UNIVERSITY OF KWAZULU-NATAL

INVESTIGATING THE ECONOMIC BENEFIT OF BETTER ACCESS TO RADIATION THERAPY TREATMENT TO WOMEN WITH CERVICAL CANCER IN RURAL KWAZULU-NATAL, SOUTH AFRICA

BY

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A dissertation submitted in partial fulfilment of the requirement for the degree of

Masters of Business Administration

Graduate School of Business & Leadership
College of Law and Management Studies

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June 2017

DECLARATION

I, Mpho Mabale Mbhele declare that:

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Acknowledgements

I wish to express my sincere appreciation and gratitude to the following individuals, without whose assistance, this study would not have been possible:

Dr Muhammad Hoque, my supervisor, for his guidance, mentoring and encouragement.

The cervical cancer patients at Greys Hospital, who availed themselves to participate in the study by answering the questionnaire,

My late husband Nhlanhla Lucky Mbhele whom I lost during the time I was pursuing this qualification, in his absence, I sincerely thank the Almighty God him, for all the support he provided and demonstrated through running our household and taking care of our two boys Kwazinkosi and Simosenkosi while encouraging me to further my career, may his soul rest in peace.

My families: the Mabale family as well as the Mbhele family for their undying support and encouragement through all my years of study.

My colleagues the Radiotherapists and the entire staff at Greys Hospital Oncology Unit, for their support and encouragement during the most difficult time of my career when I lost my husband: you people have been my rock and pillars of strength.

Data assistants: Samkelisiwe Khumalo and Nokuzola Mtolo

Menzi Mdlanyoka, the statistician, for helping me with data coding as well as generating statistical graphs for my analysis.

ABSTRACT

Cancer is the disease that touches a larger proportion of the KwaZulu-Natal population most of which are from rural setting with little or no educational background. In view of that, many of the cases that present to Greys Hospital Oncology are a majority of late stage cancers. Among the various types of cancers seen, cancer of the cervix is the highest common cancer type treated at Greys Hospital Oncology Unit. The most common challenge especially from women who received radiation treatment for cervical cancer was the length of their treatment which takes up to 8 weeks. This study aimed to describe how the cervical cancer patients would benefit socio-economically should they be granted better access to Radiotherapy for their cancer treatment. To achieve this, a descriptive quantitative study was conducted among 74 cervical cancer patients who received radiation therapy at Greys Hospital Oncology unit using a research assistant administered questionnaire. Results found that 43% of the participants were single and 39% married, 43% have more than three (03) children and 82% had no nanny at home to take care of the children. 22% had no education and only 8% completed matric while 58% were found to be pensioners and only 14% were employed full time. 88% of the participants who spend >R60 on transport did not have any nanny at home whereas 74% had nanny but this difference was not significant (p=0.145). The study also found that of those who spend >R1000 on groceries, 42% spend >R60 on transport. It could also be seen that those who spend more on groceries also spend more on transport.
Given those statistical findings, it is evident that the participants in the study were of a low socio-economic status which meant that they were likely to suffer financial toxicity as well as other social challenges in order to receive their full cause of radiation treatment for their cancer.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

Noncommunicable diseases (NCD) have been globally reported to have a significant socioeconomic impact as it increases individual and household poverty and hinders social and economic development (World Health Organization (WHO), 2016). One such disease which is rapidly growing both in its incidence as well as with its current crisis in management especially in the low-and –middle-income countries (LMIC) is cancer. According to the World Health Organization (WHO) report in 2016 cancer was recorded as the second leading (NCD) with its death toll estimated at 7.6 million and also that more than two thirds of the cancer deaths were occurring in the LMIC.

The rapidly increasing number of new cancer cases, marks cancer as an increasingly cause of morbidity and mortality in all the regions of the world and due to the challenges in tackling this disease, the increases in cancer prevalence therefore are highly unavoidable hence its global incident rate was estimated to rise from 12.7million new cancer cases to 21.4million by 2030 (Cervical Cancer Action 2015).

The impact of NCD's to LMIC was such reported as severe so much that 150million of the people affected suffered a financial catastrophe yearly and that 100 million of these affected people were eventually pushed under the poverty line due to payments incurred for health care. As a consequence, the rapidly growing burden of NCD's especially cancer, has been reported to cause the vulnerable and socially disadvantaged people to be more sicker and to likely die sooner than people of higher social positions given the reported existing inequity in the health care system (Hunter and Reddy, 2013).

