

**Assessing the Effectiveness of Prostate Cancer Care and Control
and the Role of Nursing Intervention in cancer Radiotherapy.
Case of Sub-Saharan Africa.**

Emile Nankobe

Degree Thesis
Nursing Degree Programme
2018

DEGREE THESIS	
Arcada	
Degree programme:	Nursing
Identification number:	17809
Author:	Emile Nankobe
Title:	Assessing the effectiveness of Prostate Cancer care and control and the role of nursing intervention in cancer radiotherapy, case of sub-Saharan Africa
Supervisor (Arcada):	Pamela Gray
Commissioned by:	
Abstract:	
<p>Cancer has been known to be a major health threat in low- and middle-income countries around the world. This to a large extent is due to very little or no awareness (preventive measures), huge shortages of oncologists (low cancer expertise) and lack of proper cancer medical facilities and equipment, thereby putting huge therapeutic health-care burden on the nurse. Orem's (1995) self-care theory was used as a theoretical framework for this study. This study aimed at assessing the effectiveness of prostate cancer care and control and nursing role in radiotherapy intervention in the sub-Saharan African sub-region by looking into the challenges and the role of nursing in prostate cancer radiotherapy. The study answers the questions of what the different challenges of prostate cancer in Sub-Saharan Africa are, and the role of nursing in improving the health of men receiving radiation therapy. The data analysis was based on literature review of ten (10) carefully selected articles (including peer reviewed), and text, about cancer in black people (men especially including African-American), low and middle income countries focusing more on Africa and the sub-Saharan sub-region. A deductive analysis was carried out using a qualitative approach of Granehein & Lundman, (2004), which is a systematic method of data analysis involving classification, evaluation and an unbiased verification of the qualitative data from the various articles to arrive at a logical conclusion. From the findings, PCa was known to be the most common cancer in African men. The lack of evidence-based treatment strategies is exacerbated by patients presenting at treatment centers with advanced diseases due to ignorance and poverty which is a huge challenge in the sub-region. The only widespread care and control mechanism in Africa which is the population-based cancer screening was still not common in countries of the sub-Saharan sub-region, therefore surgeons were the once in charge of all elements of cancer for patients with solid tumor, including chemotherapy and palliative care. Most patients diagnosed with PCa had advanced diseases which were only suitable for palliative care, thereby multiplying nursing role in meeting the huge therapeutic care deficits in the absence of oncologists. Though there have been little improvement over the past five years, there is still a huge gap in awareness and diagnosis of the disease in countries of this sub-region of Africa.</p>	
Keywords:	Prostate cancer (PCa), radiation therapy, nursing intervention, sub-Saharan Africa.
Number of pages:	
Language:	English
Date of acceptance:	

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Acronyms

AIDS	Acquired Immuno Deficiency Syndrome
IARC	International Agency for Research on Cancer
CNS	Clinical Cancer Specialist
EONS	European Oncology Nursing Specialist
GLOBOCAN	Global Publications on Cancer
GNP	Gross National Product
NCDs	Non-Communicable Diseases
PCas	Prostate Cancers
PSA	Prostate Specific Antigens
HIV	Human Immuno Deficiency Virus
UK	United Kingdom
US	United States
WHO	World Health Organization

1 INTRODUCTION

1.1. Context and justification

Cancer is a leading cause of death and disability in the world today. This disease kills more people globally than HIV-AIDS, tuberculosis and malaria joined together (Price *et al.*, 2012; Morhason-Bello *et al.*, 2013). However, developing and poor countries share a disproportionate burden as a result of weak adaptive capacity, poor health facilities, low government engagement, and a rising proportion of cases due to high population growth and ageing (Farmer *et al.*, 2010). In 1970, fifteen percent (15%) new cases were reported, and in 2008, fifty-six percent (56%) new cases with a projection of about eighty percent (80%) incidence by 2030, implying the trend is on an increase (Farmer *et al.*, 2010; Price *et al.*, 2012). Statistical evidences show that most of the new cases are in Low and middle income countries, particularly in Africa, and this has been due to an increasing high burden from infectious diseases (Adeloye *et al.*, 2016).

This disease constitutes a great challenge in then world today, particularly in low and middle income countries. In Africa, especially in the Sub-Saharan sub-region, some of the many challenges associated with the incidence, care and control of the disease include unavailability of treatment resources and palliative care neglects, unavailability of secondary prevention for cancer (Hayes & Bornman, 2017). The absence of collaboration or interventions coordination in stakeholders and donors in developing countries also play a great role in the disease spread (Price *et al.*, 2012). The reported cancer burden in Sub-Saharan Africa might be underestimated as a result of inappropriate diagnosis, poor health care access, limited technical workforce, infrastructure and low quality cancer data system (Adeloye *et al.* 2016; Morhason-Bello *et al.*, 2013; Hayes & Bornman, 2017). The exacerbating care and control situation is preceded by a shortage or complete absence of specialists and specialty centers (Farmer *et al.*, 2010; Kingham *et al.*, 2013). In this respect, the nurse plays a great role particularly in this kind of settings (resource-poor) as care is provided by them in the absence or unavailability of oncologists (Farmer *et al.*, 2010).

Prostate Cancer (PCa) is rated the second most common cancer and sixth leading cause for cancer death among men (Adeloye *et al.*, 2016). African men particularly in the Sub-Saharan sub-region suffer a disproportionate burden from PCa compared to other social races in the world (Adeloye *et al.*, 2016). This is partly because of the challenges involved in the management of the disease incidence and spread, and a big challenge related to communicable

diseases which also adds to the burden (Morhason-Bello *et al.*, 2013; Adeloje *et al.*, 2016). However, infections are a leading cause of cancer in this sub-region (Price *et al.*, 2012).

The cost of drugs remains a specific and substantial barrier to prevention and treatment of the disease in poor countries, including opportunities to expand absorptive capacity (Hayes & Bornman, 2017). Many radio-therapeutic interventions still remain cost-prohibitive for many governments and health ministries in these resource-shortage countries (Farmer *et al.*, 2010; Hayes & Bornman, 2017). Approaches in the past to minimize incidence, however, have failed due to very low awareness of the burden, and poor understanding of the prevention potential (Adeloje *et al.*, 2016). Strategic approaches are necessary and in high demand in care and control of the disease. This is to enable a build-up of mechanism(s) that work and is unique to the sub-region.

In the case of both cancer and AIDS, care neglect has led to unnecessary death and suffering, and prevention neglect has led to unaffordable treatment for many cases (Farmer *et al.*, 2010; Price *et al.*, 2012). The burden of PCa is expected to increase despite ongoing efforts to fight the incidence rate. This is due to continued urbanization (which has fostered significant changes in nutrition and physical activity) and increasing life expectancy in Africa (Adeloje *et al.*, 2016). Much could still be achieved in the short term, even in this kind of resource-poor setting with the use of nurses, local clinicians and community health workers (Kingham *et al.*, 2013).

1.2. Problem statement

Looking at the fact that age is a major risk factor in PCa incidence in the world, about eighty percent (80%) of all deaths in Africa occurs with people under sixty (60) years while the reverse is true for Europe and America (Morhason-Bello *et al.*, 2013). Therefore, the average age at which cancer is diagnosed in Africa is lower than in high-income countries (Hayes & Bornman, 2017).

