The cancer situation in Sudan

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Sudan, a sub-Saharan African country, is in the centre of what is now increasingly known as the African's arc of instability. This is an arc stretching from Somalia and Eritrea in the east to Mauritania in the west forming a band of countries, most of them in the African Sahel, that are particularly vulnerable to the consequences of climate change including conflicts *(1)*.

The conflict in Darfur in western Sudan is considered the "the first climate change conflict" due to the convergence of environmental and political factors leading to conflict *(2)*. The current conflict that erupted in April this year has rapidly engulfed the heart of the country, its capital Khartoum, and significantly worsened the situation in Darfur and other parts of the country. It has resulted in what the UN describes as the "biggest internal displacement of people in the world" *(3)*. The health infrastructure has almost collapsed particularly in the epicentre of the conflict, Khartoum, and Darfur. Hospitals and primary healthcare centres have been attacked, occupied or looted. Healthcare workers have been injured, killed, or internally and externally displaced. Those still working have not been paid any wages since the beginning of the conflict.

Cancer care has been severely disrupted since the eruption of the conflict. Sudan has boasted one the most advanced cancer care systems in the region. The first cancer centre, Khartoum Oncology Hospital, was established in 1964. In addition, the country has achieved significant strides in decentralization of services with the establishment of several provincial cancer centres and hospitals. Two provincial centres, Wad Medani and Merowe, provided radiotherapy although at a much more limited capacity than that of Khartoum. Other centres provide chemotherapy and a mostly partial array of cancer surgeries and diagnostics, such as those located in Shendi, El Obeid, El-Gadarif, Nyala, and El-Fasher. Most of chemotherapy and other essential cancer medicines were provided free of charge in government hospitals and there has been a growing private sector providing cancer care. The bulk of cancer services, however, was still delivered in Khartoum.

The collapse of the healthcare infrastructure in Khartoum and the Western region resulted in massive internal displacement and has placed unprecedented pressure on the provincial centres to provide care. In the period between April and August 2023, the National Cancer Institute (NCI) in Medani, the average number of new cancer cases registered has almost doubled from 1560 cases in the previous year to 2980 cases. Similarly, at the Tumour Therapy and Cancer Research Center in Shendi, there has been an increase from 163 cases to 791 cases. The East Oncology Center in Elgadarif treated 165 cases last year, which has risen to 337 cases from the start of this military conflict. Additionally, the average number of new cancer cases registered at the Eldaman Oncology and Radiotherapy Center in Merawi has risen from 217 cases to 397 cases *(4)*. The drug supply chain has been disrupted and the central Ministry of Health warehouses in Khartoum were destroyed during the war. As of August, the only cancer medicine reliably available was tamoxifen. Children with curable cancers are not receiving cancer medicines. Relapses of acute lymphocytic leukaemia (ALL) in children are now seen at alarming rates. No attempts at evacuation of these children have taken place as we have seen in other places such as Ukraine or Gaza. Access to morphine and other pain medications is an essential part of cancer care in Sudan as many patients present at late stages of the disease. The shortage in cancer pain medicines is causing significant suffering and is a tragic humane situation.

Khartoum provided the bulk of radiation therapy for the country and the entire region. Originally equipped with two cobalt RT machines at the conflict's onset, one ceased functioning in June, followed by the other in August. Consequently, as of 15 August, the NCI was forced to discontinue RT services *(4)*. Recent news from Sudan indicate that a team of Sudanese technicians, engineers, and physicists was able to repair one machine providing palliative radiation. The other centre that provides radiotherapy is Eldaman Oncology and Radiotherapy Center in Merowe, Northern State. This centre has one functioning linear accelerator radiation machine that belongs to the private sector. There is some hope recently that the radiotherapy machine in Shendi that has not been functioning before the conflict may be able to provide some services as the team of the radiotherapy workforce that was displaced from Khartoum has been working

diligently to repair the machine. Despite all these incredible efforts, the radiotherapy situation is precarious as spare parts and equipment cannot be replaced or repaired easily. Most radiotherapy is now reserved for palliative and emergency situations. Radiotherapy with curative intent is certainly no longer tenable. This will result in significant worsening in cancer outcomes in Sudan as head and neck cancer and breast cancer which are very common often require radiotherapy for treatment with curative intent.

Most of the complex cancer surgery occurred in Khartoum. Khartoum also boasted interventional radiology capabilities such liver-directed therapies Some cancer surgery is still taking place in Atabara and Wad Medani such as mastectomies or urgent colon cancer surgery. However, the main focus of surgical care is on trauma and emergency surgeries given the shortage in supplies, power cuts and workface challenges.

Cancer diagnostics are also very difficult to access, and some are now impossible to access. For example, histopathology services are available mainly in Khartoum, Wad Medani, and Algadarif (in the eastern region of Sudan), but immunohistochemistry tests for breast cancer are offered only in Khartoum *(5)*. As such we are witnessing total regression to the time when every new breast cancer patient will be treated with tamoxifen as there is no way of telling whether they have hormone receptor negative disease or not.

Not all Internally displaced patients have been able to avail themselves to the provincial centers because travel is now very expensive, fraught with hardships and even risk of violence. In the absence of an effective central government, lack of wages and the collapse of the informal sector upon which the majority of Sudanese depend for their livelihoods as laborers, or sellers in markets, the country is quickly sliding towards catastrophic impoverishment of the population. This leaves many of the patients, especially those who are poor and without resources, effectively without access to care.