Cancer is the disease that touches a larger proportion of the KwaZulu-Natal population most of which are from rural setting with little or no educational background. In view of that, many of the cases that present to Greys Hospital Oncology are a majority of late stage cancers. Cancer comprises of over 100 different tumor types growing at different sites of the body and

has a wide variability in scientific knowledge about their causes and modality of treatment (ROJIG Final Report, 2003).

1.2 Motivation of the study

During a full course of radiation therapy, most cervical cancer patients who are from the rural areas have no choice but to stay in hospital for the entire treatment due to distance. This means that those who work stay out of work and away from their homes and families. Many of these patients have young children who go to school and still need taking care of, while others rely on Government pension to survive. Due to all these challenges, these patients most often choose not to come for treatment, this has therefore brought the KwaZulu-Natal Province to have an increase in the death toll of women with cervical cancer.

For some, the fear of losing their jobs and thinking of the safety of their children, these patients therefore chose to travel daily which becomes another challenge since they incur very high out of pocket costs. These costs are substantial concern for patients and their health care providers therefore, it was highly essential to do a study that sought to investigate effective and efficient ways to provide radiation therapy to alleviate high costs to patients, in particular those diagnosed with cervical cancer since it is the most common cancer type in the Province as well as in the institution where the research is conducted.

The overall motivation of the study was therefore to highlight the following key areas:

I. Justification of treating cervical cancer with radiation therapy
II. The importance of developing cost saving strategies to encourage patients to attend cancer treatment to lower the increasing death toll due to cancer of the cervix
III. Addressing the issue of optimal placement of radiation therapy machines to allow rural patients better access.

The benefit of the study was that cervical cancer patients were to be provided with a platform to communicate directly to their health care providers regarding their challenges. The study was also sought to give the patients with cancer of the cervix hope that there could be some improvement in the health care system which was to likely improve their quality of life while they went through cancer treatment. In turn, it was also a motivation that if such information

was researched and published, it could assist the KwaZulu-Natal Health system to improve the access to better cervical cancer care and treatment for patients could be more effective.

The Kwa-Zulu Natal Department of Health will therefore also benefit because when patients are motivated to attend treatment, there will be a decrease in the death toll due to cervical cancer, but most of all, the policy makers will have evidence to assist them to improve their strategies to combat deaths caused by cervical cancer in the rural areas.

1.3 Focus of the study

The study was conducted at the Greys Hospital Oncology unit which is one of the three tertiary hospitals of the KwaZulu-Natal Department of Health that offer Radiation Therapy as a the preferred treatment modality for cervical cancer. The Kwa-Zulu Natal Department of Health has embarked on a mission to minimize the increasing death toll due to cancer of the cervix, this emanating from the statement made by Dr Motswaledi, the current National Minister of Health which stated that the severity, complications, human suffering and loss of life from cervical cancer were worsening due to poorly resourced infrastructure, limited access to early screening, treatment and management of complications. (Botha and Richter, 2015)

The participants of the study are women diagnosed with cervical cancer who have received radiation treatment at the Greys Hospital Oncology unit, who come from the rural communities of the Western Kwa-Zulu Natal.

1.4 Problem Statement

As one of the professionals who work at the Oncology unit at Greys Hospital delivering radiation to treat cancer, I get to be at the receiving point of all the concerns that patients share on a daily basis during their course of radiation treatment. The most common challenge especially from women who received radiation treatment for cervical cancer was the length of their treatment. The whole course of radiation treatment for cancer of the cervix for curative intent takes up to 8 weeks. For these clients it therefore warrants staying in hospital for 8weeks to receive the full treatment. Some patients would complain about their children being left alone back home, while others had to give up their jobs.

These challenges built up to point that there was an increase of cervical cancer cases that were not showing up to resume their radiation treatment from the fear being away from their families for a long time or while for some being the fear of losing their jobs.

The researcher therefore decided to pursue the study in order to acquire evidence that will be form part of literature which sought to assist the KwaZulu-Natal department of Health in improving better access to cancer treatment with radiation therapy as well as address disparities that exist in the Health system in as far the rural communities are concerned.

A report by The Independent Clinical Oncology Network (ICON) (2012) which reported a publication by The Green Paper Policy on National Health Insurance published on 12 August 2011, described the current ills of an underperforming National Health system as attributed to a fragmented health care system as well as a reported low increase of the equipment used to deliver radiation therapy in South Africa.

