar wealth, health systems and survival, but TNEH lower in Sweden

- Brazil - wealthiest among countries with rapidly growing economies (BRICS), spending more on health; biggest improvement in survival
Radiotherapy programmes, including training courses offered by the IAEA, are essential for capacity building in cancer treatment. There is an estimated shortfall of up to 5000 radiotherapy machines in LMICs. This will increase in the next decade unless adequately addressed.

PACT builds partnerships to fight the global cancer epidemic, relying on the IAEA’s extensive experience in delivering radiotherapy technology and know-how.

Number of people served by one radiotherapy unit
(data from IAEA-DIRAC database, 07/2013)

- Below 500 000
- 1–2 million
- 500 000–1 million
- 2–5 million
- Over 5 million
- No unit
- No data

The depiction and use of boundaries, geographical names and related data shown on maps do not necessarily imply official endorsement or acceptance by the IAEA.
Population (%) without access to basic surgery

Global surveillance of cancer survival 1995–2009: analysis of individual data for 25 676 887 patients from 279 population-based registries in 67 countries (CONCORD-2)


Summary

Background Worldwide data for cancer survival are scarce. We aimed to initiate worldwide surveillance of cancer survival by central analysis of population-based registry data, as a metric of the effectiveness of health systems, and to inform global policy on cancer control.

Methods Individual tumour records were submitted by 279 population-based cancer registries in 67 countries for 25.7 million adults (age 15–99 years) and 75 000 children (age 0–14 years) diagnosed with cancer during 1995–2009 and followed up to Dec 31, 2009, or later. We looked at cancers of the stomach, colon, rectum, liver, lung, breast (women), cervix, ovary, and prostate in adults, and adult and childhood leukaemia. Standardised quality control procedures were applied; errors were corrected by the registry concerned. We estimated 5-year net survival, adjusted for background mortality in every country or region by age (single year), sex, and calendar year, and by race or ethnic origin in some countries. Estimates were age-standardised with the International Cancer Survival Standard weights.

Supplementary appendix (175 pages)

http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2814%2962038-9/supplemental
Thank you very much!!!

- All the participating cancer registries
- CONCORD Steering Committee
- CONCORD Central Analytic Team
- Funding agencies

All 496 co-authors are indexed in PubMed