Program against Cancer in Central African Republic

El Hadji Seydou Mbaye

Keywords: Cancer Program, Cancer Control, Prevention, Early Detection, Institutional Reinforcement, Diagnosis, Treatment, Low and Middle-Income Countries, Central African Republic.

ABSTRACT

One in eight deaths worldwide were from cancer. Projections based on figures from GLOBOCAN 2012 expect a significant rise in new cancer cases in developed countries by 2035 per year if prevention steps are not broadly implemented. According to the World Health Organization (WHO), millions of lives could be saved each year if countries made use of existing knowledge and the best cost-effective methods to prevent and treat cancer. Therefore, the aim of this study is to estimate a provisional budget against cancer in low and middle incomes countries, according the GNI-PPP, the cancer incidence and the number of population. Economically country classification is determining with the Gross national income (GNI), per capita, Purchasing power parity (PPP), according the administrations of the International Monetary Fund (IMF), the World Bank (WB) and the Central Intelligence Agency (CIA). Cancer incidence data presented are based on the most recent data available at IARC. However, population compares estimates from the US Bureau of the Census. The provisional budget is established according to national economic development among the guidelines developed by WHO for regional and national cancer control programmes. Provisional budget against cancer is estimated to 6,500.819 (thousands of U.S $) for a population of 5,625,118 persons in Central African Republic.

Introduction

One in eight deaths worldwide were from cancer. Cancer causes more deaths than AIDS, tuberculosis, and malaria combined [1]. Cancer is the leading cause of death in developed countries as countries are clustered according to economic growth, and the second leading cause of death in emerging countries[2]. Rates of cancers common in Western countries will continue to rise in developing countries if preventive measures are not widely applied [3-5]. GLOBOCAN 2012-based estimates expect a significant rise of 19.3 million additional cases of cancer each year by 2025, owing of world population increases and aging. Incidence has risen in most areas of the world but there remain tremendous disparities between wealthy and poor countries. More than half of all cancers (56.8 percent) and cancer deaths (64.9 percent) occurred in less developed regions of the world in 2012, and that proportion will continue to increase by 2025[6]. Through 2030 the worldwide risk is projected to rise to 21.4 million new cancer cases and 13.2 million deaths from cancer [7]. The cancer rates will begin to grow with 23,980,858 new cases of cancer by 2035[3-5].

The financial burden of cancer is significant [8-10], in addition to the actual cancer toll. Cancer has the most devastating economic impact worldwide from any cause of death [10]. Data limitations do not allow estimating of cancer's global economic costs. However, portions of the total cancer costs worldwide were estimated to be as high as $895 billion (US) [9,10]. It is estimated that more than half of all cancer cases and deaths worldwide are potentially preventable [3-5, 7].

In Central African Republic, the number of new cancer cases is estimated to 2,876 with 2,238 deaths in 2015. By 2025, incidence is expected to grow to 3,688 with 2,854 deaths. Rates of cancers will continue to rise to 4,952 new cancer cases by 2035 with 3,832 deaths if preventive measures are not widely applied [3-5]. According to the World Health Organisation (WHO); entitled: Regional Cancer Prevention Programmes: Strategies and Implementation Recommendations, millions of lives could be saved every year if countries decided to make use of them. Existing awareness and the possible cost-effective approaches to cancer detection and treatment [11].

Therefore, the aim of this study is to estimate a provisional budget against cancer in Central African Republic, according the GNI-PPP, the cancer incidence and the number of population.

Methods

Economically Country Classification

The economics states are established among the means of GNI-PPP according the administrations of the International Monetary Fund (IMF); the World Bank (WB) and the Central Intelligence Agency (CIA) [13-15]. The difference between the data origin regarding the same country can be considerable. These variations are explaining by:

- GNI-PPP is estimated

- Previous economic crisis prediction shifts GNI-PPP data

- The estimation of the population included in the local population

- There is a analytical aspect of the elements of preference for GNI-PPP assessment.

These data must be taken with precaution economically Country is divided according to the gross national income (GNI) per capita 2016, Atlas method and PPP [15].

- Estimated to be low income ($1,005 or less)

- Estimated to be lower middle income ($1,006 to $3,995)

- Estimated to be upper middle income ($3,956 to $12,235)

- Profit reported to be strong ($12,236 or more).