We continue to see more evidence which proves the reality of the aforementioned report through more publications which have further eluded on the severity of the poor Health system mainly in the KwaZulu-Natal Province. Reported in the Sunday Tribune newspaper article, Shaikh (2017 pg. 4) alluded on the cancer service crisis faced by the KwaZulu-Natal Department of Health which he claimed was through the high resignation of Oncologists from the public sector institutions that offer cancer care. He further reported on the cancer machines that were not repaired in the same Province and this Shaikh called it a dire situation since it increased the radiotherapy treatment back log for cancer patients.

Another similar report was made recently by Pieterse (2014 pg.1) which was published as a front page article in the Witness newspaper, wherein it more emphasis was on patients dying while waiting access their required Radiation treatment at Greys Hospital due to the back log caused because the institution only had one radiation machine to cover a large population.

The researcher's motivation to conduct this study was to make sure that research around the impact of better access to Radiotherapy treatment was to voice out the concerns of these patients by acquiring evidence through gathering of data directly from the affected clients through the use of a questionnaire.

The research was therefore aimed to project quantifiable data which was going to reflect the socio-economic challenges that cervical cancer patients incur from accessing radiation treatment for their illness.

1.5 Objectives

The study was guided by the following objectives:

- To investigate the socio-economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal.
- To investigate the out of pocket cost to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit

1.6 Research Sub-Questions

The research answered the following questions:

- What are the socio-economic burdens of poor access to optimal cancer treatment for cervical patients who are from the rural Western Kwa-Zulu Natal?
- What are the out of pocket costs to cervical cancer patients who received radiation therapy treatment at Greys Hospital Oncology unit?

1.7 Limitations of the study

Since access to radiation therapy for rural KwaZulu-Natal (KZN) communities continues to be a challenge for the whole province, for a better generalization of the research, it would have carried more weight for the study to select participants from all the KZN districts. For convenience therefore, the researcher will only select participants from only three districts as indicated on annexure A.

Patients from the rural KZN present with many different cancer types which are also treated with radiation therapy which the researcher could have included in the study to allow for the generalization, however, the researcher has only used cervical cancer as a specific type for the study. This has therefore left a gap which requires more similar research using other cancer types in this research area.

1.8 Summary

This chapter aimed to provide the background of the study as well as outline the motivation of the study, the problem statement and the focus of the study. The Objectives of the study including the significance of the study were also outlined. The study also had limitations which were also mentioned in this chapter. The next chapter will be presenting the review of literature on the challenges of access to cancer treatment.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The incidence of cancer was reported by the World Health Organization (WHO) report on preventing chronic diseases: Avital investment, to be rapidly increasing with projections of over 7.5million people who would die from cancer if it is not prevented. (WHO, 2016).

Among the various types of cancers known globally, cervical cancer is mentioned to be the fourth most common type among women worldwide, and with its malignant nature, it has been reported to be responsible for the death of over 266 000 women in the developing countries, most of whom are in their prime of their lives. It was also reported that each year there is an estimated 528 000 new cervical cancer cases seen with more than 85% of these new cases occurring in less developed countries. (WHO, 2016).

Cervical cancer is a neoplasm arising from cells originating in the cervix, the cervix being the narrow part of the lower uterus also referred to as the neck of the womb. (American Cancer Society, 2016). Cervical cancer has many different types of causes, however, the human papilloma virus (HPV) is reported as the main predisposing factors and that 70% of cervical cancers are due to HPV. (El Saghir, 2014).

Although cervical cancer is described to be a slowly progressing local disease, however, once it occurs after 5-30 years of the development of the intraepithelial neoplasm (CIN) lesions and not detected nor treated early, the lesions can develop into invasive cancer and the treating modalities become more complicated (Cervical Cancer Action 2015).

Cervical cancer mortality still remains a huge global burden, which reflects that there is still a high level of inequities in wealth, gender and access to good quality health care (Cervical Cancer Action, 2015). Although statistics show an approximate 528 000 new cases every year worldwide, research continues to regard cervical cancer as an avoidable cause of death (International Agency for Research on Cancer, 2013). Cervical cancer is said to be the second most common cancer among women in the developing countries, with the vast majority of

these unnecessary deaths occurring in the disadvantaged communities within developed countries (Cervical Cancer Action, 2015).

The prevalence of cervical cancer in South Africa is higher compared to the global estimates with the highest rate reported to be 30.2 per 100 000 females as well as the highest in women between the ages of 15 – 44 years (Ndlovu, 2011). In KwaZulu-Natal cervical cancer was also reported as the second cause of female mortality contributing about 14% of deaths (Ndlovu, 2011). Most local studies around cervical cancer have focused solely on the screening for prevention and detection of the disease with minimal information in the area of treatment with Radiation therapy yet this is one of the highly used modality for treating cervical cancer globally.