The rising cancer incidence in Africa is projected to increase to eighty-five percent (85%) by 2030 (Morhason-Bello *et al.*, 2013; Hayes & Bornman, 2017). It is however presumed that the bulk of the challenge with respect to the incidence rate in Africa is in the area of prevention, care and control of the disease for most health care systems (Kingham *et al.*, 2013). There is also a large fraction of Pediatric cancer burden in populations with high proportion of children than those with less proportion. And pediatric cancer constitutes six percent (6%) of all cancers

in Africa compared to less than one percent (1%) in developed countries (Farmer *et al.*, 2010), which is a big challenge in the way cancer incidence is handled in Africa.

Two-third of people living with HIV worldwide are in Africa, with seventy-five percent (75%) of global death of the disease occurring still in African people, and about seventy percent (70%) of approximately two million new HIV incidence yearly also occurring in Africa (Morhason-Bello *et al.*, 2013). On a similar note, the world's largest tuberculosis incidence and highest tuberculosis mortality per head occurs in Sub-Saharan Africa (Morhason-Bello *et al.*, 2013). This adds to the increasing cancer burden in Africa, making cancer and particularly PCa a big threat to the sub-region.

Moreover, about ninety percent (90%) of worldwide malaria deaths occur in Africa. Also in 2008, an approximate 421,000 cancer deaths occurred in Africa, compared with one million four hundred thousand (1.4million) deaths from HIV in same year (Morhason-Bello *et al.*, 2013). Some of these variations have been attributed to relatively higher poverty levels, dietary differences, genetic differences and the presence of infectious diseases (Adeloye *et al.*, 2016).

However, it is still quite difficult to precisely describe the disproportionate burden of cancer and particularly PCa in Africa and the prevailing challenges due to weak health management information systems (Hayes & Bornman, 2017). Many countries in Sub-Saharan Africa have health-care systems that are struggling to meet the increasing demand caused by the growing number of patients with cancer (Hayes & Bornman, 2017). There is also insufficient recent and comprehensive data for cancer and death registration, inadequate information about the disease, insufficient numbers of skilled health-care personnel, high cost of immunization against human papillomavirus and other cancer causing infections (Morhason-Bello *et al.*, 2013).

Some of these challenges involving prevention, care and control of the disease also include the absence of cancer prevention and control policy, strategies and programs, low-cost community-based screening and health promotion programs, and lack of adequate follow-up, and inherent social norms and beliefs (Price *et al.*, 2012; Kingham *et al.*, 2013). Cancer care services delivery, though not sufficient enough in terms of quality, creative initiatives in reaching to more patients for early disease detection are however highly needed.

2 BACKGROUND

The background of this study takes a review of the rate of PCa, effects, nursing and radiotherapy treatment in the Sub-Saharan sub-region of Africa. This is to shed light on the general cancer situation in the sub-region and the different actors involved including the major actions and ongoing efforts in the treatment of the disease.

2.1. The rate of cancer effects in Sub-Saharan Africa

The biggest global health crisis in low- and middle-income countries is known to be cancer and cardiovascular diseases (non-communicable diseases -NCDs), rather than exotic parasites and obscure tropical viruses (Adeloye *et al.*, 2016). Sub-Sahara Africa has a very young population, with more than forty percent (40%) under 15years of age (Price *et al.*, 2012). People in this sub-region die at a very young age particularly due to health challenges that could be dealt with. However, there is a lot of questionable issues attached to health investment in this sub-region, which may either be seen as an essential development tool or a luxury. But from an observation perspective over the last decades, most governments in the sub-Saharan sub-region seems not to notice the gravity of the issue at stake. Cancer is a very challenging health issue in sub-Sahara Africa, adding to a huge burden of infectious diseases plaguing the sub-region and limited resources (Price *et al.*, 2012). This section takes a glance at the rate at which cancer has effected the health of the population in the sub-region, the challenges associated with mechanism of control of the disease, and prevention measures.

2.1.1. The rate of cancer effects at the level of health

PCa is the first of the four most common cancers in men in terms of incidence and death (including liver cancer, Kaposi's sarcoma, and esophageal cancer) (RCSI, 2010; Sumlin, 2016). The rate of PCa death in west, east, and southern Africa is higher than in the northern part of Africa (age-standardized rate 6.6–11.6 per 100,000 populations per year; 11.7 per 100,000 population per year; 6.3–45.7 per 100,000 population per year, and 3.3 per 100,000 population per year respectively) (Morhason-Bello *et al.*, 2013). According to a WHO data from Morhason-Bello *et al.* (2013), most countries with severe shortages of health workers are in sub-Saharan Africa.

From the study of Adeloye *et al.* (2016), PCa pooled incidence rate is estimated at 22.0 (95% CI: 19.93–23.97) per 100,000populations, and a medium incidence rate of 19.5 per 100,000 population, in sub-Saharan Africa. They however suggested that active cancer registration and extension are pivotal in quantifying the burden in Africa in an appropriate manner. Their

findings showed an observation of an increasing trend in PCa incidence with advancing age, making advancing age a major risk factor in the incidence with a peak of 65years across many regions of the world. The risk of cancer incidence by age of 75 years for both men and women in Africa is 12.5% compared with 24% in Europe (Morhason-Bello *et al.*, 2013). Table 1 below shows age-standardized incidence and mortality rate of the most common cancers in Africa and its sub-Saharan sub-region.

Table 1: Age-standardized incidence and mortality rates per 100,000 population per year in Africa as a whole and in sub-Saharan Africa for the most common cancers by site. Adapted from Morhason-Bello *et al.* (2013, p. e144).

	Incidence in Africa (sub-Saharan Africa), ASR			Mortality in Africa (sub-Saharan Africa),ASR		
	Men	Women	Both sexes	Men	Women	Both sexes
<i>Bladder</i>	6.7 (3.7)	1.7 (1.5)	4.0 (2.5)	4.8 (2.8)	1.2 (1.1)	2.9 (1.8)
<i>Breast</i>	..	28.9 (26.3)	..	..	16.0 (15.3)	..
<i>Cervix uteri</i>	..	25.2 (31.7)	..	..	17.6 (22.5)	..
<i>Colorectum</i>	6.9 (6.8)	5.0 (4.7)	5.9 (5.7)	5.5 (5.5)	4.0 (3.8)	4.7 (4.6)
<i>Kaposi's Sarcoma</i>	6.0 (8.1)	2.8 (3.6)	4.3 (5.7)	5.1 (6.9)	2.3 (3.1)	3.6 (4.8)
<i>Liver</i>	11.7 (13.1)	5.3 (6.3)	5.0 (9.5)	11.7 (13.2)	5.5 (6.6)	8.4 (9.7)
<i>Lung</i>	8.4 (5.9)	1.4 (2.0)	5.0 (3.7)	7.9 (5.6)	1.9 (1.9)	4.7 (3.6)
<i>Non-Hadgkin lymphoma</i>	6.3 (5.5)	4.1 (3.8)	5.2 (4.6)	5.3 (4.6)	3.5 (3.2)	4.3 (3.8)
<i>Oesophagus</i>	6.7 (8.5)	3.5 (4.2)	5.0 (6.2)	6.5 (8.2)	3.4 (4.0)	4.8 (6.0)
<i>Ovary</i>	..	4.2 (1.5)	..	..	3.4 (3.2)	4.8 (6.0)
<i>Prostate</i>	17.5 (21.2)	..	..	12.5 (15.0)	..	..