Gross National Income (GNI), Per Capita, Purchasing Power Parity (PPP)

Gross national product is gross domestic product (GDP) plus net income (employee compensation and investment income) from abroad. GNI, per capita is a mid-year population divided by GNI. PPP is balance in buying value; an foreign currency has the same purchasing power over GNI as a US one.

In the US the economy has. The PPP exchange levels are used to compensate for local costs of untraded products and services. PPP is, therefore, used for analysis through national budgets, not for measures of regional poverty [15].

Cancer Incidence

Incidence is the number of new cases that occurs during a given period of time in a specified population. It can be expressed as an absolute number of cases per annum or a rate per 100,000 people per annum.

The rate gives an estimate of the mean cancer risk. The results reported for cancer occurrence are based on the new evidence available at IARC. GLOBOCAN 2012 provides a global cancer profile that was developed using a number of methods which depend on data availability and accuracy. Wherever feasible, regional sources are used with local data and mathematical analysis employed in their absence [3-5].

Population

Standard population (POPst) for Senegal (Western Africa) with 14,668,522 people is determined. The population of the Central African Republic is estimated at 5,625,118 people. For this region, demographic forecasts specifically take into account the consequences of excess mortality due to AIDS; this may lead to lower life expectancy, higher child mortality, higher death levels, faster demographic growth rates, and shifts in population composition by age and gender than expected otherwise. Population compares estimates from the U.S. Census Bureau [16] based on population census statistics, vital statistics recording systems or recent sample surveys and on future trends: https://www.cia.gov/publications/the-world-factbook/geos/ct.html

Name: El Hadji Seydou Mbaye

Affiliation: World Health Organization, Senegal Email: seydou27@hotmail.com

Provisional Budget (thousands of U.S $)

The World Health Organisation (WHO) stresses that countries will adopt the following four specific solutions, centred on their economic growth, while designing national cancer prevention strategies:

- The primary prevention

- The early detection and secondary prevention

- The diagnosis and treatment

- The palliative care.

The provisional budget is set out according to national economic development among the guidelines developed by the WHO for regional and national cancer control programmes [11]. However, an International Atomic Energy Agency report [17] indicated that at least 60 per cent of cancer patients in developed countries required radiation therapy.

Key elements in conventional cancer care which needs significant investment in resources, qualified specialists in various fields, high-precision instruments and a specific external and internal organisation. Healthcare expenses in high-income countries will vary from 8.4 percent (UK in 2007) to 18 percent (USA in 2009) of the gross domestic product of a country [18]. Cancer consumes around 5-10 percent of the global healthcare expenditure, in which radiation therapy consumes just around 5 percent [18, 19]; therefore, more than 50 percent of patients with cancer that need radiation therapy in moderate and medium rates countries with a medium income lack access to treatment. AIn several reports [17, 20-21] a benchmark of between 400 and 500 patients per treatment unit per year was used for calculating machine throughput. Among high-income nations, the target of 450 patients per unit, which translates to around 8 hours of service a day, seems appropriate. For scenarios where demand for radiotherapy is not met, a 10 h therapy day optimizes equipment utilization and decreases the number of machines needed. But, the range of needs currently covered varies from 0% and 3-4% in Low Incomes Countries in Latin America and Africa up to 59-79% in Up-Middle Incomes Countries in Europe-Central and Asia [22].

However, in this study, in order to found the best cost-effective methods to prevent and treat cancer, the number of machines needs is establishing among 3 millions of peoples and not by the number of cancer cases, according to the weakness of the countries incomes.

Standard budget for 5 years (S0)

The regular 5 year (S0) budget is calculated using a population of 1,000,000 in Senegal (POPst).

According to the administrations, Senegal has 8361 new cases of cancer (CIst) in 2015[3-5] with a GNI-PPPst of US$ 2,551 referred to in 2016 (low middle income country) Of the International Monetary Fund (IMF); of the World Bank (WB) and of the CIA [13-15]. The estimated budget takes account of the weakness of the countries' revenues.

Standardized rapport (R0)

Standardized ratio (R0) is calculated between GNI-PPP, CI, and population number. Standardisation simplifies comparisons between populations of GNI-PPP and incidence of cancer.

$$R_0 = \frac{\text{GNI-PPP} \times CI / POP}{\text{GNI-PPP}_{st} \times CI_{st} / POP_{st}}$$

Note:

* R0 = GNI-PPP X POP / GNI-PPPst X 3 million people for Radiotherapy equipment; In 2017 Senegal installed two new machines for radiotherapy. Radiotherapy equipment is estimated to US$ 2,500,000.

