PART 3.

TACKLING SOCIAL INEQUALITIES IN CANCER

CHAPTER 15.

Research priorities for social inequalities in cancer in sub-Saharan Africa

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Introduction

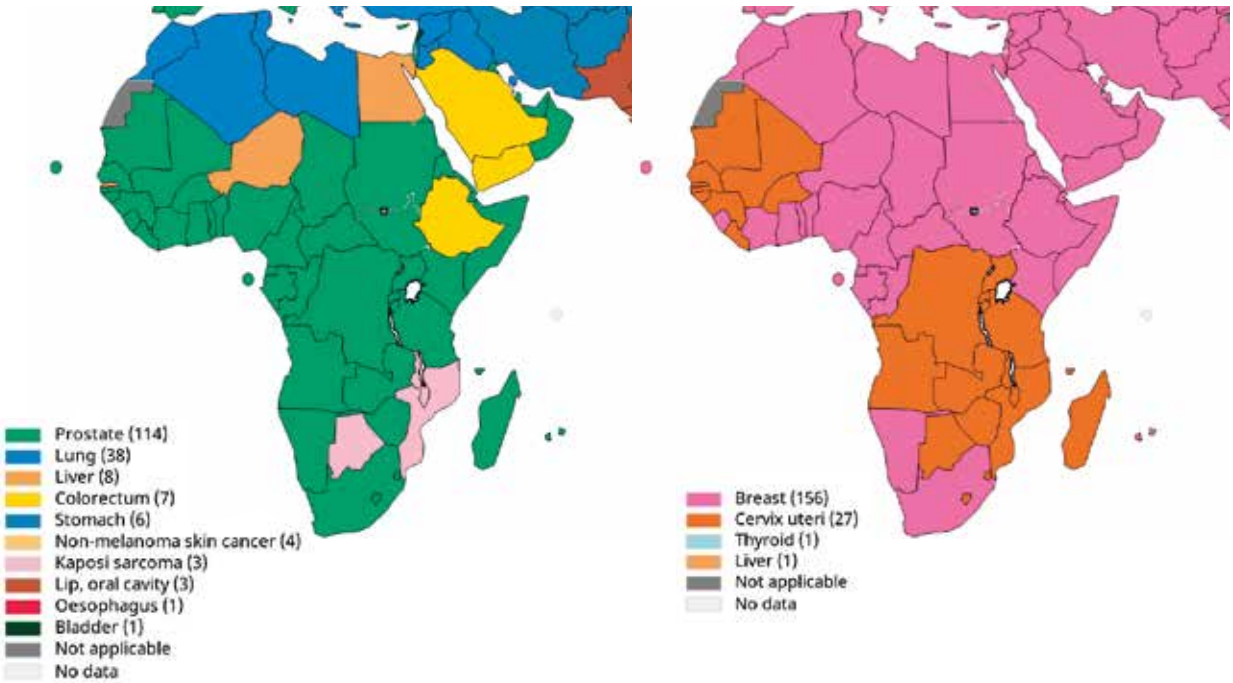
As seen in Chapter 6, to date most research on social inequalities in cancer has been conducted in high-income countries despite the fact that, globally, absolute disadvantage is far greater in resource-limited settings. Specifically, perhaps nowhere in the world is inequality more evident than in sub-Saharan Africa, which is home to some of the poorest and most deprived people in the world. By almost any health-related measure, such as the number of doctors per head of population or the availability of radiotherapy or even morphine, sub-Saharan Africa lags behind the rest of the world (Wakeham et al., 2012; Newton et al., 2013). A further challenge to cancer risks and treatment is a large and unique comorbidity profile, including a high prevalence of HIV. This chapter focuses predominantly on this region, but many issues are also relevant in other resource-limited settings.

Cancer in sub-Saharan Africa

There were an estimated 1 055 000 new cases of cancer in Africa and 693 000 deaths from the disease in 2018 (Bray et al., 2018). This burden is increasing rapidly because of demographic expansion and ageing, such that a doubling of incidence and deaths is projected by 2040. This prediction does not take into account the changing risk factor profile in this continent, which is undergoing rapid transition. The prevalence of tobacco use is currently low but is rising in some areas as a result of promotion by the tobacco industry (Nsimba and Sussman, 2006). Urbanization, changing diets, increasing prevalence of obesity, decreasing levels of physical activity, increasing alcohol consumption, and fertility transitions characterized by delayed or less childbearing are expected to increase the incidence of cancers associated with these risk factors (Moultrie et al., 2012; Holmes et al., 2018). Notably, the incidence of breast cancer has risen markedly in Africa; it is now the most common tumour among women in many sub-Saharan African countries, just as it is worldwide (Ginsburg et al., 2017).

