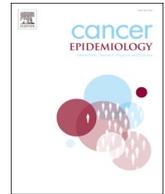




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Cancer incidence in Cotonou (Benin), 2014–2016 First results from the cancer Registry of Cotonou

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ARTICLE INFO

Keywords:
Registry
Cancer
Incidence
Benin

ABSTRACT

Incidence data from the population cancer registry of Cotonou (Benin) for the three year period 2014–2016 are presented.

1086 cancer cases were recorded, 608 cases (56.0%) in women (corresponding to an age standardized incidence rate (ASR) of 78.4 per 100,000) and 478 cases (44.0%) in men (ASR 91.8 per 100,000).

Breast and cervical cancer accounted for 49.2% of all cancers in women. Breast cancer (ASR 22.6 per 100,000) was more common than cervical cancer (ASR 14.9 per 100,000) and the mean age of cases was lower. The incidence of prostate cancer (one quarter of all cancers in men), 30.5 per 100,000, was similar to that in other West African registries. Cancers of the liver and digestive tract were also relatively common in both sexes.

These are the first data on cancer incidence in Benin, and will be invaluable for the development and evaluation of the National Cancer Control plan.

1. Introduction

Cancer has become a major global public health issue in developed and developing countries and is now one of the leading causes of death in both. In 2018, 9.6 million deaths were attributable to cancer, representing about one in six of all deaths worldwide. With 18.1 million new cases each year, in 2018 more than 43.8 million people were living with cancer [1].

In Africa, the number of new cases was estimated as 1.06 million in 2018 (5.8% of the world total) while the number of deaths was 693,000 (7.3% of the world total). The number on new cases is projected to increase by at least 46% between 2018 and 2030 [1].

The absence of comprehensive mortality statistics for almost all African countries means that data on cancer incidence and survival from population-based cancer registries are essential for cancer surveillance and monitoring, as components of national cancer control plans [2,3]. In Benin, the Ministry of Health established a population-based cancer registry for the capital city of Benin in 2014, under the control of the National Programme for Control of non-Communicable Diseases (PNLMNT). Cancer services in Benin are provided almost entirely through tertiary level hospitals, and in the absence of universal

health coverage, most treatment costs are met by out-of-pocket expenditure. Currently there are no population-based, organized cervical and breast cancer screening programmes in the country

The current report presents the results of the first 3 years of registration (2014–2016) and compares these with the results of other registries in the region, and with the black population of the United States.

2. Material and methods

2.1. Population coverage

The population covered by the registry is comprised of all individuals normally resident in the city of Cotonou, the capital of the Republic of Benin. The size of this population, by 5-year age group and sex, for the years 2014–2016, was estimated based on the most recent population and the housing census (for the year 2013) [4]. The mean average population for the period 2014–2016 was 719,712 (378,745 women and 340,967 men) or 6.8% of the total population of Benin (Fig. 1).

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<https://doi.org/10.1016/j.canep.2019.01.006>

Received 19 September 2018; Received in revised form 2 January 2019; Accepted 11 January 2019

Available online 24 January 2019

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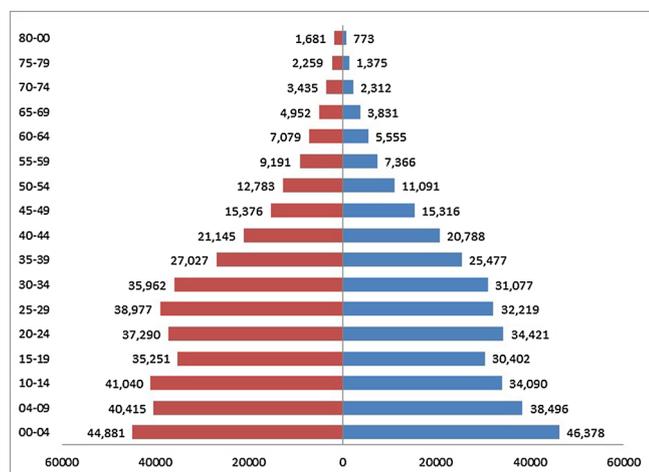


Fig. 1. Population data for the city of Cotonou in 2013 [4].