** R0 = GNI-PPPX POP / GNI-PPPst X 3 million individuals for the preventive and screening network.

R0= Standardized ratio between GNI-PPP, CI and population count

GNI-PPPst= Normal gross national income per capita In Senegal, purchasing power parity

GNI-PPP= Gross National Income Per capita Purchasing Power Parity of interest

CIst= Standard Cancer Incidence in Senegal

CI= Cancer Incidence of interest

POPst= Standard Population in Senegal

POP= Population of interest

3. Results

Country	GNI per capita Purchasing power parity (PPP)				Population	Cancer incidence (CI)
	Ref.	US$	Year	Means of GNI-PPP (US$)		
Central African Republic	IMF	659	2016	686	5,625,118	2,876
	WB	700	2016			
	CIA	700	**2016**			

IMF= International Monetary Fund; WB= World Bank; CIA= Central Intelligence Agency; GNI= Gross National Income; PPP= Purchasing Power Parity; Ref.= Reference.

Table 1: GNI-PPP, prevalence of cancer (CI), and population level

Cancer Control	Management	Stand. budget (S0)	Stand. rapport (R0)	Account per (R0)	General POP. budget
Cancer primary prevention	Development of an information system	50	0.24121	12.060	67.841
	Against Tobacco	250	0.24121	60.302	339.208
	Against Infections	500	0.24121	120.605	678.416
	Against carcinogenic substances	125	0.24121	30.151	169.604
	Against environmental risks	125	0.24121	30.151	169.604
	Diet or nutrition promotion	250	0.24121	60.302	339.208
	Sport promotion	200	0.24121	48.242	271.366
	Cancer risk factors survey	50	0.24121	12.060	67.841
Cancer early detection and secondary prevention.	Breast cancer screening	150	0.24121	36.181	203.524
	Cervical cancer screening	125	0.24121	30.151	169.604
	Prostate cancer screening	50	0.24121	12.060	67.841
	Colorectal cancer screening	50	0.24121	12.060	67.841
	Others cancers screening	50	0.24121	12.060	67.841
	Rise of cancer professional	125	0.24121	30.151	169.604
Cancer institutional reinforcement	Development of cancer research	175	0.24121	42.211	237.445
	Development of cancer prevention courses	100	0.24121	24.121	135.683
Cancer diagnosis and treatment	Assistance for Palliative Care	150	0.24121	36.181	203.524
	Chemotherapy equipment	100	0.24121	24.121	135.683
	Surgical equipment	175	0.24121	42.211	237.445
	Radiotherapy equipment *	2,500	1.00	2,500	2,500
	Prevention and screening infrastructure **	400	0.50422	201.688	201.688
Total		5,700			6,500.819

Based on: World Health Organization. National Cancer Control Programs: Management Guidelines and Policies. 2nd ed. Geneva, 2002.

S0= Standard budget for 5 years for a population of 1,000,000 persons; R0= Standardized rapport among the GNI-PPP, CI and the number of the population; * With the weak number of population and the low income; 1 radiotherapy machine is considered. ** Infrastructure for prevention and screening among GNI-PPP / GNI-PPPst only, for every 3 million people.

Table 2: Estimated Budget (thousands of U.S $).

4. Conclusion

Cancer has the most damaging economic effects worldwide of any cause of death. Incidence has increased in most parts of the world but there are enormous inequalities between rich and poor countries. GLOBOCAN 2012 estimates projections predict a substantial increase to millions of new cancer cases per year by 2030.

Rates of cancers will continue to rise by 2035 in Central African Republic, if preventive measures are not widely applied. The critical need today is to establish efficient and accessible solutions to cancer prevention.

Further expenditure in capital and costs is projected to be more focused on the country's income level than on the GNI community or the geographic area out of the planet. Nonetheless, to identify the most cost-effective approaches for cancer prevention and diagnosis, the proposed cancer expenditure is projected at 6,500,819 (thousands of U.S. dollars) for one community of the 5,625,118 persons in the Central African Republic, the incidence of cancer and population numbers according to GNI-PPP.