In 2018, the most commonly diagnosed cancers in Africa in men, shown in Fig. 15.1, are prostate cancer,

Fig. 15.1. Most common cancer types in men (left) and women (right) in Africa in 2018. Source: reproduced from Ferlay et al. (2018).



liver cancer, Kaposi sarcoma (KS), non-Hodgkin lymphoma (NHL), lung cancer, colon and rectum cancer, and oesophageal cancer. In women, the most common cancers are breast cancer, cervical cancer, liver cancer, colon and rectum cancer, NHL, ovarian cancer, and KS. Several of these cancers are associated with poverty or infections, namely KS, NHL, liver cancer, cervical cancer, and oesophageal cancer. Among children, the most frequent cancers in many sub-Saharan African countries include Burkitt lymphoma and KS, whereas leukaemia and non-Burkitt lymphomas predominate elsewhere. Currently, at least one third of cancers in Africa are caused by infections, many of which are preventable (Plummer et al., 2016). With the exception of hepatitis B virus in some but not all African countries, efforts to reduce the burden of cancer-causing infections are patchy or absent. Cancer control programmes aimed at the early detection of disease and effective treatment are few; indeed, there is widespread failure to cure even the curable cancers, the most notable of these being childhood cancers. Effective palliative care is available to only a small minority of those dying from cancer.

In terms of societal inequalities, although economies of some African countries have experienced immense growth, and life expectancy has increased across the continent over the past 20 years, inequalities have also grown. In 2016, the mean Gini index (see Chapter 4) in Africa was higher than the world average, driven by extreme inequalities in just seven countries: Angola, Botswana, the Central African Republic, the Comoros, Namibia, South Africa, and Zambia (UNDP Africa, 2017). Despite a global decline in the number of people living in extreme poverty, Fig. 15.2 illustrates that the absolute number of people living in poverty is increasing in sub-Saharan Africa. Furthermore, despite a reduction in the proportion of populations living in poverty around the world, Fig. 15.3 shows how this reduction has been substantially less in sub-Saharan Africa (in which > 40% of the population live in poverty). Sustainable Development Goal 1, adopted by the United Nations Member States in 2015, is to end poverty by 2030; however, one in three people in sub-Saharan Africa currently live below the international poverty line. For a family living in poverty on less than 1.90 international dollars per day, if a family member has symptoms of cancer, how does the family attain the know-how, resources, and finances, and overcome logistical and sometimes sociocultural barriers, to reach a cancer diagnostic facility, navigate the health-care system, and support their family member through their treatment, in a hospital located up to several hundred kilometres away?

Such is the situation facing the majority of cancer patients in sub-Saharan Africa. As economic development continues, a levelling-up approach

Fig. 15.2. The number of people living in extreme poverty has declined on a global scale for the past two decades, but not in sub-Saharan Africa. Source: Roser and Ortiz-Ospina (2018).