For women from low and middle income settings, the screening models available have performed poorly due to poor test performants, poor follow up systems, financial implications and other social challenges that prevent many of these women from traveling repeatedly to these screening facilities. Despite the screening methods available, to further combat mortality from cervical cancer, the available prevention programmes need to be integrated with good referral systems to higher level treatment facilities for effective clinical outcome (Cervical Cancer Action, 2015).

Below is a statistical pie diagram from the GLOBOCAN (2016) which displays the estimated number of new cancer cases by regions. The two regions displayed are the more developed as well as the less developed regions. From the figure below, we see that cancer of the cervix (cervix uteri), accounts for 5.5% of the population of all the less developed regions while nothing is recorded in the more developed regions (Torre *et al*, 2015). This information adds more emphasis on the fact that cervical cancer can indeed be cured if diagnosed and treated early. This also gives an indication that with better access to cervical cancer treatment as well as its detection and prevention methods, it is possible not to have any new emerging cervical cancer cases.

2.1.1 A statistical overview of the global burden of cancer

The registry estimates that the current lifetime risk of developing cancer in South Africa is 1 male in 6 and 1 female in 8 (SA Cancer Statistics, 2016). The primary objective therefore for

optimal cancer control, is to provide optimal cancer management which integrates cancer services, outreach programs as well as improving better access to cancer treatment available.

Among the various types of cancers seen, cancer of the cervix is the highest common cancer type treated at Greys Hospital Oncology Unit, with an average of 199 cases seen in the clinics and an average of 126 booked to receive Radiotherapy as a treatment modality yearly.

The results of the study that was conducted by Comai (2014), reported that access to screening and high early detection were not adequate as most of the women from KwaZulu-Natal that she interviewed in her study felt that even after early detection and increased awareness of cervical cancer, the system did not favour them. Patients in that study alluded that they had to travel far to get to urban radiation treatment centres only to be returned with a further appointment date for radiation treatment due to long waiting lists.

Greys Hospital is one of the only three public Hospitals in KwaZulu-Natal that offer cancer treatment services. Greys Hospital is a referral hospital100% tertiary service to the UMgungundlovu district which has an approximate population of 1million to the Western half of KwaZulu-Natal which include 5 health districts with a total population of 3.5million. Greys Hospital offer 18 main services, among which is the cancer management and treatment service offered by the Radiation Oncology Department.

The location of the hospital does pose challenges to the rural community to access the cancer treatment service due to its geographical placement. The study was conducted to highlight the challenges that cervical cancer patients encountered during the time they were undergoing Radiotherapy which is one of the treatment modalities used to treat cervical cancer.

The diagram below shows a global statistical description of the supply and demand of the resources required to improve the status of the radiation therapy treatment for cancer patients given the rapidly increasing incidence of cancer.