ASR=age-standardised rate. Data from GLOBOCAN 2008

From table 1 above, prostate cancer (PCa) stand to have the most effect on men than any other forms of cancer in Sub-Saharan Africa, both in the rate of incidence and mortality.

2.1.2. Challenges associated with mechanism of control of cancer

Though there have also been reported increases in cancer incidence rates in particularly developing and low income countries (like in Africa) to its peak in the 1990s, the trend is changing in some developed countries (like in the US). This is due to heightened awareness, early detection, prevention and the availability of new and more effective treatment regimens (Farmer *et al.*, 2010). Many research reports have assert that it takes the governments' [of poor

countries] willingness and active engagement to fight cancer (Price *et al.*, 2012; Kingham *et al.*, 2013; Adeloje *et al.*, 2016; Hayes & Bornman, 2017). Experience has also shown that much can be done to prevent and treat cancer in resource-poor countries (including sub-Saharan Africa especially) without specialized medical services (Kingham *et al.*, 2013). This has happened simply by deploying primary and secondary caregivers, off-patient drugs use, and applying regional and global financial and procurement mechanisms (Farmer *et al.*, 2010).

For many cancer types, particularly PCa, future change in incidence rate in low income and poor countries is highly dependent on whether key risk factors could be controlled. This is partly because only few original population based cross-sectional studies or cohort studies on PCa exist in Africa, with most of the relevant studies which are mainly population-based or hospital-based registries' surveys (Adeloje *et al.*, 2016). Implying limited information exist on PCa in Africa (from incidence rate to presentation and treatment at designated centers).

Strategies to strengthen the entire health-care system of this region (Africa) in PCa control has been through the building of awareness and prevention services, management of infectious diseases and adverse drug reactions, community based care and support, education against stigma, provision of pathological testing for accurate and timely diagnosis, surgical support (Farmer *et al.*, 2010). These could be addressed with the establishment of regional centers with sufficient expertise to address the problem of cancer in developing countries.

There is the existence of cost-effective measures to address the most prevalent cancers (PCa inclusive) and their risk factors in developing countries in both the short and long term (Bollyky & Andridge, 2015). But adapting care guidelines from high income countries to the sub-Saharan (with fewer resources, fewer personnel, and different cancer biology in some cases) constitutes a big challenge (Kingham *et al.*, 2013). With the availability of population-based cancer screening as the [only] care and control mechanism in Africa, it is still not common in many parts of the continent, particularly the sub-Saharan countries (Adeloje *et al.*, 2016). Surgeons are often the once in charge of all elements of cancer care for patients with solid tumor, including chemotherapy presentation and palliative care in this sub-region (Saraf, 2013). Late presentation of patients at treatment centers is also very common in the sub-Saharan (Price *et al.*, 2012; Morhason-Bello *et al.*, 2013).

Though the use of radiation therapy relies on improved medical infrastructure, its use in sub-Saharan Africa is limited by poor medical infrastructure which is being replaced with inadequate surgery or chemotherapy (Kingham *et al.*, 2013). Only twenty-three (23) out of fifty-

two (52) African countries were able to offer radiation therapy before the year 2007 (Kingham *et al.*, 2013). South Africa and Egypt accounts for roughly sixty percent (60%) of all radiation therapy resources in the African continent. According to Kingham *et al.* (2013) External beam radiation therapy is the most widely used form in sub-Saharan Africa, with brachytherapy rarely in use. Also, cobalt-60 and linear accelerators are the two types of radiation therapy machines used. Cobalt-60 machine is simpler, easy to use, and relatively inexpensive to acquire and maintain compared with linear accelerator machine, but they are incapable of complex treatment plans and have fixed energy level and a lower percentage depth of dose. Linear accelerator can go for complex and precise treatment plans than Cobalt-60, but are very expensive to maintain, resulting into treatment delays. Radiation therapy is prescribed for many cancer types in the sub-Saharan including breast and cervical (Adeloye *et al.*, 2016).

The first essential cancer management step is a histopathological diagnosis, and the facilities in the sub-Saharan setting are inadequate for it (Morhason *et al.*, 2013). In 2002, only eighteen percent (18%) of the needed radiation treatment supplies in Africa were met (Morhason *et al.*, 2013). However, there are basic standards of cancer care that even low-income countries could, but often do not, meet (Kingham *et al.*, 2013). However, some preventive measures have been put in place to try to limit the incidence and mortality of the disease.

2.1.3. Cancer prevention measures

In low and middle income countries, about four (4) million people die of cancer every year, and this could be averted through detection and treatment (Morhason-Bello *et al.*, 2013). The difficulties in cancer diagnosis and lack of trained health personnel (including oncologists) in many parts of Africa particularly the sub-Saharan have limited ongoing research efforts, which is a big issue in identifying prevention measures (Adeloye *et al.*, 2016). In 1990, PCa incidence rates were between 2.6–16.9 per 100,000 population across many parts of Africa (Adeloye *et al.*, 2016).

Some measures used for prevention involves routine medical screening and the use of Prostate Specific Antigen (PSA) tumor marker, by which PCa have been reportedly diagnosed early in many asymptomatic (no symptoms) patients (Adeloye *et al.*, 2016). But these are recent developments found only in some urban cities in some countries of Africa especially. According to Adeloye *et al.*, (2016), annual PSA screening may lead to early treatment commencement for slow-growing PCAs, thereby avoiding potential adverse effects of over-

treatment. Radiation treatment through treatment centers has been one major way of fighting PCa in men, though the task is challenging which usually resorts to surgery.

Based on the above, one could say that the mechanism(s) of control is weak in the sub-Saharan, thereby causing the burden to fall on the health personnel in finding a way out as a remedy for most patients. In this respect the nurse who are primary caregivers are highly involved in meeting care needs for most patients. With the low involvement and engagement of governments of the sub-Saharan sub-region in the phase of the cancer challenge amidst other health challenges like malaria and HIV-AIDS, the nurse comes in to fill that gap by providing therapeutic care for most cancer patients, especially those suffering from PCa. Therefore the following sub-section looks into nursing and radiotherapy in Africa.

2.2. Nursing and radiotherapy in Africa

Nursing is a field that provide direct patient care in a variety of settings, including outpatient clinics and community settings. This field in the health system is vital in life-saving adventures, human provision and health care, and it is often regarded as a costly health care resource (P. Anne *et al.*, 2013). In Africa with social and economic challenges and challenges related to awareness, nursing intervention is challenging before, during and after completion of treatment. This is partly because of the risk regarding poor adjustment by patients who in their great number are either singles, widowed, or unemployed, with little or no external assistance (Price *et al.*, 2012). The role of the nurse is inevitable in this kind of resource-poor setting(s) (poor not only on the side of patients, but much more on the side of the health personnel, system and facilities).