Name: *El Hadji Seydou Mbaye*

Affiliation: *World Health Organization, Senegal Email: seydou27@hotmail.com*

Being conscious of the nature of cancer prevention is really relevant for both organizations. A flexible approach is needed. This account must be added to the actual supply efforts of cancer prevention and treatment. Nevertheless, meaningful strategies to minimize cancer morbidity and mortality include the active intervention of cancer patients and their surrounding communities; coordination and adequate resource allocation; terminology Evidence-based initiatives and established interventions; and involvement of non-profit, for-profit and public agencies and entities. Ultimately, cancer control goes hand in hand with efforts to promote human and economic development and to improve standards of health, education, and medical care throughout the world.

References

1. World Health Organization. Ten statistical highlights in global public health. World Health Statistics, Geneva 2007.

2. American Cancer Society (2011) Global Cancer Facts & Figures 2nd Edition. Atlanta.

3. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, et al. (2013). GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 11. Lyon, France: International Agency for Research on Cancer.

4. GLOBOCAN 2012. Cancer Incidence, Mortality and Prevalence Worldwide. World. All cancers excl. non-melanoma skin cancer. Estimated number of new cancers in 2035 (all ages).

5. GLOBOCAN 2012. Cancer Incidence, Mortality and Prevalence Worldwide. All countries. All cancers excl. non-melanoma skin cancer. Estimated number of new cancers in 2015 (all ages).

6. International Agency for Research on Cancer. PRESS RELEASE N° 223. Latest world cancer statistics Global cancer burden rises to 14.1 million new cases in 2012: Marked increase in breast cancers must be addressed; Lyon/Geneva, 12 December 2013.

7. Ferlay J, Shin HR, Bray F, Forman D, Mathers CD, et al. (2010) GLOBOCAN 2008, Cancer Incidence and Mortality Worldwide: IARC CancerBase No.10. France, Lyon. 127: 2893-2917.

8. Mackay J, Jemal A, Lee NC, Parkin DM (2006) The Cancer Atlas. American Cancer Society; Atlanta.

9. John RM, Ross H (2008) Economic value of disability-adjusted life years lost to cancers.

10. American Cancer Society (2010) American Cancer Society and LIVESTRONG. The Global Economic Cost of Cancer; Atlanta.

11. World Health Organization (2002) The National Cancer Control Programmes: policies and managerial guidelines. 2nd ed. Geneva.

12. Zubizarreta E, Van Dyk J, Lievens Y (2017) Analysis of Global Radiotherapy Needs and Costs by Geographic Region and Income Level. Clinical Oncology 29: 84-92

13. International Monetary Fund - IMF. World Economic Outlook Database. 2016. http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/weorept 14. Central Intelligence Agency - CIA World Factbook. COUNTRY COMPARISON, GDP - PER CAPITA (PPP). 2016.

15. World Bank. Gross national income per capita 2016, Atlas method and PPP. World Development Indicators database, 15 December 2017. 16. US Bureau of the Census. Population compares estimates, July 2017.

17. International Atomic Energy Agency (2010) Planning National Radiotherapy Services: a Practical Tool. HUMAN HEALTH SERIES No 14.: 83.

18. Sullivan R, Peppercorn J, Sikora K, et al. (2011) Delivering affordable cancer care in high-income countries. Lancet Oncol 12: 933-980.

19. Luengo-Fernandez R, Leal J, Gray A, Sullivan R (2013) Economic burden of cancer across the European Union: a population-based cost analysis. Lancet Oncol 14: 1165-1174.

20. Slotman BJ, Cottier B, Bentzen SM, Heeren G, Lievens Y, et al. (2005) Overview of national guidelines for infrastructure and staffing of radiotherapy. ESTRO-QUARTS: work package 1. Radiother Oncol 75:349-354.

21. International Atomic Energy Agency (2008) Setting up radiotherapy programme: clinical, medical physics, radiation protection and safety aspects. Vienna: International Atomic Energy Agency.

22. Zubizarreta EH, Fidarova E, Healy B, Rosenblatt E (2015) Need for Radiotherapy in Low and Middle-Income Countries. The Silent Crisis Continues. Clinical Oncology 27: 107-114

Name: El Hadji Seydou Mbaye

Affiliation: World Health Organization, Senegal Email: seydou27@hotmail.com