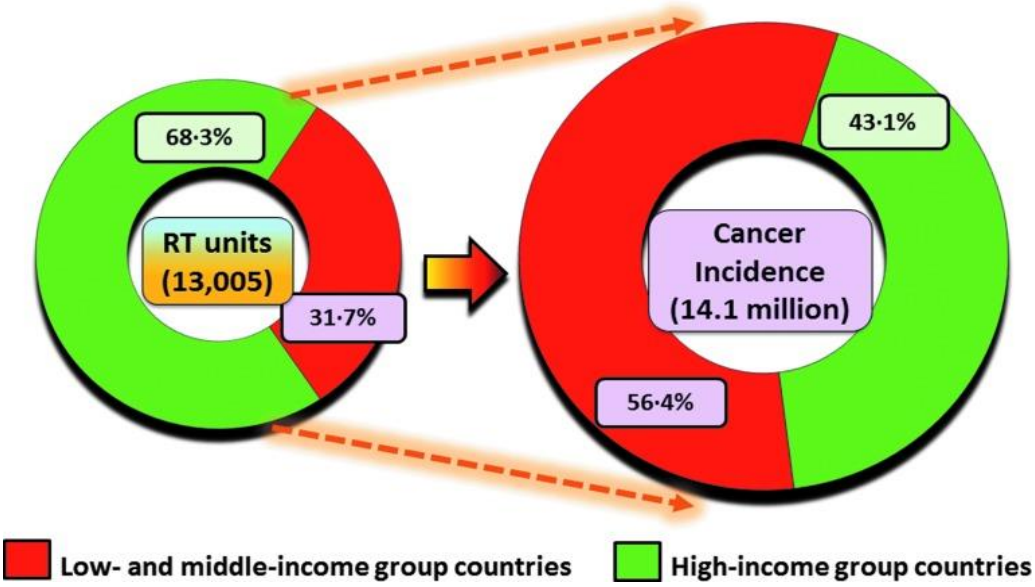
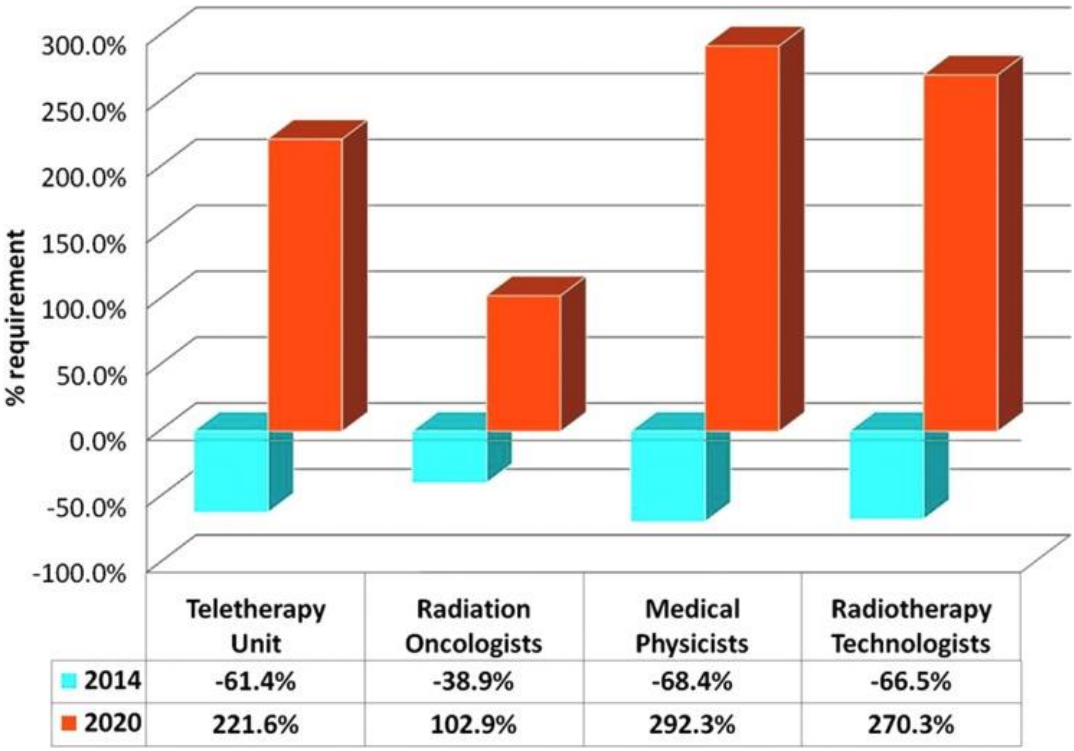


Figure 2.1 Available teletherapy units and the proportion of cancer incidence in low- and middle-income group countries versus high-income countries. (Datta *et al*, 2015).



	Teletherapy Unit	Radiation Oncologists	Medical Physicists	Radiotherapy Technologists
2014	-61.4%	-38.9%	-68.4%	-66.5%
2020	221.6%	102.9%	292.3%	270.3%

Figure 2.2 Present deficit in teletherapy units, radiation oncologists, medical physicists, and radiotherapy technologists in low- and middle-income countries and the additional requirements by 2020 for each of these radiotherapy capacity components. (Datta *et al*, 2015)