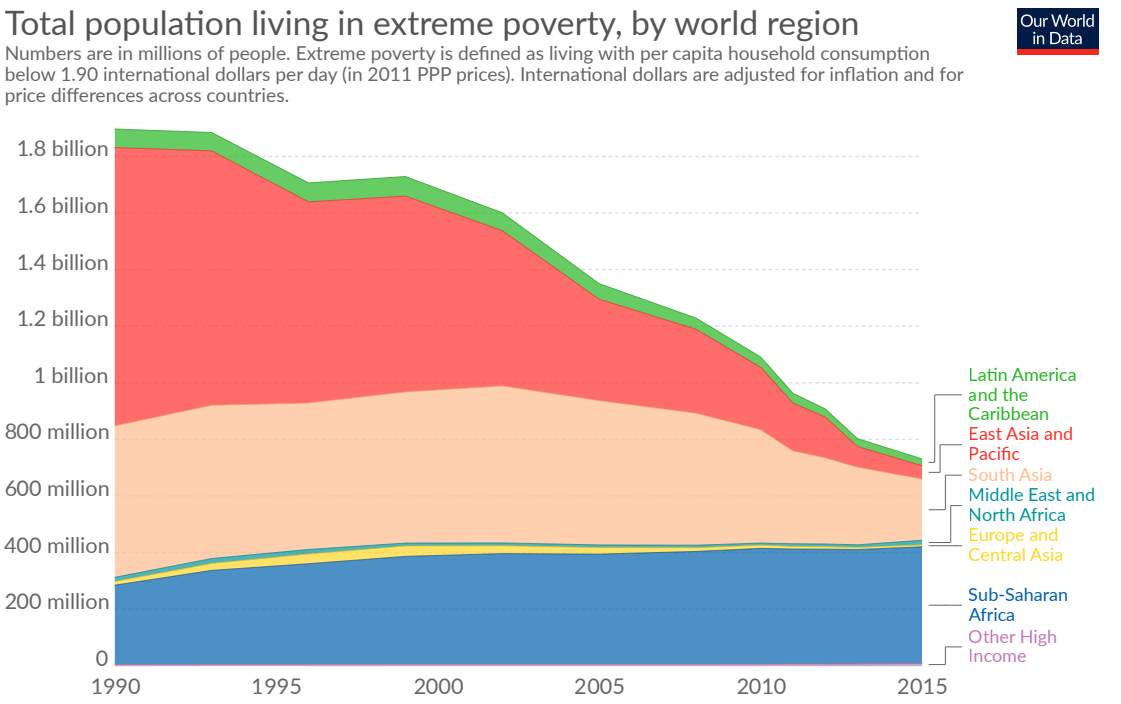
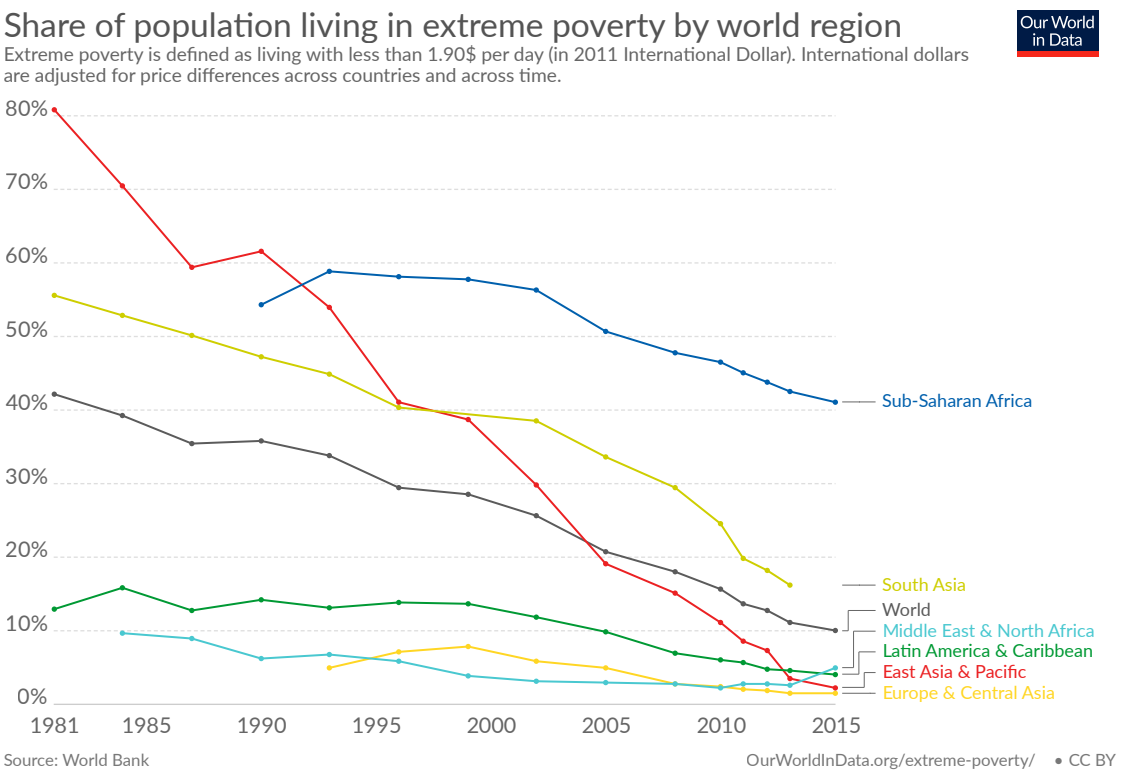


