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degree than their healthy peers. Interestingly, diagnosis before age 10 years negatively affected high school completion but not university graduation rates.⁹ These results suggest that a childhood cancer diagnosis does not inevitably affect educational attainment, at least in high-income countries, because of access to effective treatments, ongoing monitoring, and the availability of educational and psychological support.

Although research documents educational challenges after a childhood cancer diagnosis, particularly in contexts characterised by poverty and disadvantage, causation and amelioration remain open questions. The diagnosis in a high-income country will be associated with depression, anxiety, and fatigue in the child, and time missed from school for treatment and recovery. The same diagnosis in a displaced child will inevitably be associated with even more severe challenges, including potential malnutrition and post-traumatic stress disorder associated with displacement.

In this issue of *The Lancet Oncology*, Raya Saab and colleagues¹⁰ describe the work of the Children's Cancer Institute at the American University of Beirut Medical Center (Beirut, Lebanon), a collaboration between American and Lebanese health services, to expand cancer services rapidly and provide effective treatment for displaced people in Lebanon. Services were restricted to first-line therapies and palliative care because of a scarcity of resources and reliance on support from non-governmental organisations. Access to appropriate therapies was improved; however, sustainability can be questioned because the programme depends on funding and support from non-governmental organisations, academia, and not-for-profit health-care institutions.

Without ongoing funding to support displaced children diagnosed with cancer, the possibility of good short-term and long-term outcomes is compromised. These children have poor access to timely health care, restricted educational opportunities, and probably trauma and emotional difficulties. Successful treatment is possible but requires financial support and an expansion of

services in host countries. Given the high poverty rates in many of these locations, there is a need to relocate displaced children and their carers to safe environments to prevent further trauma and distress, and to provide host countries with resources to meet their ongoing treatment and educational needs. It is particularly important that displaced children with cancer receive timely cancer treatment and psychological support, continuity of care, and educational opportunities. To meet the acute and long-term needs of this group, and to provide the foundation for a successful and healthy future, displaced communities require coordinated financial support for health services from both governmental and non-governmental organisations, and international cooperation.

We declare no competing interests.

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Global cancer research in the post-pandemic world

The COVID-19 pandemic has dramatically altered the global landscape for cancer prevention, diagnosis, and treatment.¹ Whether or not this change will ultimately

be a force for good for driving progress towards universal health coverage for cancer control is unknown. What is certain is that delivering better, more affordable,

and equitable cancer outcomes will require all countries to energise (or re-energise) and in some cases reprioritise their research ecosystems. The pre-existing barriers to achieve strong national research frameworks in many countries are high. Some of the major barriers are low national science and technology intensity (outputs) and poor public sector funding coupled with reductions in the clinical academic workforce.

Nevertheless, the global cancer community has responded remarkably well to the research challenges resultant from the COVID-19 pandemic. The pandemic has led to crucial discussions with the oncology community about the value of cancer care interventions. In some contexts, clinicians have had to prioritise which investigations and treatments can offer the greatest benefit to patients, while simultaneously recognising and deimplementing those that offer very small benefits or might be harmful (over treatment or unfavourable risk-benefit ratio).² Looking forward, it will be essential that this element of introspection with regards to the value of cancer care remains at the forefront of clinical research activities. The global cancer community has also reoriented itself to understand the vulnerabilities and risks of SARS-CoV-2 to different populations of patients with cancer, evaluate the effectiveness of COVID-19 vaccines in immunocompromised patients,³ and develop high-level health system and policy tools to better understand and mitigate the impact of delays in cancer diagnosis and treatment. This research effort has been inconsistent, mostly taking place in high-income settings and some middle-income settings—eg, China and India.⁴ Furthermore, the work has largely been undertaken without substantial financial support from major cancer research funders. There remains a major divide between the aspirations of learning from the pandemic, building back better health systems for global cancer care, and the realities of what and how much global funding has been made available to achieve this. Crucial research is being left behind and essential questions remain totally or partially unsolved. These include defining how different national cancer care systems were affected. How did these systems adapt? What has been the effect of any mitigation measures applied? How should the global cancer community address differences in COVID-19 vaccine effectiveness? These are major unknowns, and a failure to understand and to answer

these questions might have a devastating effect on the resilience of cancer care systems in the future when faced with the next pandemic. If we are to address these challenges, then there needs to be a collective global cancer research effort to prevent widening of existing disparities in cancer outcomes.

WHO has recently suggested that, although most countries now have national cancer control plans, progress is uneven towards the goals set out in the World Cancer Declaration.⁵ What is not made apparent is that the majority of national cancer control plans have little to say about cancer research. Yet all evidence shows that, to achieve affordable, equitable, and high-quality outcomes, countries must be research active. The pandemic has, more than any other recent event, illustrated gross global inequalities both in where research is undertaken and in who benefits from such efforts. Just nine countries in the world control nearly 70% of the world’s cancer research. The one remarkable statistic about this is China’s meteoric rise to second place, just behind the USA in terms of gross cancer research output.⁶ Although research might have been stalled in high-income settings, our work suggests that the pandemic is highly unlikely to affect future trajectories in these settings, with the most detrimental effects likely to be on those countries most in need of strengthening their cancer research ecosystems, which is low-income and middle-income countries (LMICs). Again, a combination of factors, from macro-economic downturns to loss of health-care professionals, will be

	Number of publication outputs (% of world total)*	Number of publication outputs with authors from LMICs (% of country total)
UK	63 759 (5.75%)	2452 (3.85%)
France	48 895 (4.41%)	1868 (3.82%)
Australia	32 789 (2.95%)	1228 (3.75%)
Canada	43 936 (3.96%)	1462 (3.33%)
Germany	69 990 (6.31%)	1915 (2.74%)
USA	317 950 (28.65%)	7806 (2.46%)
Spain	32 622 (2.94%)	766 (2.35%)
Italy	66 464 (5.99%)	1289 (1.94%)
China	254 171 (22.90%)	1884 (0.74%)
Top nine country total	773 975 (69.74%)	14 805 (1.91%)
World total	1 109 800	68 893 (6.21%)

Data are n (%) or n. LMICs=low-income and middle-income countries. *The outputs of the nine individual countries sum to 83.86%, but the combined total is only 69.74% because of double counting of collaborative papers.

Table: Total global cancer research publication outputs in the 10 years before the COVID-19 pandemic (February, 2010, to February, 2020) from the top nine output countries, as a percentage of world total cancer research publications and percentage of publications with coauthors from LMICs

most acutely felt across LMICs and, in turn, negatively affect nascent cancer research collaborations.⁷

The directors of the USA National Cancer Institute (NCI) and the NCI Centre for Global Health jointly called for cancer as a global health priority.⁸ This timely and important call recognises the reality of where we stand today. A deeply asymmetric global cancer research ecosystem, dominated by the basic science and biopharmaceutical agendas, set by high-income countries and the private sector, with little recognition or regard to health systems strengthening. High-income country commitments to global cancer research remains small, with less than 4% of total annual outputs (publications) coauthored with individuals in LMICs (table; data available from Institute of Cancer Policy, King's College London, London, UK). Yet the pandemic has shown that countries and health systems can learn a great deal from each other. This bidirectional flow challenges the classic neocolonial unidirectional flow of knowledge whereby contributions and research from lower-resource settings are often not given adequate recognition.⁹ It is our collective view that we need to set in motion an international agenda around research on cancer control systems and policies in a post-pandemic world, while enabling knowledge sharing and transfer across institutions and countries that are supported by direct research assistance—ie, high-income countries supporting global research as well as by improvements to domestic research and development expenditure on cancer research.

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