

## Cancer incidence and radiation therapy in Mozambique – a comparative study to Sweden

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### To the Editor,

Cancer is a leading cause of death worldwide, including developing countries [1,2]. In Mozambique, because of the high prevalence of infectious diseases such as malaria and later HIV [3,4], the cancer burden has received less attention until it has recently become a public-health problem. With improving life standards and health care, cancer incidence and prevalence will most probably continue to increase as cancer is an age-related disease.

Surgery and chemotherapy are the main cancer treatment modalities in Mozambique. However, a national cancer registry of good quality could help identify the need for radiation therapy (RT), which is a major treatment modality and is utilised for cure or palliation of about 50% of all cancer patients in the developed world [5,6].

In a big step towards national reporting on cancer, a population-based cancer registry has been established in the Beira Central Hospital, Province of Sofala, Mozambique, with help of the International Agency for Research on Cancer (IARC) and it is expected that the registry will gradually evolve to cover the whole nation [7–9].

The spectrum of cancer types displayed on the Beira Cancer Registry and Globocan 2008 estimates indicates that Mozambican cancer patients could greatly benefit from RT alone or in combination with surgery and chemotherapy, already available. At the present time, only a very limited number of patients can afford to receive RT treatment as it is only offered abroad.

Therefore, it was the aim to compare the cancer incidence in Mozambique and Sweden in relation to

the choice of treatment for particular types of cancer in order to determine the potential role of RT in Mozambique.

The importance of RT for cancer care has been recognised by the Government of Mozambique and after joining the IAEA in 2006 [10], the country is part of the IAEA's Programme of Action for Cancer Therapy (PACT), which includes the establishment of the national RT and nuclear medicine centre (IAEA-TC project MOZ6002) [11].

## Material and methods

Estimates on cancer incidence and mortality in Mozambique and other countries of the world are presented in the IARC's Globocan 2008 project [1]. As part of the project, a population-based registry was established in 2006 in the capital city of the Province of Sofala, Beira, with the purpose of augmenting the quality of the estimates. The Beira Cancer Registry is confined to the city area (631 km<sup>2</sup>) and covers a population of about 432 000 inhabitants [12]. Data entered in the registry system is collected in healthcare departments, obituary and civil registries. About 90% cancer cases are confirmed with histology, which is the main basis of diagnosis [7–9]. Prevalence studies are not performed yet. Cancer incidence of the registry is impaired with significant underreporting [7–9]. As a national cancer registry is not available yet, Globocan 2008 statistics were assumed to reflect the minimum figures of the cancer burden in Mozambique.

To capture the status of cancer care delivery, a multi-purpose questionnaire was emailed to five medical doctors in major healthcare centres in the

cities of Beira and Maputo. All doctors responded and in summary reported lack of or poor cancer care facilities and high mortality associated with late presentation at diagnosis. All recognised the need for RT.

Estimation on the need of RT in Mozambique is based on available data of Sweden, which is known to have good cancer registration and RT services [13,14].

## Results and discussion

Table I shows the most common cancer types in Mozambique and in Sweden. For each five-year age group, age-standardised incidence (ASIR) and mortality (ASMR) rates, are defined as the number of new cancer cases or deaths per 100 000 persons per year, respectively. ASIR and ASMR are standardised according to the world standard population and allow for international comparisons, i.e. Sweden has higher prostate incidence ASIR (95.4) compared to Mozambique (16.1) [1].

Most cancers in Mozambique lead to death in contrast to Sweden where about two of three cancer patients survive the disease. This could reflect better cancer care in Sweden, including early diagnosis and RT. In fact, the questionnaire and the Beira Cancer Registry showed that Mozambican cancer patients in general mostly presented in advanced stages at diagnosis.

Crude incidence rates for the Beira and Swedish cancer registries were calculated for each five-year age group. The first group is 0–4 years and each group is represented as a point at the last year of that group. Women and men are grouped separately.

Table I. Top 15 most common cancer types in Mozambique and Sweden together with the corresponding world age-standardised incidence rate (ASIR) and mortality rate (ASMR) values [1].