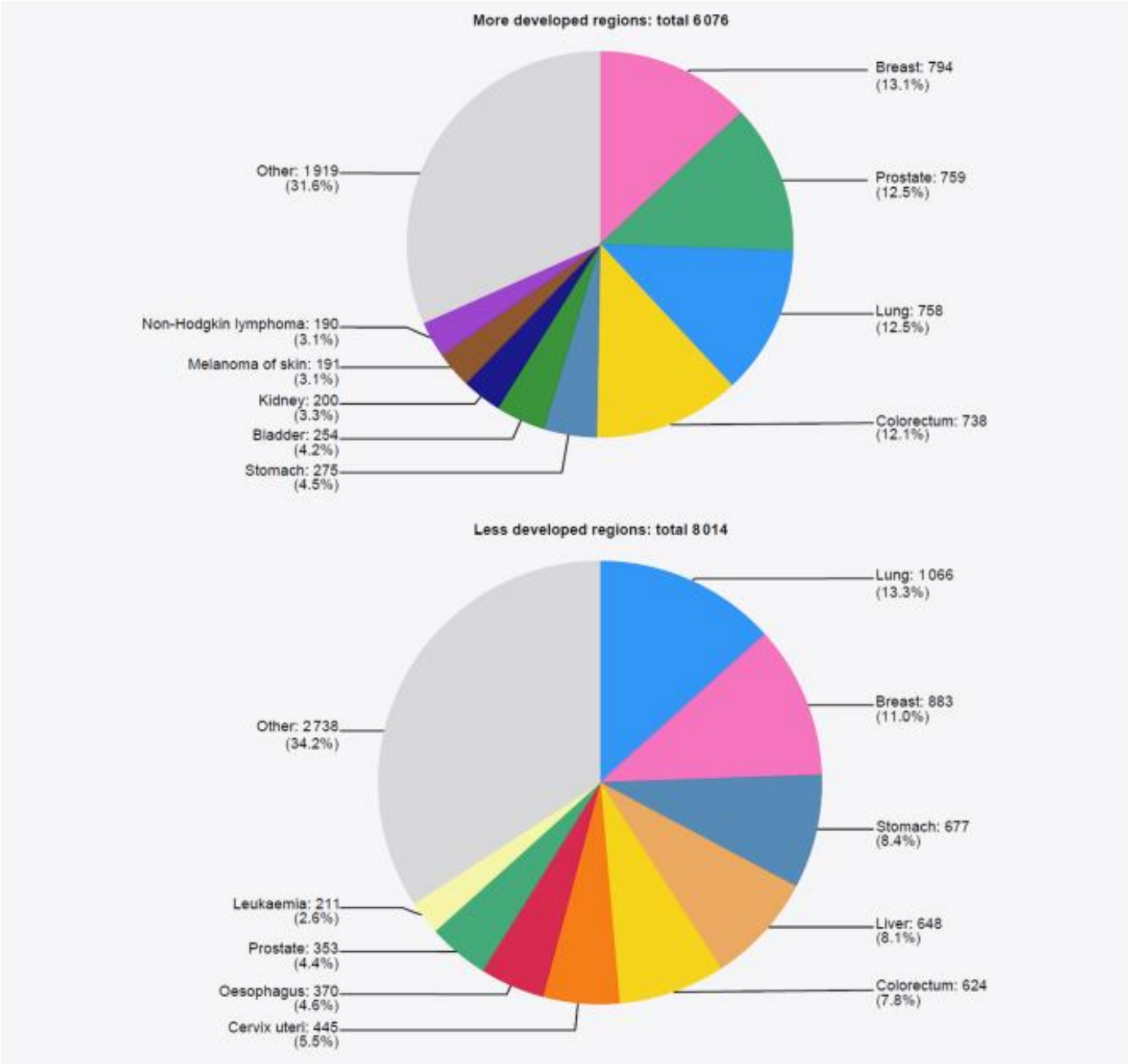


Figure 2.3 Estimated global numbers of new cases (thousands) with proportions for more developed and less developed regions, both sexes combined. (GLOBOCAN, 2016).