Many reports recognizes nursing in particularly terminal illnesses like cancer and HIV-AIDS in resource-poor countries as very necessary in the face of shortages of specialists and health care centers to meet a huge health care demand (Wengström, 1999; RCSI, 2010; Shah, 2015; Sumlin, 2016). However, social support from family and friends outside the home is also very important in coping (P. Anne *et al.*, 2013). According to the Center for Nursing and Midwifery Research – RCSI (2010), a Clinical Nurse Specialist (CNS) also acts as an ‘expert’ clinician and autonomous practitioner, intervening in symptom management, particularly pain management and lymphedema care. These nurse specialists are ideally placed to reduce the impact of symptoms for patients and help improve the quality of patients’ lives by providing information and advice (Orem, 1995).

However, nursing care in radiotherapy should be organized in such a way that provides nurses with sufficient time to provide this care (RCSI, 2010). Diminished access to timely treatment diagnosis, compromises the quality of care, taking into consideration that the primary goal for many cancer prevention programs is to reduce the risk factor effect, thereby limiting (or reducing) incidence (Sumlin, 2016). The increased number of men diagnosed with PCa may be attributed to a lack a knowledge and understanding about the risk factors and screening procedures, particularly with men having a genetic history of PCa (Price *et al.*, 2012). This could also be due to lack of diagnosis, limited access to health care providers and poor quality cancer data system in resource shortage countries (Sumlin, 2016; Adeloje *et al.*, 2016).

Radiation therapy on the one hand is one of the most successful therapies for cancer though having associated after-effects that could cause major problems to patients; ranging from pain and fatigue to second malignancies (European Oncology Nursing Specialist – EONS, 2010). It is the use of ionizing radiation for cancer treatment control or to kill malignant cells and normally delivered by a linear accelerator without destroying the tissues (Cox *et al.*, 1995). This therapy is also the corner stone of modern cancer management with an estimated 50-60% of [all] patients with cancer receiving the treatment (either alone or in combination with chemotherapy at certain stage) (EONS, 2010). Because of improved early detection and survivor rates, especially in developed countries, there is a wide range of observed chronic morbidities in long-term cancer survivors. However, later effects of this radiation treatment usually occurs after some months to years from the end of the treatment (Hanks *et al.*, 2003).

3 THEORETICAL FRAMEWORK

This study is guided by Orem's (1995) self-care theory as its framework. Orem's model lay emphasis on the individuals' demand for self-care which the nurse can accomplish through certain actions to promote health and well-being (Shah, 2015). Orem views health as physical, mental and social well-being and her theory focus more on the concern limitations in meeting self-care requirements and its effects on health. According to Shah (2015), Orem (1995) theory is applicable in settings such as acute care unit, hospice, ambulatory clinics, senior citizen homes and rehabilitation centers. It is a theory that provide a framework for radiation oncology nursing, consisting of six core concepts which include: self-care, self-care agency, therapeutic self-care demand, self-care deficit, nursing agency and nursing system (Wengström, 1999).

- Self-care

According to Orem, Self-care is a human regulatory function for ensuring one's own functioning and development, or that of a dependent, which takes the form of intentional action with aim to meet self-care requirements (Shah, 2015). It is a deliberate action and therefore it is different from other regulatory function such as neuro-endocrine regulation (Wengström, 1999). Self-care has to do with an individual's activity to maintain his/her own life, health and well-being (Shah, 2015). According to Orem (1995), health and well-being are inter-related in that in the association of health and well-being, success is inevitable both in personal endeavor and sufficiency of resources. Based on this concept, the nurse can also accomplish the individuals' demand for self-care in order to promote health and wellbeing.

- Self-care agency

Self-care agency is the individuals' capability in performing their own self-care to meet everyday requirements for care in promoting their life, health and well-being (Rosińczuk *et al.*, 2015). Humans constantly interact with internal and external environmental stimuli which may either enhance or impede their abilities to cope with such changes (Shah, 2015). Therefore in radiation therapy, the nurse has the role to encourage patients to maximize their self-care agency. This is because individual patients, to a large extent, are responsible for their own self-care (Orem, 1995). The nurse is only there to help patients take steps leading to individual adaptation from the influence of affected stimuli (Rosińczuk *et al.*, 2015).

- Therapeutic self-care demand

This involves activities at specific times or during a period of time to meet known self-care needs in order to maintain health and promote wellbeing (Orem, 1995). For Orem, person

(patient/human in question) is the recipient of care and the major focus of nursing. One important part of a therapeutic process in patients is a skillful preparation of a patient to find an optimal way of dealing with a disease, as well as maintaining independence and joy of life (Rosinićzuk *et al.*, 2015). This help in filling the incapability self-care gap of patients receiving radiation therapy.

- **Self-care deficit**

Self-care deficit is the relationship between therapeutic self-care demand and self-care agency (or action). According to Shah's (2015) analysis of Orem (1995) aim in self-care deficit, the nurse is there to provide care in order to sustain life and health, and recovery from diseases, because the nurse's main role in self-care deficit is to overcome the patients' limitation in self-care demand. In this respect, it is important for the nurse to assist patients and their families in identifying self-care deficits during radiotherapy. The approach is also important in that it helps establish appropriate care regimes for the patient (or for patients).

- **Nursing agency**

Orem (1995) sees nursing as a helping service, not only in helping patients but also in helping patients help themselves. Thus nursing agency is the power of the nurse to act, know and to help patients meet their self-care demands. Still according to Orem, nursing agency is the person(s) trained as nurses that provide such care. This power of nursing agency is achieved through specialized training, education in clinical nursing practice with inputs and guidance from advanced practitioners in addition to the nurse's clinical experience in caring for individuals or groups of patients (Wengström, 1999). For patients receiving radiotherapy, the move towards normalcy consist of lessening the suffering and pain from severe side effects while promoting self-care agency and working to minimize any self-care deficit.

- **Nursing system**

Nursing system is the relationship between the nurse and the patient which consists of actions in the interest of the patient to meet the required self-care need (Shah, 2015). In the nursing system, the nurse review and select valuable ways to help patients. According to Renpenning & Taylor (2003), the essential requirements for effective nursing practice fits into three groups: relationships, qualifications of practitioners, and situational requirements. In Orem's (1995) self-care model, there are three system of nursing care that make up the nursing system, this include the educative/supportive, the partially compensatory, and the wholly compensatory.

The educative system requires that the patient is competent in self-care and is given the required knowledge of the disease and or treatment. In the early stages of radiation therapy, patients should be capable of their self-care, and as the treatment progresses and sides effects starts occurring, there is a need to assess patients' learning capacity in relation to the symptom(s) management and other issue(s) that may arise.

The partially compensatory system requires patients to carry out some self-care measures. This implies a sharing of responsibility between the patient and the nurse, and it varies based on the patient's medical limitations, knowledge, skill and psychological readiness. Patients receiving radiation therapy should be encouraged to promote independence by taking part in decision-making and treatment.

The wholly compensatory system comes into play when patients are incapable for self-care, and therefore their self-care need is provided by another (the nurse) who is responsible for the protection of the patient's personal integrity and powers of self-care agency. The nurse also educate and support family members during radiation therapy on the care measures involved in order to minimize the treatment side effects (Orem, 1995).

