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Review article

Strengthening care and research for women's cancers in Sub-Saharan Africa

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1. Introduction

Until recently, medical care in sub-Saharan Africa (SSA) has addressed the immediate demands of Human Immunodeficiency Virus (HIV), Tuberculosis, Malaria and Maternal–Child Health. Though these challenges remain, the region has had a degree of success in these efforts, and sufficient urbanization and economic development that an epidemiologic transformation, in which people live long enough to develop cancer and other non-communicable diseases, is well underway in SSA (Binagwaho, 2012).

The care of patients with cancer is one of the great challenges and achievements of modern society. It requires specific, coordinated multidisciplinary care from highly trained specialists, extensive infrastructure and a detailed and nuanced understanding of both the individual patient and the population at hand. In high-income countries (HICs), the care of patients with cancer is costly and highly resource intense, and often based on a specific molecular or genetic defect.

The treatment of cancer in the resource-limited context of SSA, therefore, presents a tremendous challenge. A simple transposition of protocols and technologies from HICs would be impractical and inhumane; resources would rapidly be depleted and many patients would remain without care. Other models have been developed that better match their setting, and this is as it should be. The challenges of biology, resources and human capacity found in SSA are such that effective solutions should be and, in fact, can only be developed in SSA. For this reason it is imperative that multifaceted research be developed in step with clinical cancer care in SSA (Varmus & Trimble, 2011). Here we review some of those challenges and opportunities.

The reader should note that the region of SSA is a huge and vastly diverse one, containing multiple sub-regions, 47 countries and approximately one billion people. To discuss cancer care and research in SSA is to broadly generalize as much as it might be to discuss cancer care in other WHO designated regions. Despite this significant limitation, however, we believe that some common challenges exist across the region, and that by exploring them we may be ready to more effectively address them.

2. What is the burden of women's cancers in SSA?

Cervical and breast cancers are consistently the two most common cancers in women across SSA (Wabinga et al., 2014; Mpunga et al., 2014; Ferlay et al., 2015). The incidence and mortality of cervical cancer are both far higher in SSA than is seen in more developed regions, while breast cancer has been observed to present in more advanced stage and to carry a far higher case fatality rate than that seen in other regions. The mortality from cervical cancer in Eastern and Southern Africa for example is 18 times higher than that seen in Western Asia and Western Europe. Similarly, though the rate of breast cancer is lower in SSA than in more developed regions, the mortality is still high: in Western Asia the age adjusted breast cancer mortality is 6 per 100,000 women, while in Western Africa it is 20 per 100, 000. Though ovarian and endometrial cancers seem to be less common in LMICs than in more developed countries, these diseases are regularly encountered and create considerable burdens and challenges for patients and practitioners (del Carmen et al., 2015).

3. What is the capacity for care of patients with cancer in SSA?

Farmer has observed that effective health care delivery requires space, staff, stuff and systems (Stulac et al., 2015). To this one might add a fifth 's': $ (or funding). The delivery of cancer care in SSA is challenged by shortages of physical infrastructure, human resources, equipment, validated standard operating procedures, and funding. Though most nations in SSA have pledged to commit 10% of their budgets to healthcare, current budget allocations are generally significantly lower (Morhason-Bello et al., 2013), and ministers of health

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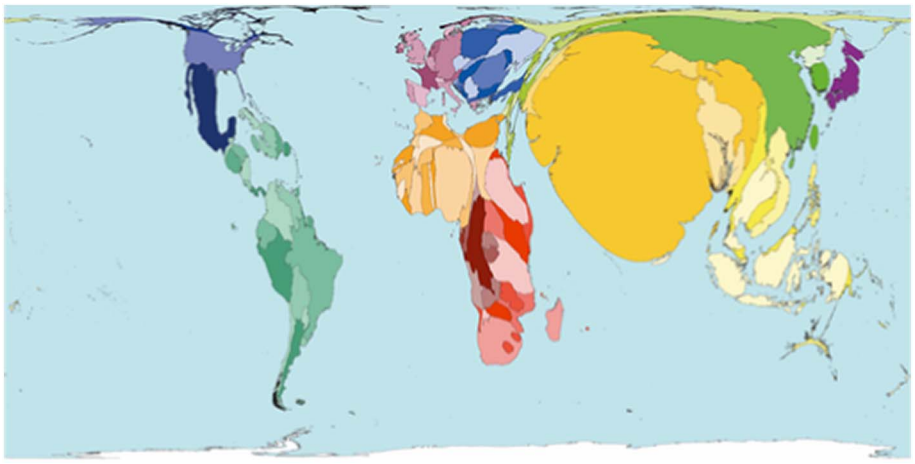

Fig. 1. Pictograph of deaths from cervical cancer mapped as land area of affected countries. Low- and middle-income countries are disproportionately affected.