2.2. Collection and management of data

The registry uses the methods and definitions of the Standard Operating Procedure Manual of the African Cancer Registry Network [5]. Malignant cancers at all sites are registered, regardless of the basis of diagnosis (based on pathology, imaging, tumour markers, or clinical examination alone). Data collection is active, through regular visits to some 28 sources where cancer patients who are residents in the registry's target area are likely to have been diagnosed and / or treated:

- 9 public Health Facilities
- 14 private clinics
- 5 pathology laboratories

The National University Hospital of Cotonou (CNHU-HKM) is the most important source of information for the registry. Appropriate data collection methods have been put in place according to each source of information. In the period studied, there were no specialist oncology services; the Cotonou Private Centre of Oncology became operational only in 2018.

Information on the cancer case (personal data of the patient, details of the tumour and its treatment, the source of information, and the outcome for the patient (alive or dead)) are abstracted from the records in the data sources onto data collection forms. Several items of information are coded (using the International Classification of Diseases for Oncology (ICD-O 3) [6] for the site and morphology of the tumour), before entry of all the information into a database managed by the CanReg5 software developed by the International Agency for Research on Cancer (IARC) [7].

2.3. Quality and completeness of the data

Data capture, quality control and data consistency are performed by the software DepEdits and IarcTools that are integrated into the CanReg5 system [8].

In order to ensure the completeness of ascertainment of cancer cases among Cotonou residents, one or two visits per year are made to health facilities outside of the catchment area which have facilities of diagnosis or treatment of cancer.

2.4. Patient data security

The registry database is maintained in an inaccessible network, with no connection to the internet. The database files are encrypted and accessible only by password. The registry premises are not accessible to unauthorised personnel; completed registration forms are kept in a

locked cabinet. The registry data are saved monthly to an encrypted external disk.

The registry operation is under the authority of the Advisory Committee on Management of Health Research Information and the National Non-Communicable Disease Control Program of the Ministry of Health of Benin.

2.5. Data analysis

Incidence rates are calculated based on all malignant invasive cancers. The data are processed and analysed using the software R. The frequency and incidence tables are produced using the CanReg 5 software, and Excel 2010*.

The results are presented as the number of cases recorded, crude, age standardised (ASR) and cumulative (0–74) incidence rates for a period of 3 years (2014–2016). Age standardisation was carried out by the direct method, using the world standard population [9].

3. Results

In the three-year period (2014–2016) a total of 1086 cases of cancer (ICD -10 codes: C00-C96) were registered among Cotonou residents, 608 cases (56.0%) among women, corresponding to an age-standardized incidence rate of 78.4 per 100,000 person-years, and 478 (44.0%) among men corresponding to an age-standardized incidence rate of 91.8 per 100,000 (Table 1).

Overall (both sexes) some 3.5% of cancer cases ($n = 38$) occurred in childhood (ages 0–14), and 16% in the elderly (ages 70 or more), but the age distribution was very different by sex, with females being, on average younger at the time of diagnosis (48.5, compared with 54.2 in males). 37.7% of cancers in women were in the age group 30–49 years at diagnosis compared to 24.7% for men. 23.2% of men with cancer were over 70 years of age compared to 10.4% of women.

Table 1 shows the numbers of cases, crude and age standardised and cumulative incidence rates by cancer type (classified by ICD-10) in males and females. The percentage of cases – by cancer site – diagnosed on the basis of morphology (histology or cytology) is also shown.

Prostate cancer (C61) was the most commonly diagnosed cancer among men, comprising 23.2% of all cases, with an age-standardized rate of 30.5 per 100,000. The next most frequent, in terms of numbers of cases, were liver cancers (11.1%) and large bowel cancers (C18-20) (8.6%), leukaemias (7%) and stomach cancer (6.1%). In women breast cancer (C50) was the most common cancer accounting for 32.1% of all cases, with an age-standardized incidence rate of 22.6 per 100,000. Cancer of the cervix uteri (C53) ranked second (17.1%), with an age-standardized incidence 14.9 per 100,000. These two cancers comprised almost half of all female cancers.

Fig. 2 shows, on a semi-logarithmic scale, the age-specific incidence rates of the four most common cancers: liver, prostate, breast and cervix. In men, prostate cancer shows a rapid and progressive rise in incidence from the 50–54 age group. In women, breast cancer begins at a much younger age (20–24 years) with a steady rise and relatively little change in incidence after the age of peak in the 50–54. The increase in cervical cancer starts at an older age (30–34) than breast cancer, and the incidence shows a rather steady increase with age, so that, the mean age at diagnosis (55.0) is seven years later than for breast cancers (47.6).