4. AIM AND OBJECTIVES OF THE STUDY

The aim of this study was to assess the effectiveness of prostate cancer care and control and the role of nursing in radiation therapy intervention. In order to achieve the aims the following research questions were posed:

1. What are the challenges of prostate cancer in Sub-Saharan Africa?
2. What role does the nurse in the sub-region play in improving the health of patients receiving radiation therapy?

5 METHODOLOGY

This study makes use of literature review of selected articles and texts about cancer in black people (men especially including African-American), low and middle income countries focusing more on Africa and the sub-Saharan African region. This was to get information on the challenges of cancer (particularly PCa) care, control, treatment and prevention in the sub-Saharan sub-region of Africa. It also exploited the care and control mechanism of PCa and its effectiveness in the sub-region, and the implication on nursing intervention in men receiving radiation therapy.

5.1. Data collection

To collect data for this study, Medical Subject Headings (MESH) and keywords were identified and a final search strategy was developed. A systematic search to retrieve articles related to the study subject was conducted on Global Health, Arcada's academic databases (Academic Search Elite (EBSCO and ScienceDirect) with publication dates set from 2008 up to date, and with the use of key words in relation to the topic. Since most cancer studies were registry-based which may be unpublished, additional search was done on Google scholar, Google search, the lancet, Journal of Global Oncology (JGO), International Association of Cancer registries (IACR), International Agency for Research on Cancer (IARC), World Health Organization (WHO) African region websites to gather more data. Global publications on cancer like the "GLOBOCAN studies" and "Cancer in Africa: Epidemiology and Prevention" were also reviewed. The following major phrases were used to narrow the search:

1. Effectiveness of prostate cancer care
2. Prostate cancer control and nursing role
3. Nursing intervention in radiotherapy
4. Sub-Saharan Africa

Through the reading of the abstracts and the contents of derived articles, those with more of the keywords and their relevance to the research questions were chosen for further assessment. Some of the criteria for inclusion were: language (English), full text articles, with focus on Africa and specifically on sub-Saharan Africa, and particularly those with more of the key words. The following major articles were selected and used for the analysis.

1. Adeloye *et al.*, 2017. An Estimate of the Incidence of Prostate Cancer in Africa: A Systematic Review and Meta-Analysis.

2. Bollyky *et al.*, 2015. Cancer prevention and treatment in developing countries: recommendations for action.
3. Farmer *et al.*, 2010. Expansion of cancer care and control in countries of low and middle income: A call to action.
4. Kingham *et al.*, 2013. Cancer Control in Africa: Treatment of cancer in sub-Saharan Africa.
5. Morhason-Bello *et al.*, 2013. Challenges and opportunities in cancer control in Africa: a perspective from the African Organisation for Research and Training in Cancer.
6. Price *et al.*, 2012. Cancer Care Challenges in Developing Countries.
7. Centre for Nursing and Midwifery Research (RCSI), 2010. Evaluation of the Role of Clinical Nurse Specialist in Cancer Care.
8. Saraf, 2013. "Geographic Variation in the Costs of Prostate Cancer Care".
9. Shah, 2015. Compare and Contrast of Grand Theories: Orem's Self-Care Deficit Theory and Roy's Adaptation Model.
10. Sumlin, 2016. Complexity of Prostate Cancer Diagnosis in African American Men in the United States.

5.2. Content analysis

In analyzing the contents of the selected articles, a qualitative approach of Granehein & Lundman, (2004) was utilized, which is a systematic method of data analysis involving classification, evaluation and an unbiased verification of the qualitative data as its three stages. The finding was then linked to the Orem framework. By this method, a deductive content analytical process of reading through the content of the selected articles to gain a general understanding and to capture what Granehein & Lundman, (2004) described as manifest and latent meaning contained in the different texts, was applied. According to the above authors, the basic decision of this approach (content analysis) is to select the unit of analysis which in the context of this study were the ten selected articles, before trying to capture the manifest and latent content. The manifest content or meaning simply deals with the description of the visible and obvious content of the text without going too deep, while the latent content deals with a deeper interpretation of the underlying meaning of the text. Based on this approach, the phrases, words, texts or paragraph related to each other in terms of their content and context were considered as meaning units. The different meaning units were then coded and marked for classification. Codes with similar contents were put together into categories, making up a sequence of categories that identify a major element in the content analysis.

The ten selected articles were read for the first time, and during the second reading, the meaning units were highlighted and coded based on the manifest content of the text. The coding was a function of the relationship of the different text to the key words of the research (PCa, radiation therapy, nursing intervention, and Sub-Saharan Africa). The code is simply the label of a meaning unit. This process was done with the help of colored markers for better identification, and therefore for easier coding. The theme which according to this approach is an expression of the latent content, was divided into three sub-themes which were further divided into six categories with each sub-theme having two categories each.

Table 2. Themes, sub-themes and categories developed from content analysis

Theme	Assessing effectiveness of PCa care and control and nursing role		
Sub-themes	Health challenge assessment	Care and control challenge	Nursing role
Categories	<ol style="list-style-type: none"> 1. Challenges with regard to health institutions (hospitals and treatment centers) 2. Challenges with respect to patients 	<ol style="list-style-type: none"> 1. Care challenges based on the Orem framework 2. Control challenges based on the Orem framework 	<ol style="list-style-type: none"> 1. Palliative care 2. Role in self-care deficit situation

In the evaluation stage however, the assumption made from this approach is that reality could be interpreted in various ways and the understanding of it is a function of the subjective interpretation of the content. Verification was done through the application of concepts linked to the qualitative tradition in reporting the findings. The verification process also test trustworthiness of the research.

5.3. Research Ethics

Primarily, standards and instructions laid down by the Arcada University of Applied Sciences and ethics rule (Gray *et al.*, 2018) that guides scientific writing were put into use to ensure the study meets all required criteria. This was to ensure no-direct-copying of other authors' write-ups and not failing to acknowledge intellectual property of others, all to avoid plagiarism and come about with innovative ideas in contributing to the body of science and in the field of nursing.

6 FINDINGS

6.1. The Challenges of PCa in Sub-Saharan Africa

The challenges of PCa in Sub-Saharan Africa is multifaceted, thus I decided to present them in two categories which include the health challenges and the care and control challenges.

6.1.1. Health challenges

The increase burden of cancer in sub-Saharan Africa is associated with factors that have persistently affected the area, such as infectious diseases, unhealthy lifestyle, poor food supply, poverty and conflicts (Farmer *et al.*, 2010). Cancer is a public health crisis in developing countries, and in the sub-Saharan Africa, with patients often presenting with advance diseases, thereby reducing their chances of getting cured (Kingham *et al.*, 2013). Many scientific findings also hold that other factors add to this incidence rate in Africa including infectious diseases in particular (Farmer *et al.*, 2010; Price *et al.*, 2012; Kingham, 2013; Adeloje *et al.*, 2016). There is a lack of evidence-based treatment strategies in PCa, shortages of PSA-based PCa-based screening in Africa, making it hard to know the true incidence and prevalence rate of the disease (Saraf, 2013).