2.1.2 The statistical overview of global incidence and mortality rates of cervical cancer

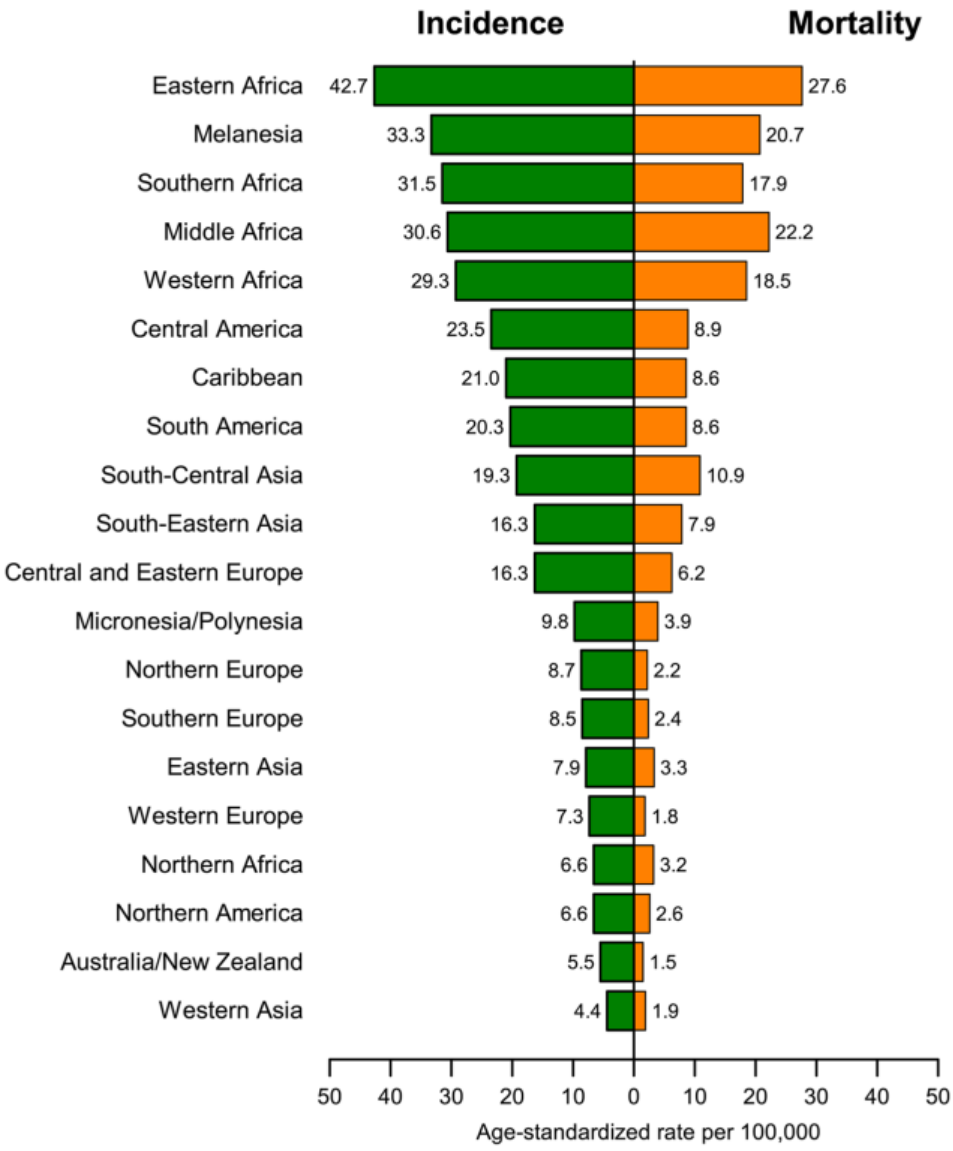


Figure 2.4 Cervical cancer incidence and mortality rates by World Area. ("GLOBOCAN", 2016)

In their analysis, Torre et al, (2015), reported an estimated 527 600 new cervical cancer cases and 265 700 deaths worldwide in the year 2012, with 90% of the deaths being in the developing countries. Of these developing countries reported, Africa has 60 100 deaths by cervical cancer and one of the leading country is the Southern Africa.

2.2 Treatment of Cervical cancer

It is estimated that by 2030, approximately 800 000 new cervical cancer cases will be diagnosed annually if preventative and treatment measures are not successfully implemented. (WHO, 2016).

Although HPV vaccination is known to be part of the comprehensive approach to cervical cancer prevention, however, due to the diverse geographical settings and the cost to roll it out especially in the rural settings of KwaZulu-Natal, it still remains a challenge. It is therefore important to also put more emphasis in making sure that treatment measures in place are used effectively to allow for optimal control of cervical cancer. (Botha and Richter, 2015).

Treatment for cervical cancer includes surgery, radiotherapy, chemotherapy or a combination of all three; however, the decision to select the type of treatment modality to use depends on various factors such as the stage of the cancer, the age of the patient and the general health condition of the patient. (American Cancer Society, 2016).

The progression of cervical cancer ranges from the early stage which is defined as FIGO clinical stages IA1 to IIA which mean that the disease is confined within the cervical portion to the upper vagina with no invasion to other surrounding structures. For these stages treatment will be conisation to preserve fertility or a simple hysterectomy without pelvic node dissection if fertility is not of concern. (National Comprehensive Cancer Network NCCN, 2017).