4. Discussion

Until 2013, there were no population-based data on the cancer profile in Benin. The only published data were based on histology reports from the department of pathology in Cotonou of cases referred from gynaecology in 2000–2008 [10,11]. The national estimate for Benin in Globocan 2012 [12] was derived from the average incidence of cancer (all sites) in West Africa, partitioned according to the relative

Table 1
Numbers of cases recorded by site and sex incidence rates and percentage of microscopic verification (MV%) of diagnosis: Cotonou (2014–2016).

	ICD-10	Males						Females					
		No.	%	MV%	Incidence			No.	%	MV%	Incidence		
					Crude (per 10,000)	ASR (per 10,000)	Cumulative (0-74) %				Crude (per 10,000)	ASR (per 10,000)	Cumulative (0-74) %
Oral cavity & pharynx	C00-C14	26	5.4	57.7	2.5	3.6	0.39	24	3.9	54.2	2.1	3.3	0.44
Oesophagus	C15	24	5.0	75	2.3	5.5	0.75	15	2.5	66.7	1.3	2.6	0.32
Stomach	C16	29	6.1	62.1	2.8	5.4	0.64	17	2.8	82.4	1.5	2.4	0.26
Colon & Rectum	C18-20	40	8.6	77.6	3.9	7.3	0.97	22	3.7	68	1.9	3.0	0.30
Liver	C22	53	11.1	11.3	5.2	7.9	0.84	19	3.1	5.3	1.7	2.9	0.32
Pancreas	C25	11	2.3	27.3	1.1	1.8	0.22	14	2.3	0	1.2	2.3	0.33
Lung	C33, C34	7	1.5	42.7	0.7	1.3	0.13	6	1	66.7	0.5	0.9	0.15
Skin (excl melanoma)	C44	18	3.7	61.1	1.6	2.7	0.26	16	2.6	64.7	1.2	1.7	0.19
Breast	C50							195	32.1	74.4	17.2	22.6	2.31
Cervix	C53							104	17.1	84.6	9.2	14.9	1.68
Corpus uteri	C54-55							23	3.8	87	1.8	3.7	0.64
Ovary	C56							22	3.6	54.5	1.9	0.3	2.7
Prostate	C61	111	23.2	51.1	10.9	30.5	3.30						
Kidney	C64	12	2.5	75	1.2	2.0	0.28	10	1.6	20	0.9	1.2	0.12
Bladder	C67	12	2.5	8.3	1.2	2.2	0.35	3	0.5	66.7	0.3	0.4	0.03
Eye	C69	2	0.4	100	0.2	0.4	0.08	12	2	66.7	1.1	1.1	0.07
Brain & Nervous syst.	C70-72	11	2.3	18.2	1.1	1.9	0.33	7	1.2	28.6	0.6	0.7	0.06
Thyroid	C73	0	0	100	0	0	0	7	1.2	100	0.6	0.9	0.07
Lymphomas	C81-85	18	3.8	88.9	1.8	2.2	0.23	12	2.0	68.8	1.1	1.1	0.08
Leukaemia	91-95	33	7.0	100	3.2	5.1	0.41	27	4.4	100	2.4	3.3	0.38
Other and non specific		71	13.0		10.9	30.5	3.30	53	8.1				
All sites		478	100	57.0	46.7	91.8	10.42	608	100	71.0	53.5	78.4	8.78

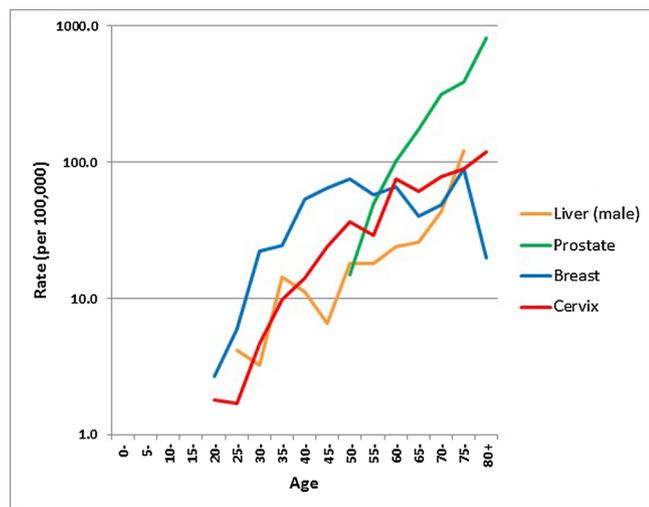


Fig. 2. Age-specific incidence rates (per 100,000) for the four most common cancers in Cotonou 2014–2016.

frequency of different cancers in unpublished data from two pathology departments. It suggested an ASR of 87.2 per 105 in males, with the most common cancers being liver (22.9%), prostate (21.5%) and colon-rectum (6.6%); the ASR in females was 102.7 per 100,000, with more than half of the cases being cancers of the breast (30%) or cervix (26%). Apart from the rather more frequent occurrence of prostate cancer and the lower frequency of liver cancer in males, and lower than predicted rates in females, the incidence data from Cotonou for 2014–6 are rather similar, and these were used for the more recent national estimates in Globocan 2018 [1].