These diseases according to Bollyky & Andridge (2015) killed eight (8) million people before their sixtieth birthdays in these region in 2013 alone. However, there are very few published studies on diagnosis and treatment delays about sub-Saharan Africa, and there is very little data on the cost of treatment in many sub-Saharan countries like in Cameroon where the annual per capital Gross National Product (GNP) is 1190 dollars (Price *et al.*, 2012). Moreover, there is limited capacity in providing multimodal cancer-care by insufficient number of trained oncology health-care workers (Kingham *et al.*, 2013). The emergence of PCa as a health crisis in this sub-region is projected to worsen and become more challenging to address in the future if urgent measures are not put in place (Morhanson-Bello *et al.*, 2013).

The GLOBOCAN 2012 report indicated an incidence and mortality rate of 23.2 and 17.0 per 100,000 population respectively in Africa (Adeloje *et al.* 2016). In Africa as a whole, only few countries have population-based cancer registries, which are not even well equipped (Adeloje *et al.* 2016). The effects of these could be seen in the tables below.

Table 3: Pooled PCa incidence rates over study periods

<i>Year</i>	<i>Data points</i>	<i>PCa incidence (per 100,000)</i>	<i>95% CL (per 100,000)</i>
1980–1989	8	15.7	12.7–18.8
1990–1999	28	21.9	18.9–25.0
2000–2009	26	26.1	21.0–31.2
2010–2015	4	13.3	1.6–25.1
<i>Total</i>	66	22.0	20.0–24.0

Adapted from Adeloje et al. (2016, p. 9), doi:10.1371/journal.pone.0153496.t003

Table 4: Pooled PCa incidence rates over age groups

<i>Age (years)</i>	<i>Data points</i>	<i>PCa incidence (per 100,000)</i>	<i>95% CL (per 100,000)</i>
40–49	10	12.9	7.0–18.7
50–59	11	16.3	10.1–22.4
60–69	41	25.0	22.4–27.5
70+	3	39.0	19.9–53.3
<i>Total</i>	66	22.0	20.0–24.0

Adapted from Adeloje et al. (2016, p. 10), doi:10.1371/journal.pone.0153496.t004

Tables 3 & 4 show the result of an African study carried out by Adeloje et al., (2016) in sixteen African countries which provided the first systematic derived pooled estimate of PCa incidence in Africa, and shows that PCa incidence increases with advancing age, making advancing age a major risk factor. Table 3 suggests a peak incidence among men of age 65 years or higher, with 70 years plus, indicating the highest incidence per 100,000 population. Less than 50% of the data displayed on the tables were from population-based registries according to Adeloje et al. (2016), and that most of the cancer registries were restricted to specific locations of the countries involved which did not cover all the national population. The absence of effective low-cost PCa screening facilities and health promotion programmes across countries of the sub-region plays negative on the management of the disease (Morhanson-Bello et al., 2013).

6.1.2. Care and control challenges

In Sub-Saharan Africa, the cancer burden is poorly documented, and in many sub-Saharan cities, the physical environment is not conducive enough to healthy living (Morhason-Bello et al., 2013). Houses in this sub-region do not have appropriate ventilation, and there is no existing active regulatory agency to monitor emissions, putting the dwellers on a vulnerable point to passive smoking and other environmental pollutant emerging factors for cancer (Morhason-Bello et al., 2013). There is however a disparity between the need for surgical care and the existing surgical infrastructure (facility) seen with very few surgeons available to serve a huge population in many cases in the sub-Saharan sub-region of Africa. (Kingham et al., 2013)

According to Price *et al.* (2012), in case of cancer symptoms for example, 54% of patients first consulted general practitioners, 19% consulted specialist physicians, 17% consulted nurses and 9% consulted religious and traditional healers. Still in Cameroon, only 13% of patients were given prescription for either a biopsy or cytology to confirm suspicious malignancies (disease) by the first health care contact (Price *et al.*, 2012). However, the delay between the first time patients' consultation to a health care professional and the time of diagnosis (system delay) is higher than 3 months for 47% of patients and 6months for 37% of patients. Traditional healers are often the first stop for patients in the sub-Saharan (Farmer *et al.*, 2010). In this sub-region where poverty is the rule so-called, rather than the exception, researchers believe that most patients affected with the disease never make it to the hospital (Farmer *et al.*, 2010; Price *et al.*, 2012; Adeloje *et al.*, 2016).

In many African settings, the urologists present also lack the expertise to effectively perform curative radical prostatectomies, which is further worsened by shortage of artificial sphincters and relevant devices useful in the management of possible complications from the process (Adeloje *et al.*, 2016). However, there is limited use of radiotherapy treatment in this sub-region; scarcity of urologists, pathologist, radiotherapy and androgen-deprivation therapies in the sub-Saharan (Farmer *et al.*, 2010). This radio-therapy treatment relies on improved medical infrastructure that are limited in the sub-region, thus it is being replaced, most times, with inadequate surgery (Kingham *et al.*, 2013).

Still in this sub-region, General surgical care is often provided by non-physician medical officers (or general physicians) (Price *et al.*, 2012). Therefore, cancer care in the sub-Saharan lies in the hands of surgeons, as they are often the most available physicians that patients are able to consult for diagnosis, treatment (including chemo-therapy) and palliative care (Kingham *et al.*, 2013). However, poor access to surgical care is also a major impediment to cancer care (Price *et al.*, 2012; Morhanson-Bello *et al.*, 2013). As of the year 2013, many of the sub-Saharan African countries did not have even one trained oncologist or radiation oncologist (Kingham *et al.*, 2013).

Chemotherapy use is also often limited, and even cancer treatment facilities in urban areas often lack equipment and supply needed for oncology care (such as pathology labs, CT scanners, surgical supplies, hoods for chemotherapy preparation, infusion pumps, and regular access to blood count and chemistries) (Kingham *et al.*, 2013). PCa significantly contribute to the public health burden in this sub-region, though the exact burden is yet to be known (due to

gaps in data) (Morhanson-Bello *et al.*, 2013). Moreover, the burden is still expected to increase in the future (Adeloye *et al.*, 2016). Large numbers of affected individuals never reach a health facility, and the major determinant of access to diagnosis is distance to a tertiary facility.

There exists differences in womens' and mens' access to resources when it comes to awareness with that of female cancer being higher than cancer with men (e.g. Prostate, lung, esophagus, and liver) (Sumlin, 2016). This disparity is due to the fact that female cancer(s) have benefited greatly from collaboration initiatives between developed and developing countries thereby enhancing public health campaigns and education outreach programs for women (Sumlin, 2016). Poor public awareness about the disease (cancer) in the sub-region also contributes greatly to morbidity and mortality from the disease, which if improved upon, could improve risk reduction behaviors and promote timely screening for early detection, thereby reducing the cancer burden in the sub-region (Price *et al.*, 2012; Morhason-Bello *et al.*, 2013).