Fig. 15.3. The proportion of the population living in extreme poverty has declined steeply across the world, but in 2015 it remained above 40% in sub-Saharan Africa. Source: Roser and Ortiz-Ospina (2018).



for cancer prevention and cancer care will be needed to achieve an equitable sharing of progress in improving cancer outcomes (Braveman and Tarimo, 2002).

Research on social inequalities in the occurrence of cancer

Predominantly on the basis of European and North American countries, Whitehead introduced the logic of interventions to tackle health inequalities (Fig. 15.4) and summarized a typology of four categories of actions to tackle them (Whitehead, 2007): strengthening individuals, strengthening communities, improving living and working conditions, and promoting healthy macro-policies.

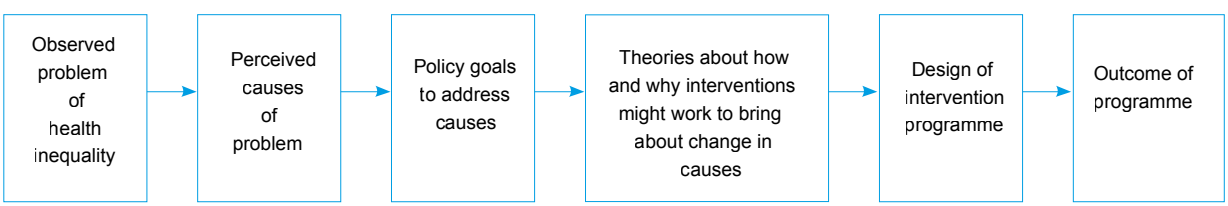
Impeding the first fundamental task in the logic of intervention (Fig. 15.4) – observing the problem of cancer inequality – are weak health information systems. Cancer intelligence data need to be strengthened across many low-income settings; in Africa this initiative is supported by IARC (http://gicr.iarc.fr/en/) and the African Cancer Registry Network (Gakunga et al., 2015). However, measuring the burden of cancer in Africa is severely restrained by three related problems that may have social gradients and that make population-based cancer registration a challenging yet vital component of cancer control programmes: (i) an inadequate characterization of disease: technologies for diagnosing cancer are unavailable in many countries, particularly in imaging and histopathology for diagnosis; furthermore, poorer individuals may not be able to afford histology and other diagnostic fees and may never be diagnosed within the formal health-care system; (ii) an incomplete ascertainment of cases: there is uncertainty about the scale of this problem, and it affects our understanding of the geographical distribution of specific cancer types; and (iii) an inadequate ascertainment of population denominator data.

With this background, basic cancer registration needs to be strengthened to first gauge the extent of cancer inequalities between and within countries. An ideal situation would be to have one urban and one rural registry in as many countries as possible, because some of the most disadvantaged populations reside in rural settings. Supporting transitions to electronic health information systems, now being adopted in some low- and middle-income countries (LMICs), would greatly facilitate this process (Mutale et al., 2013). In terms of estimating social gradients in cancer incidence, differences have justifiably been well documented for certain population groups at very high risk, including of AIDS-defining and HIV-associated cancers in people living with HIV/AIDS. In terms of socioeconomic indicators, it is often not feasible for cancer registries to routinely collect good-quality data at the individual level; however, expanding area-level indicators based on geographic information systems could be generated from residential origin. Some registries are attempting to capture data on socioeconomic indicators, occupation, actual ethnicity, or predicted race based on analysis of surnames (e.g. in the National Cancer Registry of South Africa), and others are focusing their efforts on the collection of such detailed data for a short period or on a smaller geographical scale. Where this is possible, even if denominator data or cohorts are not available for the calculation of absolute incidence or mortality rates, insights into social or other gradients can be obtained from relative risks for a specific cancer using other cancers as controls. Impressively, the Nairobi Cancer Registry has been able to do this. From an analysis of 22 000 cancers diagnosed during 2000–2014, the relative incidences of individual cancers in White, Asian, and Kenyan ethnicities, and between the different Kenyan tribes, were calculated (Korir et al., 2017).