Mozambique Tumour site	ASIR	ASMR	ASIR/ ASMR	Sweden Tumour site	ASIR	ASMR	ASIR/ ASMR
Cervix uteri	50.6	34.5	0.7	Prostate	95.4	19.9	0.2
Prostate	16.1	12.9	0.8	Breast	79.4	14.8	0.2
Kaposi's sarcoma	15.5	13.2	0.9	Colorectum	28.1	11.2	0.4
Breast	13.1	7.5	0.6	Lung	17.1	17.5	1.0
Oesophagus	12.8	12.4	1.0	Melanoma of skin	16.0	2.7	0.2
Liver	4.6	4.7	1.0	Corpus uteri	14.0	2.5	0.2
Non-Hodgkin's lymphoma	4.6	3.7	0.8	Bladder	10.3	2.6	0.3
Bladder	4.2	3.0	0.7	Ovary	8.9	6.0	0.7
Colorectum	3.3	2.7	0.8	Brain, nervous system	8.9	4.5	0.5
Ovary	3.2	2.6	0.8	Non-Hodgkin lymphoma	8.7	2.9	0.3
Stomach	3.0	2.9	1.0	Cervix uteri	7.8	1.9	0.2
Lip, oral cavity	2.3	1.1	0.5	Leukaemia	6.9	3.6	0.5
Lung	2.1	2.0	1.0	Testis	6.1	0.2	0.0
Corpus uteri	2.0	0.7	0.4	Kidney	6.1	3.0	0.5
Larynx	1.7	1.0	0.6	Pancreas	4.3	7.2	1.7
Total	139.1	104.9	0.8	Total	313.0	100.5	0.3

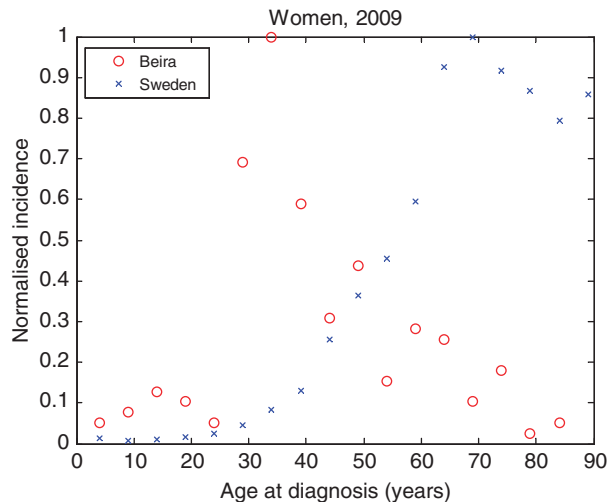


Figure 1. Normalised frequency curves versus age at diagnosis for women in the city of Beira, Mozambique (O) and Sweden (X). Each point is calculated as the number of cancer incidence per year in each age group divided by the maximum of incidence, which is observed in the age group 30–34 years (City of Beira, Mozambique) and 65–69 years (Sweden).

The rates were normalised to one and are shown in Figures 1 and 2.

Cancer in the city of Beira affects mostly women in the age group 30–34 years in contrast to women in Sweden, where the most affected group is 65–69 years (Figure 1). Figure 2 shows that men in the age groups 25–29 years and 65–69 years are the most affected by cancer in the city of Beira and in Sweden, respectively.

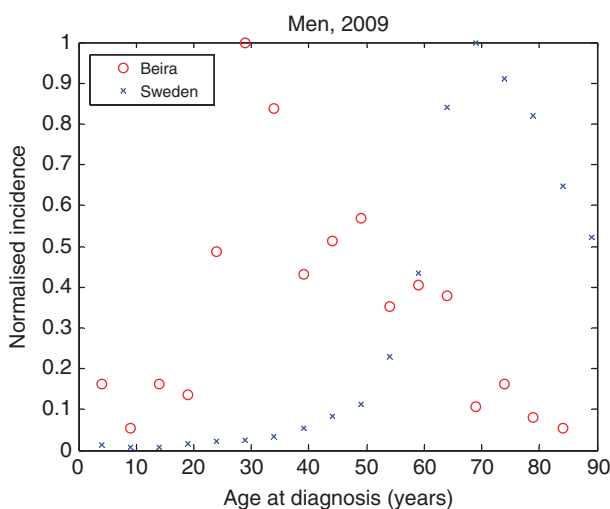


Figure 2. Normalised frequency curves versus age at diagnosis for men in the city of Beira, Mozambique (O) and Sweden (X). Each point is calculated as the number of cancer incidence per year in each age group divided by the maximum of incidence, which is observed in the age group 25–29 years (City of Beira, Mozambique) and 65–69 years (Sweden).