In Cameroon (a middle income country in the sub-Saharan) for example, there were two medical oncologists serving a population of about eighteen (18) million people by 2012, which were centralized in the French capital city of Yaoundé (Price *et al.*, 2012). All this results and contributes greatly in patients waiting longer between the initial notice of symptoms and presentation at hospital centers, a key challenge in care and control of the disease in many sub-Saharan countries (Adeloye *et al.*, 2016). Also in Nigeria for example, forty-seven percent (47%) of patients had to wait six (6) months longer (after symptom(s) realization) before hospital presentation (Price *et al.*, 2012). However, diminished access to timely treatment (and diagnosis) undermines quality of care received by affected patients (Sumlin, 2016).

One other key challenge affecting care and control (and its quality included) in the sub-Saharan is poverty. Widespread poverty in particularly countries in the sub-Saharan makes western medications an expensive alternative to traditional medicines (healers, in the African context) (Farmer *et al.*, 2010; Kingham *et al.*, 2013; Adeloye *et al.*, 2016). Due to the fact that patients in the sub-Saharan are geographically isolated from specialists (who are capable of diagnosis and management of the disease) makes traditional medicines more reliable and important for the population, even in urban cities. For example, fifty-five percent (55%) of patients with breast cancer had consulted a traditional healer before their first presentation in a medical center (Price *et al.*, 2012)

Moreover, stigma associated with the disease and the unawareness of the importance of screening, contributing greatly to the risk factors (Farmer *et al.*, 2010). This shows there is a

huge (largely unperceived) cost of inaction around cancer in the sub-Saharan. Therefore reducing risk factors, which is a cheap and major control measure, is one big way of preventing future incidence.

The unavailability of effective low-cost PCa screening facilities and health promotion programs across many Sub-Saharan African countries is one of the major challenges (Kingham *et al.*, 2013; Bollyky & Andridge, 2015; Adeloje *et al.*, 2016; Hayes & Bornmam, 2017). This has had a big disadvantage in the management and control of the disease by medical personnel including the nurse. Based on routine medical screening (examination) and with the use of Prostate Specific Antigen (PSA) tumor marker, PCa has been reportedly diagnosed early in many asymptomatic (nosymptoms) patients, with nursing playing a big role in this process (Adeloje *et al.*, 2016).

6.2. The role of nursing in radiotherapy

Most patients diagnosed with cancer infection and particularly PCa in the Sub-Sahara African setting have advanced diseases, which are suitable only for palliative care, and therefore the nurse have multiple role to play in meeting the huge care deficits (Morhason-Bello *et al.*, 2013). Major challenges on care comes from severe shortages of oncology nurses, pharmacists, and lab personnel, who are the basic care providers and are in limited number in Sub-Saharan African countries (Kingham *et al.*, 2013). In this respect, nursing intervention in radiation therapy is therefore aimed at enhancing well-being and quality of life for patients receiving therapy and their families involved within the framework of out-patient care (Shah, 2015).

The nurse primarily does care test for cancer in the absence or few availability of oncology specialists (Price *et al.*, 2012). There is also the inability of most patients (self-care agency) in Sub-Saharan Africa, coupled with low capacity, to meet self-care needs in the face of increase infectious disease, thereby redefining the role the nurse plays within that context. As a result, self-care agency becomes weakened (Adeloje *et al.*, 2016). Thus in the above kind of setting however, with limited cancer centers, facilities and specialists, the nurse is an important substitute in providing care (Shah, 2015; Sumlin, 2016). In addition, they provide a supportive environment, physical and psychological comforting, and instructions on guidance, action, or the do's for patients (Shah, 2015).

The weak self-care agency with most PCa affected patients also leads to increased therapeutic self-care demand. This is seen in the case of Cameroon where only few oncology specialists were available in only one reference hospital in the francophone capital city of Yaoundé to

serve a population of over eighteen million inhabitants nationwide by 2012 (Price *et al.*, 2012). This therapeutic self-care have been provided mostly particularly by the nurse as there are shortages of oncology experts and even surgeons in all of the Sub-Saharan African countries (Farmer *et al.*, 2010; Kingham *et al.*, 2013; Adeloje *et al.*, 2016). The nurse helps patients in identifying self-care deficit before, during and after the process of radiation therapy (RCSI, 2010).

Still within the Sub-Saharan African context, most patients do not have an appropriate care regime as the governments are unable to secure a universal health care or health insurance for all. The nurse (or nursing agency) in this respect is the one responsible to help establish appropriate care regime for most of the PCa patients under them. The nurse is therefore the major provider of self-care in self-care deficit situations in Sub-Saharan Africa (Sumlin, 2016). Patients with especially head, neck and PCa cancers receiving radiotherapy treatment are physically, psychologically and socially vulnerable to some significant extent, and need specialist's treatment and care from the nurse (RCSI, 2010). This adds to the important role the nurse plays during radiation therapy. The nurse intervenes and participates in different areas including clinical, education, research and audit, support, and coordination of care (RCSI, 2010).

According to RCSI (2010), one of the most distressing phases of cancer care is the fear of recurrence which most patients and their families are often faced with. In this case, the nurse in palliative care put more effort (and is somehow compelled) to combat the issue by providing emotional support during and even after hospital discharge. Though there are challenges in delivering this type of care (emotional) requiring skills in managing the process, the nurse (CNS) enhances patient care, promote stability in a chaotic environment in view of supporting professional nursing practice (RCSI, 2010).

7 DISCUSSION

Looking at the situation of PCa in sub-Saharan Africa, the high incidence rate could be linked, among many factors, to poor health-care which stem from poor health facilities and standards, limited number of health care personnel, and ignorance of the population due to little or no sensitization (Kingham *et al.*, 2013; Adeloje *et al.*, 2016). The fact that most patients present late at health-care centers and with advance diseases is an indication of their inability to identify and or interpret symptoms on time, which conform to the fact that self-care agency is weakened (Adeloje *et al.*, 2016; Sumlin, 2016).

Another issue which is common to sub-Saharan African countries is the very low income level of the people (or high poverty level), unable to meet basic health-care needs for majority of the population, including those in urban cities (Farmer *et al.*, 2010; Price *et al.*, 2012). As a result most PCa patients are unable to afford therapeutic health-care, and therefore tend to seek cheaper and affordable health-care from traditional doctors ('local healers') who most times are not able to do proper diagnosis (Famer *et al.*, 2010), thereby adding to the burden after so much delay. Limited number of specialists and high cost for the few available specialists coupled with limited government support (Morhason-Bello *et al.*, 2013; Adeloje *et al.*, 2016), could account for why most patients seek unorthodox ways of getting therapeutic health-care. These could also be used as factors to explain the late presentation of patients at the few available cancer treatment centers in the sub-region.

Though population-based cancer screening is the only available mechanism for cancer care and control in Africa, it is still not commonly found in the sub-Saharan as a result of the cost incurred and a huge shortage of specialists and low quality treatment centers. Research findings like Morhason-Belo *et al.* (2013) and Adeloje *et al.*, (2016) explain this to be due to limited resources for the different governments to divert to cancer diagnosis in the face of other health challenges (emerging infectious diseases) affecting the sub-region. The situation is worsening in this part of Africa as cancer diagnosis and treatment is not a priority for most of the governments compared to other parts of Africa (Morhason-Belo *et al.*, 2013). However, it is a demonstrated fact that government support is one of the highest support a country could ever get in the treatment of such malignancy (Adeloje *et al.*, 2016). There is also the prediction of an expected increased burden in the future as a result of factors such as high population growth, increased urbanization and increase life expectancy (Morhason-Belo *et al.*, 2013).