Social inequalities and primary prevention research

Given the inadequate cancer diagnostic and treatment facilities, for many cancers primary prevention is key to cancer control in LMICs. For established carcinogens, social

Fig. 15.4. The logic of interventions. Source: reproduced from Whitehead (2007), copyright 2007, with permission from BMJ Publishing Group Ltd.



gradients in exposure prevalence, exposure levels, and, importantly, exposure source apportionment can be conducted within cross-sectional or cohort studies to inform later exposure mitigation interventions. As a starting point, a somewhat underutilized resource to assess social gradients in cancer risk factors are Demographic and Health Surveys (DHS); the representativeness and large scale of the repeated standard DHS provide valuable data on household- and individual-level social indicators and environmental and lifestyle risk factors (Corsi et al., 2012). Some risk factors for cancer are now included (see examples in Box 15.1), and socioeconomic indicators are both extensive and relevant to the setting. Indicators that relate to the most disadvantaged groups of society, such as level of literacy, are key and provide essential information in the design of communication strategies for cancer awareness and early presentation. For example, as African countries implement the World Health Organization Framework Convention on Tobacco Control, progress in eliminating social inequalities can be monitored. Analyses of recent DHS

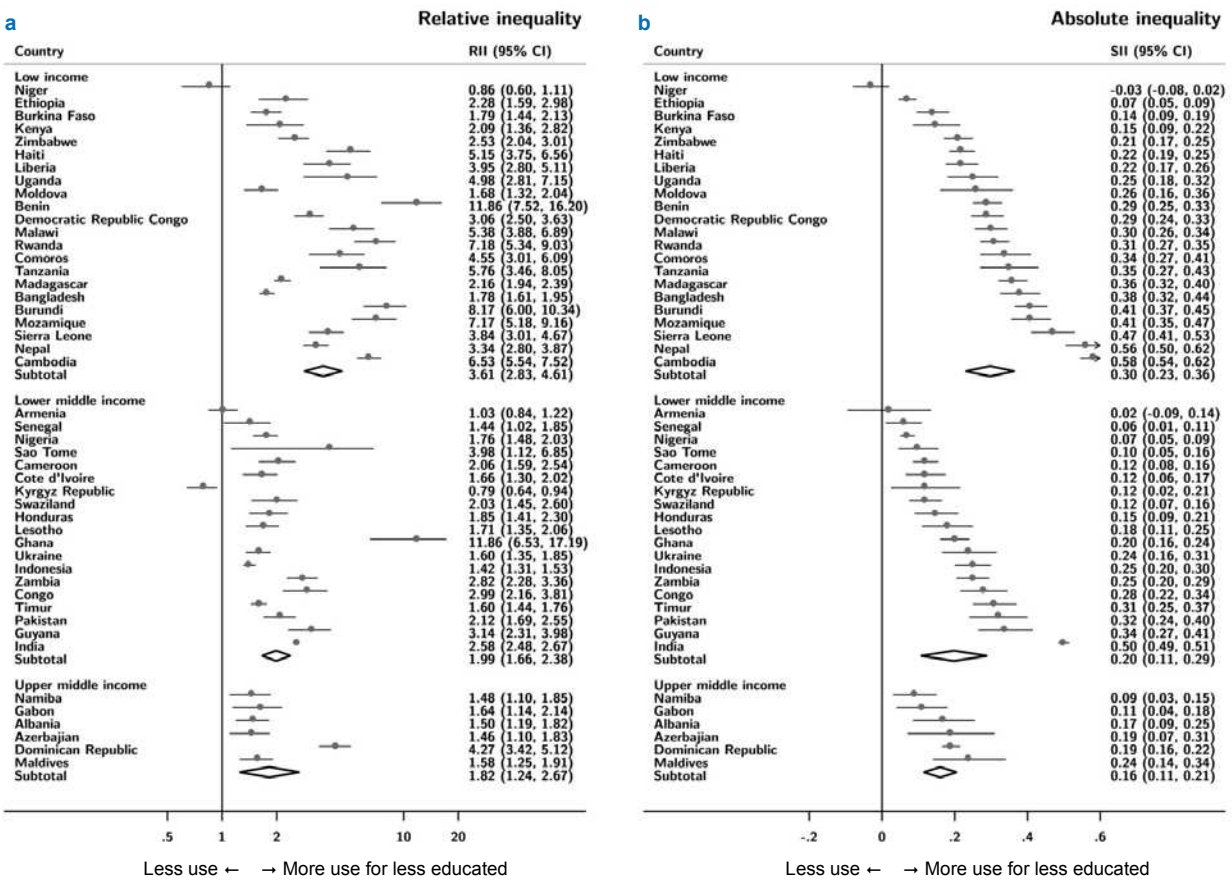
Box 15.1. Demographic and Health Surveys data relevant to research on social inequalities in cancer.