Although most of the cases registered (56%) represent patients diagnosed and treated in the major teaching hospital (National University Hospital (CNHU)), a substantial proportion (43% of cases in males, 29% in females) were registered without a histological confirmation of

diagnosis. This is in part because of the low proportion of histological diagnosis of liver cancers (less than 10% of cases (Table 1) are histologically verified). The data obtained are subject to checks for duplicate registrations, and validity of recorded information by the CanReg software [13]. The lack of comprehensive registration of deaths means that death certificates cannot be used as a source of information by the registry, nor for appraisal of completeness of case finding. The registration of cases not diagnosed through pathology implies lack of validity concerning the precise cancer diagnosis, but is generally reassuring concerning the thoroughness of case finding in a registry [14], although the low overall incidence in women, compared with the regional average (cumulative rate 8.8% in Cotonou vs 13.6% in West Africa [1]) suggests otherwise.

Fig. 3 compares cumulative incidence rates in Cotonou with other regional registries, and with the black population of the USA. In general, the rates in males are rather similar to those in other regional registries, while the rates for cancers of females – especially cervix cancer, are rather lower (although the latter is still more than double the rate observed in the black population of the USA). The pathology series cited above [11] had suggested that breast cancer was more common than cervix cancer (93 and 56 cases, respectively, in 9 years), although it was pointed out that the probability of biopsy in case of advanced cervix cancer was lower than for breast cancer cases of similar stage. In the present population-based data, the proportion of registered cases with histology is higher for cervix (85%) than breast cancer (74%), which may imply a degree of under-registration of this cancer [14]. There is no systematic screening programme for cancer of the cervix in Benin, and no cases of carcinoma in situ registered in the 3-year period.

In 2012, the prevalence of HIV infection among adults (15–49) in Cotonou was reported to be 1.9% [15]. A regional study has shown the risk of Kaposi sarcoma to be greatly increased by HIV infection [16], despite which cases of Kaposi sarcoma were very rare (no cases in women, and only 3 cases in men – all above age 45).