In most cases, chemotherapy prescribed by surgeons to replace radiotherapy which rely on improved medical infrastructure, is due to the fact that there are few available oncologists (cancer specialists) in the sub-region and who focus more on hematological malignancies as explained by Kingham *et al.* (2013). Therefore, cancer surgery (as an initial therapy) by inexperienced physicians, so-called, in cancer care becomes the option in treatment and care, which sometimes may result to residual diseases or early recurrence. The inclusion of chemotherapy by surgeons of this sub-region as a compliment for radiotherapy is also as a result of high cost and unavailability of the drugs (Kingham *et al.*, 2013). This is so because treatment centers in urban areas even lack the equipment and the needed supply for oncology care (Price *et al.*, 2012).

Morhanson-Belo *et al.*, (2013) assert that cancers that are treatable in developed countries are often death sentences in developing countries. From here we see that it is not the lack of mechanisms to tackle the challenge, but much more it is the inability to afford these available care and treatment mechanisms. PCa is not unique to the sub-Saharan, but the sub-Saharan approach makes it look as though the sickness is endemic to this sub-region. However, in helping out to improve the present situation, the same approaches that the global health community is using to ensure safe, sound, and reliable supplies of HIV-AIDS and Malaria treatment, childhood vaccines and contraceptives, could be used (leverage) to improve access to essential therapeutic care needed to address PCa in particularly in developing countries.

The huge care deficits in patients' diagnosed with PCa in Sub-Saharan Africa is partly as a result of advanced diseases, thereby making the situation suitable for palliative care only. With the shortages of oncologist as presented in the above, the huge burden falls on the shoulders of the nurse in meeting the care deficits through therapeutic care. Most basic care providers such as pharmacists and laboratory personnel are in limited number due to the lapses and the lack of enough funding in the entire health sector in countries of the sub-region (Price *et al.*, 2012). It could also be attributed to a high population growth rate and a prevailing poverty situation (Morhanson-Belo *et al.*, 2013), leading to patients' late presentation at care centers and with advanced diseases. Due to the severe shortages of oncology specialists and even surgeons in this setting according to Kingham *et al.* (2013), the nurse is therefore oblige to do primarily care test for most patients.

The weak self-care agency situation with most PCa affected patients is as a result of the lack of appropriate knowledge and understanding about the risk factors and screening procedures,

especially with men having a PCa genetic history (Shah, 2015). It could also be explained by limited access to therapeutic health care because therapeutic care helps strengthen individuals' self-care agency. The fact that most governments of the sub-region do not prioritize cancer as an important health issue (Farmer *et al.*, 2010; Price *et al.*, 2012), is one major reason why nursing is bound to engage in helping establish appropriate care regimes for most patients.

8. CONCLUSION

Many dead have been recorded within short time periods as a result of cancer infection in Africa and particularly countries of the sub-Saharan which has made cancer a public health crises and very challenging for the governments of these countries. This study which aimed at

assessing PCa care and control and the role of nursing intervention in radiotherapy looked into the sub-Saharan Africa case. There is limited use of radiotherapy treatment in Africa; scarcity of urologists, pathologist, radiotherapy and androgen-deprivation therapies in the sub-Saharan Sub-region. However, in most African settings, these available urologists also lack the expertise and equipment to effectively perform curative radical prostatectomies. In the sub-Saharan sub-region, the cancer situation in general is worsened by a number of factors ranging from poor health facilities and personnel to patients' awareness. Limited capacity in providing multimodal cancer-care by insufficient number of trained oncology health-care workers is a big challenge. Moreover, the lack of evidence-based treatment strategies and the shortages of PSA-based PCa-based screening in Africa could be overcome with improving on cancer research efforts in order to know the true incidence and prevalence rate of the disease. Without these statistical data, it would be more challenging to face the cancer challenge in Africa as a whole. Developing evidence-based screening, diagnosis and treatment guidelines for PCa that is adaptive to the sub-regional context would be a great mechanism for the care and control of the disease. The use of radiation therapy in sub-Saharan Africa is limited by poor medical infrastructure which is replaced by inadequate chemotherapy and or surgery. However, the issue of most patients diagnosed with PCa having advanced diseases is common in this setting which only makes it suitable for palliative care, thereby giving additional care burden on nursing. This increased therapeutic self-care demand provided by the nurse results from weak self-care agency with most PCa affected patients. In addition, the nurse helps design appropriate care regime for most of these patients. Therefore, nursing role is very vital in this kind of resource-shortage setting as they are involved practically in almost all the different stages of the disease prevention, care and control.

8.1. LIMITATIONS AND RECOMMENDATIONS

8.1.1 LIMITATIONS

In the course of this study, many difficulties were encountered which may have hindered the clarity of the information presented and the long time spend on putting the ideas together. Such limitations include:

1. Limited access to relevant literatures on PCa and nursing role in radiotherapy in the sub-Saharan African context.
2. Published studies available on diagnosis, treatment delays, and cost of treatment in the Sub-Saharan Africa, were either few and or difficult to access. Most of the few articles found needed to be paid for in order to access.
3. The cancer burden in Africa is poorly documented. This is partly because only few original populations based cross-sectional studies or cohort studies on PCa exist in Africa, with most of the relevant studies mainly population-based or hospital-based registries' surveys according to Adeloje *et al.* (2016), which could be accessed only at hospital and treatment centers.

8.1.2 RECOMMENDATIONS

The following recommendations were derived from this study:

1. There is a need for massive sensitization and support to governments of sub-Saharan African countries on the advantages of spending more on cancer related researches, and investments on low cost early cancer detection and preventions.
2. There is also a need for more government investment to be channeled towards the training of more personnel on cancer care and control, and build nursing capacity through exchange programmes and fellowships with international partners.
3. It is important to develop evidence-based guidelines for the screening, diagnosis and treatment of PCa (Saraf, 2013). International partners may assist in addressing this challenge by supporting registries in the Sub-Saharan countries to define incidence, mortality and survival rates for different cancer types. They could mobilize more aid for the development of resource-level-appropriate guidelines for the management of treatable cancers like PCa, and also boost resources dedicated to NGOs working to adapt and develop lower-cost, less infrastructural-intensive PCa screening and diagnosis.

4. Appropriate training and education of primary cancer health-care providers such as nurses, and clinicians, is a necessity in raising public awareness in the Sub-Saharan (Price *et al.*, 2012).
5. Programmes seeking to improve cancer care in Sub-Saharan Africa should endeavor to partner with traditional healers at the local level.
6. Local organizations/institutions have to enhance their partnership with cancer centers and specialists worldwide to prioritize training for medical oncologists and their strategic placement (Kingham *et al.*, 2013).
7. To succeed in building up elastic mechanism(s) to control PCa incidence and spread in Sub-Saharan Africa, the authorities have to put in place new leadership, critical thinking strategy, both public and private investment, and understanding in the health domain/sector (Morhanson-Bello *et al.* (2013).

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