Social indicators: education, wealth, education, occupation, marital status, and religion.

Risk factors: tobacco use (and type), alcohol consumption, anthropometry (including being underweight, of normal weight, overweight, obese), diabetes, HIV, fertility (age at first birth, number of children), and household (cooking fuels, water source).

Screening: breast cancer screening and cervical cancer screening.

Fig. 15.5. Demographic and Health Surveys provide useful data for use in evaluating social inequalities in lifestyle and environmental risk factors for cancer. Here, tobacco use in men is higher in less educated than in more educated men, and this difference is, on average, larger on a relative scale in low-income countries. RII, relative index of inequality; SII, slope index of inequality. Source: reproduced from Sreeramareddy et al. (2018), copyright 2018, with permission from BMJ Publishing Group Ltd.



data (in about 2015; Fig. 15.5) show greater prevalence of tobacco use in men with a lower versus a higher education level across many African countries and other LMICs (Sreeramareddy et al., 2018). In contrast, the prevalence of tobacco use in African women is low.

Poverty is also connected to higher risks of exposure to infectious carcinogenic agents and to carcinogens originating from food, occupational, or environmental sources, some of which are depicted in Fig. 15.6. For example, indoor air pollution from the burning of biomass fuels in poorly ventilated kitchens leads to excessive exposure to polycyclic aromatic hydrocarbons in women and young children (Ezzati and Kammen, 2001); clean-fuel cooking stoves are an attractive remedial solution to reduce the risks of multiple respiratory diseases, including lung cancer. Aflatoxin, a mould that grows on staples such as maize and peanuts kept in poor storage conditions, causes hepatocellular carcinoma, which is particularly common in West Africa. HIV prevalence is higher in groups with lower socioeconomic status (Wabiri and Taffa, 2013). With respect to occupational exposures, LMICs tend to have fewer regulations on the protection of workers from environmental carcinogens (McCormack and Schüz, 2012). Even when such regulations exist, they are difficult to monitor and enforce, especially within the large informal employment sector. Furthermore, environmental protection measures are often weak, and the disposal of industrial waste may not exclude downstream human exposure.

Human biomonitoring studies, involving analyses of exposure or effect biomarkers, provide the most definitive evidence of exposure to carcinogens. To address social inequality, the sampling frame of such studies needs to be purposefully designed. Without targeted recruitment to enhance participation, socially disadvantaged groups may otherwise be under- or even unrepresented (Morrens et al., 2017). A growing number of cohorts in Africa aim to fill this gap, such as rural and HIV/AIDS cohorts.

Fig. 15.6. Examples of carcinogen exposures that are prevalent among poorer populations in sub-Saharan Africa. (a, top left) Traditional alcohols, such as this kachasu distillation in Malawi, are much cheaper than commercial alcohols and can have ethanol percentages of 60% and higher. (b, top right) Exposure to polycyclic aromatic hydrocarbons is high in women who cook and sleep by a fire that burns biomass; western Kenya. (c, bottom left) *Schistosoma haematobium*, a bladder carcinogen, affects people living on Lake Malawi. (d, bottom right) Aflatoxin-affected maize, a major cause of hepatocellular carcinoma in Africa. Source: (a–c) courtesy of Valerie McCormack and (d) courtesy of Thomas Lumpkin/CIMMYT via Flickr; CC BY-NC-SA 2.0.