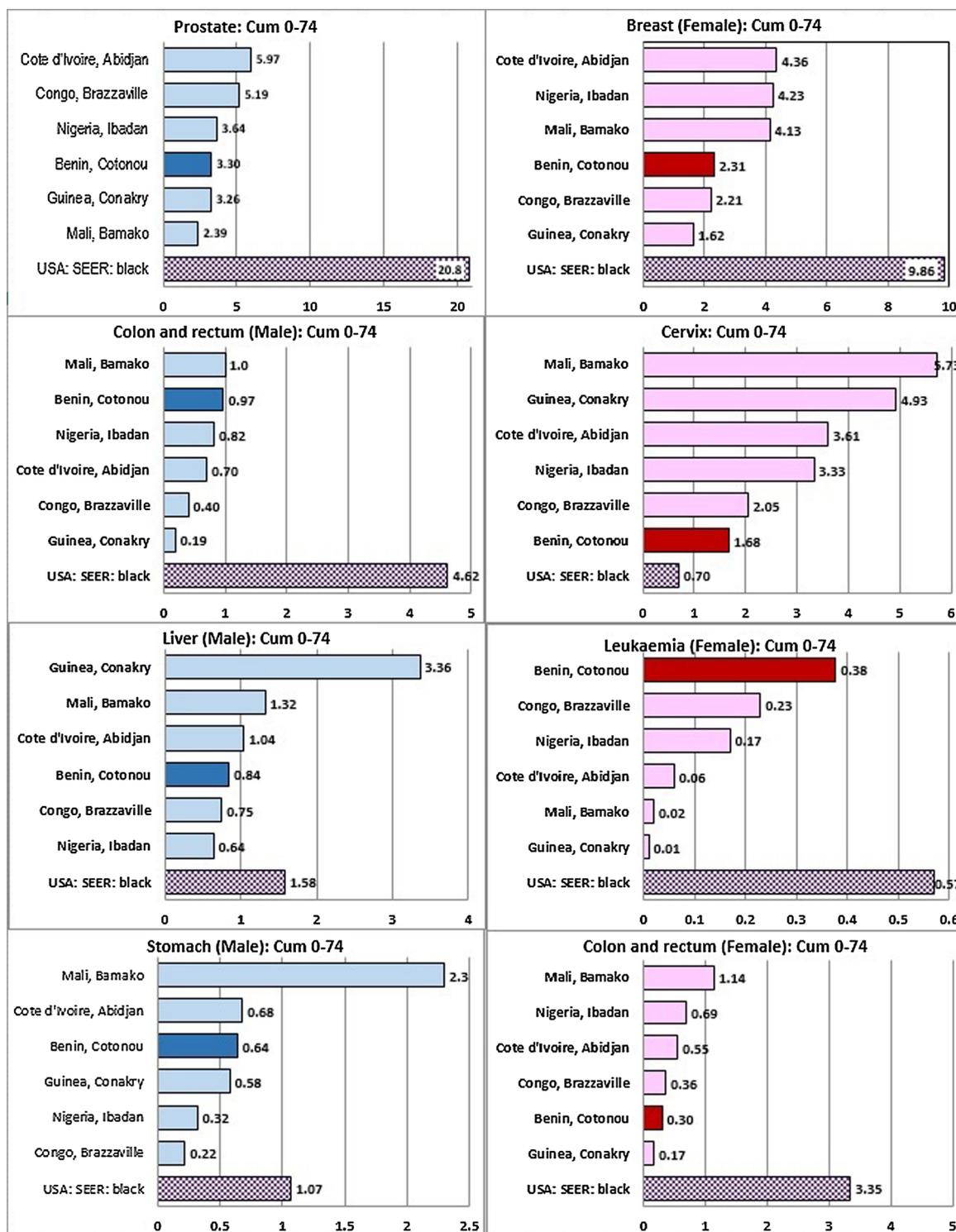


Fig. 3. Comparison of incidence rates (cumulative rate (0–74) %) of the four most common cancers in each sex, with rates in other regional cancer registries and in the black population of the US SEER registries, 2008–2012 (source [13]). Other regional cancer registries and the years concerned: Congo, Brazzaville 2009–13; Cote d'Ivoire, Abidjan 2014–15; Guinea, Conakry 2001–10; Mali, Bamako 2010–14; Nigeria, Ibadan 2006–09 (source [17]).

5. Conclusion

As in West Africa as a whole, four cancers dominate in Cotonou: prostate and liver cancers in men (one third of male cancers) and breast and cervix cancer in women (almost 50% of female cancers), underlining the need for programmes of early detection to improve outcome (breast and prostate), and for prevention of liver and cervix cancer through vaccination, and cervix cancer by screening. The establishment

of a cancer registry in Benin is part of the National System of Information and Sanitary Management (SNIGS) of Non-communicable Diseases (NCDs). The epidemiological surveillance of cancers in Benin has been partly ensured by the establishment of the Cotonou Cancer Registry, which covers about 10% of Benin's population.

The Cotonou Cancer Registry is scientifically and technically supported by the PNLMT of the Ministry of Health of Benin.

Despite its small size (-only 10% of the national population resulting

in a relatively small number of enrolments), the Cotonou Cancer Authority is expected to provide vital information for the planning and evaluation of cancer control programs. To improve the completeness of the registration of cases, the registry has intensified its efforts to collect data on eligible cases of cancer diagnosed in outpatient clinics / hospitals in the city of Cotonou.

Conflicts of interest

The authors declare no conflict of interest.

Contributions of the authors

- Mr Marcel D. EGUE : Ensured the collection and analysis of data. He prepared the first draft of this article and participated in the writing.
- Dr. Freddy H.R. GNANGNON : participated in the discussion of the results and the writing of the article.
- Prof. Marie-Thérèse AKELE AKPO: Conception and design of the cancer registry. Participated in the discussion of the results and to the editor of the article.
- Dr. Max PARKIN : has helped in the discussion of the results, the drafting and translation of the article and its publication in a scientific journal.

Acknowledgments

We acknowledge the support and encouragement of Professor Dismand Houinato, Coordinator of the National Non-Communicable Diseases Programme (PNLMNT/MS), and the assistance of Ms Biying Liu, Administrator of the AFCRN, for help in preparing the manuscript and figures.

The preparation of this paper by ME was supported by a grant from the AFCRN, financed by the American Cancer Society (ACS Contract #50137).

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