The risk of getting cancer increases with age [15,16]. The trend is clearly shown in (Supplementary Figures 1 and 2 to be found online at <http://informahealthcare.com/doi/abs/10.3109/0284186X.2013.861078>) for Sweden, where almost all cancers are recorded in the national registry [17]. The Beira Cancer Registry has larger bars error bars and the trend is not clear.

The age-corrected incidence was calculated as the ratio of the number of people diagnosed with cancer in one year in a certain age group and the corresponding total healthy population in the same age group. Supplementary Figures 1 and 2 to be found online at (<http://informahealthcare.com/doi/abs/10.3109/0284186X.2013.861078>) show the age-corrected incidence trend for women and men in the city of Beira, Mozambique, and in the whole of Sweden.

About 50% of cancer patients in the developed world are treated with RT either with curative or palliative intent [5,6]. The RT utilisation,  $RT$  (%), in Sweden in the year 2000 [18], is presented in (Supplementary Table I to be found online at (<http://informahealthcare.com/doi/abs/10.3109/0284186X.2013.861078>)). Due to very low incidence of Kaposi sarcoma in Sweden, the role of RT for this type of cancer could not be appreciated; however, RT could have a role in managing Kaposi sarcoma [19] in Mozambique, where this type of cancer is very frequent and mostly associated with HIV. For instance, about 70% of patients with Kaposi sarcoma in the city of Beira tested positive to HIV [7–9].

Supplementary Table I to be found online at (<http://informahealthcare.com/doi/abs/10.3109/0284186X.2013.861078>) shows that about 60% of all Mozambican cancer patients would require RT at some point in their treatment either as the primary or adjuvant treatment. For the two most common cancers in Mozambique; cervical and prostate, RT is a valid option for many patients [20–22]. The proportion of patients that would benefit from RT indicates that investment in RT is justified.

RT is a relatively cost-effective way of managing cancer in comparison to chemotherapy and surgery. Indeed, the Swedish Council on Technology Assessment in Health Care (SBU) showed that in the year 2000, RT care in Sweden cost only 5.6% of all cancer treatment modalities [23] but was used in about 47% of all cancer treatments [18]. RT should thus be a prioritised cancer treatment modality in developing countries as Mozambique.

However, it has to be mentioned that the success of RT in the management of cancer dramatically depends on the stage of the disease and the accuracy of determining, delineating the target and the organs at risk. Therefore, a combined programme

on diagnostic imaging and therapy has to be implemented and a complex infrastructure, including diagnostic radiology and magnetic resonance imaging as well as RT facilities has to be developed. The programme should integrate personal training in the specialties of RT, including radiation oncologists, medical physicists and RT technologists.

## Conclusion

Data from the Beira and Swedish cancer registries show that cancer in Mozambique mainly affects young people in contrast to Sweden, where old people have higher frequencies of the malignant disease.

RT is a very cost-effective way of treating cancer disease with curative or palliative intent and a very large proportion of cancer patients in Mozambique would benefit from this treatment modality. The most common cancer types in Mozambique: cervix, prostate and breast, appear to be well managed with RT in most parts of the world.

## Acknowledgements

We are grateful for the continuous support by Sida through the International Science Programme (ISP) at Uppsala University, Sweden. The authors would also like to thank Josefo Ferro for providing the reports of the Beira Cancer Registry and Bo Nilsson and Debbie V D Merwe for their comments.

**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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## Supplementary material available online

Supplementary Figures 1–2 and Table I to be found online at <http://informahealthcare.com/doi/abs/10.3109/0284186X.2013.861078>.