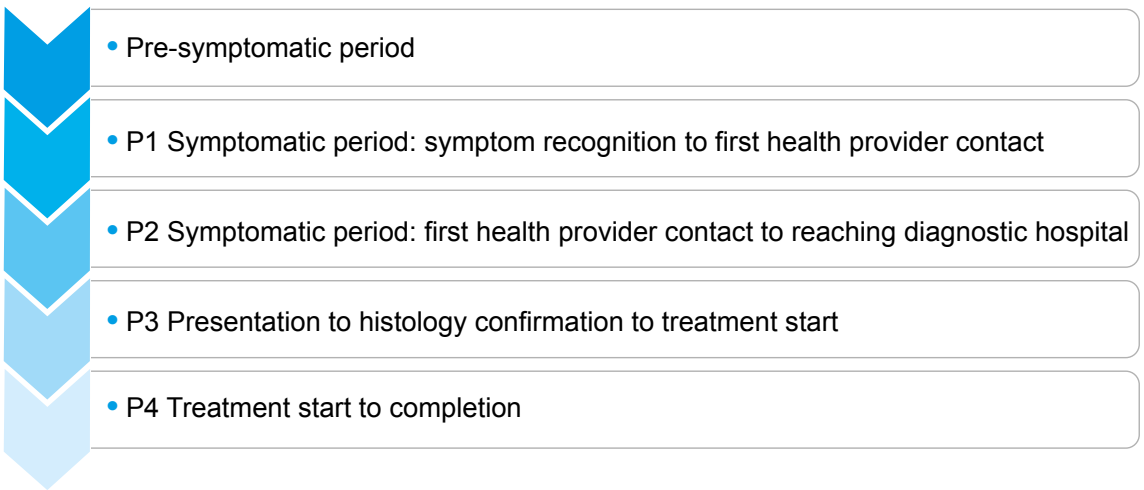
The journey to diagnosis and cancer care

Early diagnosis of cancer and timely appropriate treatment are essential components of cancer control. For treatable cancers for which stage at diagnosis is a major prognostic factor, social inequalities in the length of, barriers to, and composition of the cancer journey are important to understand, especially for potentially curable cancers, such as those of the breast, cervix, and endometrium in women, and of the prostate in men. In about 2015, the majority of cancers in sub-Saharan Africa were diagnosed at stages III and IV, limiting treatment and survival prospects even under the best circumstances. Furthermore, within-country social inequalities in this already-late-stage distribution, and thus in survival outcomes, are present. For breast cancer, 75% of patients are diagnosed at stages III and IV (Jedy-Agba et al., 2016); this was higher in 2010 than in Black and White women in the USA diagnosed four decades previously. Unfortunately, the stage distribution may be even worse as many non-tertiary hospitals do not have diagnostic imaging facilities to detect the presence of metastases. This late-stage distribution is amenable to change, however, even over a short time frame. At the Chris Hani Baragwanath Hospital in Soweto, South Africa, a functioning dedicated breast cancer clinic, which can be relied upon by peripheral hospitals and clinics, has achieved a reduction in stage III/IV disease from 70% to 50% in 5 years, in the absence of any form of organized early-detection programme (McCormack et al., 2013). However, when such improvements are made to overall situations, women already at a disadvantage need extra attention. For breast cancer, sub-Saharan African social groups with more advanced disease at diagnosis are more likely to be unmarried women, women with lower socioeconomic status, less educated women, Christian women compared with Muslim women, and those with less breast cancer awareness, including those who do not believe that the disease is curable (Brinton et al., 2017; Jedy-Agba et al., 2017; McKenzie et al., 2018a). Cancer conceptualization at the community level is important to tackle, notably the prevalent views that cancer is incurable and that taking a biopsy leads to death or a fate too often sadly described as "worse than HIV" (Malambo and Erikson, 2018; McKenzie et al., 2018b).

Beyond identification of groups at risk of late-stage diagnosis, research on social inequalities needs to address how socioeconomic, cultural, health system, and geospatial factors influence different segments of the prolonged journey to diagnosis, a protracted diagnostic period, and a delayed or incomplete treatment regimen (Fig. 15.7). These segments need to be dissected; it is too often assumed that the pre-contact (or patient delay) symptomatic period is where the delay occurs, but increasing evidence suggests that the post-contact (health system) period may in fact be where the greatest delay occurs for most patients. Incorporation of traditional social structures into community sensitization and to the referral process may be an effective way to increase awareness and reach cancer patients at the start of this journey (Kapambwe et al., 2013).