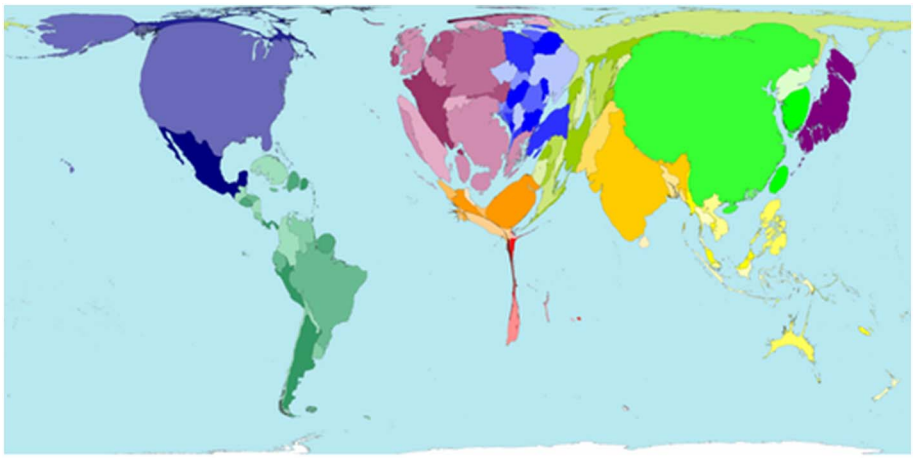

Fig. 2. Pictograph of physicians working depicted as land area of the respective nations. Sub-Saharan Africa, with the highest rates of cervical cancer deaths in the world, has the fewest physicians.
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must manage these limited funds to address a broad range of diseases. The WHO has documented the severe shortages of nurses and physicians across SSA, and the findings are concerning (Organization WH, 2016). Kinfu and colleagues evaluated the number of physicians in 12 SSA countries and compared the number being trained to two estimates of attrition (Yohannes Kinfu et al., 2009). They found that these countries on average had 0.09 physicians per 1000 population, compared to the U.S. which has over 26 times as many physicians at 2.4 per 1000 population. The number of nurses and midwives in SSA is 0.55 per 1000 population, compared to 9.8 in the U.S. Of more concern is the fact that most countries studied had an inflow of doctors and nurses that was either at or actually below estimated outflow of health personnel from the workforce. Figs. 1 and 2 show pictographically that the rates of cervical cancer mortality in SSA are among the highest in the world, while the supply of physicians is among the world's lowest. These levels are far below recommendations, let alone the numbers found in HICs. Holmer and colleagues recently evaluated the global distribution of surgical specialists and found that LMICs, with 48% of the world's global population, have only 20% of the world's surgical specialists. This includes 19% of the world's surgeons, 15% of the anesthesiologists and 29% of the world's obstetricians (Hampus Holmeremail et al., 2015). Disparities also exist within LMICs, with SSA having some of the lowest densities of specialists seen. In Uganda, for example, there are 0.6 surgeons and 0.3 obstetricians per 100,000 people, while in Nicaragua these numbers 8.7 and 4.5 and in the U.S. they are 36.1 and 12.6. Medical staff in SSA is therefore both overburdened clinically and less available for specialty training.

Freestanding cancer centers are uncommon in SSA and therefore often face an overwhelming volume of patients. Stefan reviewed the published literature and the internet and found only 102 cancer programs across Africa, despite an expected annual cancer related mortality of nearly 600,000 in the region (Stefan, 2015). Outside of these facilities, practitioners must balance the demands of more acute patient needs against the ongoing needs of cancer patients. For example, general surgeons may commonly be forced to delay a woman's mastectomy to attend to another patient with an appendiceal abscess, while women needing a radical hysterectomy for cervical cancer may be delayed due to obstetric or gynecological emergencies. There are shortages of chemotherapy, operating theaters and surgical equipment. Perhaps the starkest example of equipment shortage in SSA in radiotherapy: while the International Atomic Energy Commission recommends a radiotherapy facility for every 250,000 to 500,000 people, in Africa there are 140 facilities for a population of over 1.2 billion. Zubizaretta and colleagues estimate that 407 facilities, running 12 h a day, would be needed to meet the current needs for radiotherapy in Africa (Zubizarreta & Lievens, 2016). In North America, by contrast, there are 2787 radiotherapy facilities while only 1200 would be needed to meet current demand. Abdel-Wahab surveyed radiotherapy needs in Africa and noted that out of 52 countries assessed, 23 had teletherapy and only 20 had brachytherapy (Abdel-Wahab et al., 2013). Thus, few people in Africa have access to standard radiotherapy for diseases such as cervical cancer that require treatment with both teletherapy and brachytherapy.

This deficit of equipment and facilities further compounds the challenge of building human capacity; there are many specialized personnel, such as radiation physicists, radiotherapy technicians, and pharmacy staff qualified to work with chemotherapy, who have no training opportunities or job prospects in such a setting. The initiation