Limited information or data is available for externally displaced cancer patients. Likely the number is small but current available information indicates that most Sudanese refugees in neighbouring countries are experiencing significant delays in the processing of their documentation by the UNHCR or the host countries and most remain without health insurance or access to care and having to rely solely on out-of-pocket expenses.

Sudan is also a major destination for cancer treatment for surrounding African countries *(6)*. Sudan shares borders with seven countries, six of which have conflicts and fragile health systems. Many of the 16 African countries in conflict are contiguous, stretching from the western Sahel through the Horn of Africa, encompassing the Lake Chad Basin and Great Lakes regions *(7)*. Most of these countries have traditionally, for geopolitical reasons and configurations, excluded from attention. The Sahel region has been destabilized by climate change, conflicts, poor governance, and a marginalized status in the global geopolitical map. The climate change in these regions is a glaring form of "climate injustice" as these regions are bearing the brunt of the catastrophic results of climate change while contributing little or none to cause it. The geographical clustering in conflict prone areas causes conflicts to be protracted, often appear to be sudden and intense and exhibit what is now recognized as being locked in harmful cycles of inequity, conflicts, and instability *(8)*. The disruption of cancer services in Sudan is a major blow to cancer services in the entire region.

Lessons learned from the Sudanese experience

It is now more than six months since the conflict started. There has been a remarkable mobilization by the Sudanese cancer workforce exerting enormous efforts in the provisional centres providing care for patients, liaising with Sudanese doctors and communities in Diaspora to try to facilitate shipments of cancer medicines, and repairing and maintaining radiotherapy machines. Telemedicine consultations with patients carried out by physicians either locally or those in the Diaspora have provided significant support for patients who have access to cell phones. Sudanese oncologists have collaborated with Sudanese oncologists in the Diaspora and their allies to raise awareness and bring attention to the crisis in Sudan through publications, interviews and conference talks.

Such resilience and concerted response, while insufficient to address the current dire situation of cancer care delivery, could not have been possible without the upscaling of cancer services that occurred in Sudan despite the challenges and political turmoil the country has witnessed since independence from British rule in 1956. This upscale included investment in the workforce with local training of most of the workforce including physicians, decentralization of services and limited universal health coverage.

Another lesson is that no matter how much health system strengthening has been achieved in hubs such as central Sudan, the destabilisation of the entire region would eventually engulf these hubs as well. The destabilization is partly due to uneven development, health disparities and inequities, and marginalization of large segments of the population within the centre and between the centre and the periphery. Solutions to these crises must take into consideration that health system strengthening must be equitable to achieve health and peace for all.

Response at the African and international level and the way forward

At the regional level, African governments and the African oncology community have yet to come together and produce coherent plans of action on what needs to be done for cancer services in countries in crises. One possible explanation for the inaction is that most previous and current conflicts have occurred in countries with no or sparse cancer services and attention has mostly been on addressing the health consequences of violence such as trauma or epidemics. However, this is changing as we are witnessing increasing awareness of cancer as a major health threat in the continent which is likely to translate into interest in cancer in conflict zones in Africa. The African Organization for Research and Training and Cancer (AORTIC) and other cancer organization are experiencing transformative changes because of the expansion in cancer workforce. The new and more interconnected cadre of African cancer health professionals and researchers are now coming together to address the various gaps in the cancer control agenda on the continent including cancer and crises. In addition, the world is experiencing a surge in conflicts and destabilization and the suddenness of the violence in Khartoum, a regional hub for medical education and health services, has brought it home that we do need to come tother in the oncology community in Africa and address our crisis-preparedness at a regional and continental level.

Regarding the rest of the international community, the response is still very suboptimal, due partly, to the normalization of conflicts in Africa resulting in a sense of helplessness and inertia. Another reason is lack of a coordinated responses from withing the African continent, and the fact that most of the conflicts are in countries with fragile health systems and marginalized status in the geopolitical space. Again, this starting to change with the advent of the crisis in Sudan as some international cancer organizations and knowledge platforms such as *The Lancet*, ASCO, UICC, London Global Cancer Week, Cancer Control are increasingly engaged in efforts to raise awareness regarding cancer in conflict zones in Africa.

While Sudanese oncologists and cancer hospitals are working hard to find safe passages or corridors for cancer medicines and other supplies, the international community should make concerted efforts to help in procurement of medicines, maintaining radiotherapy services, supporting the Sudanese cancer workforce and the continuation of it training and education, in addition to the collection of accurate data on the effect of the conflict on patients, cancer delivery system and cancer outcomes.

Long-term solutions include making serious efforts to tackle health system fragility and address the "cancer care desert zones in Africa", which tend overlap with conflict zones, through introduction and decentralization of cancer services in entire regions. Having cancer services in South Sudan, Eretria and Chad would have helped enormously in the current crisis in Sudan; not only in providing services for displaced Sudanese patients but also for the cancer patients in these countries especially those who are dependent on Sudan for provision of cancer services.

At a global level a paradigm shift is needed in how cancer care in conflict areas is addressed. As conflicts are increasing especially in vulnerable regions such as the Sahel region, the global oncology community should shift from a passive position to that of "a cancer conflict preparedness" especially at regional levels. An important element is the recognition that health equity and gender equality are pre-requisites for peace as well. Lack of access to health and health services is one of the causes of conflicts. Addressing climate injustice and working on global solutions to address the roots of conflicts are essential components of this response. The WHO is advocating for "health for peace". Cancer as a major health threat in LMICs must have its place on the agendas for peace. ■

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