Many factors must be considered in determining which social groups have prolonged journeys to cancer diagnosis. In addition to the socioeconomically disadvantaged with reduced access to health care, populations may be inhibited because of lower cancer awareness, cancer stigma, and competing life stressors. Individuals with a lower level of education, including the illiterate, are a substantial patient group, because cancer now affects people who were born in the 1950s and 1960s when global literacy rates were 40%, that is, half of the literacy rates reached by the end of the 20th century (OECD, 2014). In the massive geographical expanses of African countries, with a few or just a single cancer treatment hospital, patients need to overcome barriers associated with time and travel costs to reach a cancer care centre, often without personal transportation. Travel distances are beyond those faced by rural populations in most countries. Despite language barriers, a small proportion of people travel to neighbouring countries in an attempt to seek diagnosis and care. Furthermore, sexual inequalities in who would be taken to a hospital for a potential cancer diagnosis were present in some countries, but appear to have improved. For example, in the 1960s–1970s oesophageal cancer case series reported had male-to-female ratios of more than 30, most likely due to sexual-biased referral, which have since declined to less than 6 (Middleton et al., 2018). Moving to the present day, populations of the growing urban slums of some larger African metropolises are likely to face similar challenges in achieving effective cancer service delivery or benefiting from awareness campaigns as, for example, the populations of the slums of Mumbai. At the other side of the residential spectrum, little is known about what proportion of people with cancer obtain a cancer diagnosis or care among nomadic populations, such as the Maasai, Pokot, and San. Within a

Fig. 15.7. A late-stage cancer diagnosis in sub-Saharan Africa results after a long symptomatic period (P1+P2). Delays and losses from recommended care plans can also occur in the diagnostic (P3) and treatment (P4) phases. Identifying where, why, and how these delays and losses lead to social inequalities is a first step towards reducing inequalities in outcomes.



syndemic framework (Mendenhall, 2017), the comorbidities affecting African cancer patients have a distinct profile. People living with HIV (35 million older than 15 years worldwide, the majority in sub-Saharan Africa) have increased cancer risks; in the era of antiretroviral drugs, however, they are now more likely to have non-HIV-associated malignancies. Research on drug–drug interactions, side-effects, and outcomes in Africa for this comorbidity is in its infancy, as it is for other prevalent comorbidities, including diabetes, hypertension, and obesity.

Finally, the cost of cancer treatment is a major barrier to achieving equality in access to cancer care, costs which often lead to a catastrophic financial burden on families. However, initiatives are under way to achieve more efficient and lower-cost resource-appropriate treatments (Gopal, 2017), which should improve access for all. Examples of technological advances to accelerate and streamline diagnosis (Haney et al., 2017) include cytology-free point-of-care diagnosis of cervical cancer, organization of periodic one-stop 24-hour breast cancer diagnostic clinics as piloted in Zambia (Pinder et al., 2018), and mobile-phone-based imaging to detect oral cancers and for molecular cancer diagnostics.

In conclusion, in strengthening sub-Saharan African cancer control programmes for prevention and improvement of outcomes, attention to all social groups is critical because cancer inequalities are already present and are large. While efforts are being made to address these, it is important to keep in mind the care and compassion needed for a terminally ill cancer patient, as highlighted by Singer and Bowman: “If someone is condemned to a premature death because of the injustice of global health inequality, it is doubly unjust for that person to be condemned to an agonising death racked by preventable pain” (Singer and Bowman, 2002).

Key points

- The evidence base for within-country social inequalities in cancer needs strengthening in sub-Saharan Africa; existing evidence suggests that inequalities in prognosis and survival are extremely large.
- Studies of social gradients in risk factors from existing population health surveys and from specific cancer studies, using other cancers as controls, offer useful insights.
- Poverty is linked to vulnerabilities to alcohol, tobacco, infections including HIV, and occupational and environmental carcinogenic exposures, as well as syndemics, that is, multiple related comorbidities, at the time of diagnosis.
- Across all social groups, shortening time to diagnosis and ensuring treatment access and completion are key to reducing the immense social inequalities in cancer outcomes.

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