For stages above the early stages mentioned, which are anything from the locally advanced clinical stages IIB to IVA which mean that the disease is likely to have invaded other surrounding structures, the treatments are either the class III Wertheim's radical hysterectomy with bilateral pelvic lymph node dissection, postoperative radiotherapy, concurrent chemo radiotherapy (CCRT) or a combination of all. (NCCN, 2017).

2.3 The role of surgery as a treatment of cervical cancer

The indications of surgery for the management of cervical cancer are to diagnose and confirm the presence of the disease, to determine how far the disease has spread if confirmed to be present and lastly to remove the tumour mainly for early stage cervical cancers. Removal of

the tumour for early stage cervical cancer is often dependent on whether the patient wants to preserve fertility or not. (Disaia *et al*, 2017). The stages suitable for surgery as an option for cervical cancer treatment are include stage 0 also known as carcinoma in-situ (CIN), where the cancer cells are only in the surface layer of the cervix and have not grown into deeper layers of cells; stage IA1, where the treatment option is largely dependent on the wish of the patient to preserve fertility but only if the cancer has not grown into the blood or lymph vessels, in these cases a cone biopsy will be done after which the woman will only be watched with no further treatment as long as the cancer does not come back. (Disaia *et al*, 2017).

For women who do not want to preserve fertility despite of the early stage, then a simple hysterectomy will be done where there is no lymph node invasion or a radical hysterectomy with removal of pelvic nodes will be done where lymphovascular invasion is evident. (NCCN, 2017).

2.4 The role of radiotherapy for cervical cancer treatment

As the prevention and treatment of infectious diseases such as AIDS continue to improve over the years, on the other hand cancer treatment continues to grow as a concern. (Zietman, 2014). Radiation therapy as one of the modalities required to treat cancer continue to play a vitally important role especially for the treatment of cervical cancer to patients in the low- and middle income countries despite that its underuse still remains staggering. (Zietman, 2014). The important role that radiotherapy plays as a cancer treatment modality and the emphasis of its scarcity to the developing countries has become popular for many researchers in this field of study. Hanson *et al* (1990) had long ago described the importance of radiotherapy as a treatment modality to the overall health programme as strongly related and highly influential to the social, economic and educational development of the population that needs the service. They further stressed that many people still had no access to this service in the developing countries despite the rapidly increasing incidence of cancer in those countries. (Hanson *et al*, 1990).

Radiotherapy as a treatment option is given both as external beam as well as using Brachytherapy which is radiation given internally, together both treatments will generally take 5 -7 weeks to complete (Mohanti *et al*, 2011). The NCCN (2017) supported the statement

through a report that stated that for optimal coverage of microscopic nodal disease for cervical cancer, the course of radiation treatment requires a dose of 45Gy in conventional daily treatment doses of 1.8Gy - 2Gy and a boost to the gross disease of another 10 – 15Gy. This in total is delivered over 5 – 7 weeks.

Radiation therapy treatment is often used in the management of patient with cervical cancer either as definitive for those with locally advanced disease or for those who are poor surgical candidates or as adjuvant therapy following radical hysterectomy for those who have one or more pathologic risk factors (NCCN, 2017).

According to the NCCN (2017) the use of radiation therapy is considered the standard of care for treatment of cervical cancer. This guideline was supported through a study conducted by Du (2012) which concluded that the use of radiation therapy in the form of intensity modulated radiation therapy technique improved dose distribution, gave lower toxicities and a significantly higher disease progression free survival. Efstathiou *et al* (2016) in their study for Botswana, which looked at establishing and delivering quality radiation therapy in resource-constrained settings, also provided more evidence on the critical importance of radiation therapy for the treatment of cervical cancer given the good outcome they had observed from the patients who were sent to receive treatment in South Africa.

With all of the above said, it is also important for the purpose of this research to mention that much as this mode of treatment is vitally important for cervical cancer, it involves very complicated sequence of processes prior to its delivery all of which cannot be avoided for treatment to be undertaken. (Datta *et al*, 2015). The challenging part with these processes which especially form part of poor access to such facilities being accessible anywhere, are that each process has its own equipment different from the other to put together a required radiation dose of treatment. (Datta *et al*, 2015).

To produce cancer treatment using radiation therapy, all patients would have to undergo all the processes as shown in figure 2.3 below which are: treatment simulation using a conventional simulator or computed tomography-based simulation machine used to provide digitally reconstructed images of the area to be treated; tumour and normal structure contouring and calculation computers with special software called the treatment planning system and then

finally, the patient goes to the actually treatment delivery machines which are offered in different models depending on the affordability to that specific facility where they are available. (Datta *et al*, 2015).

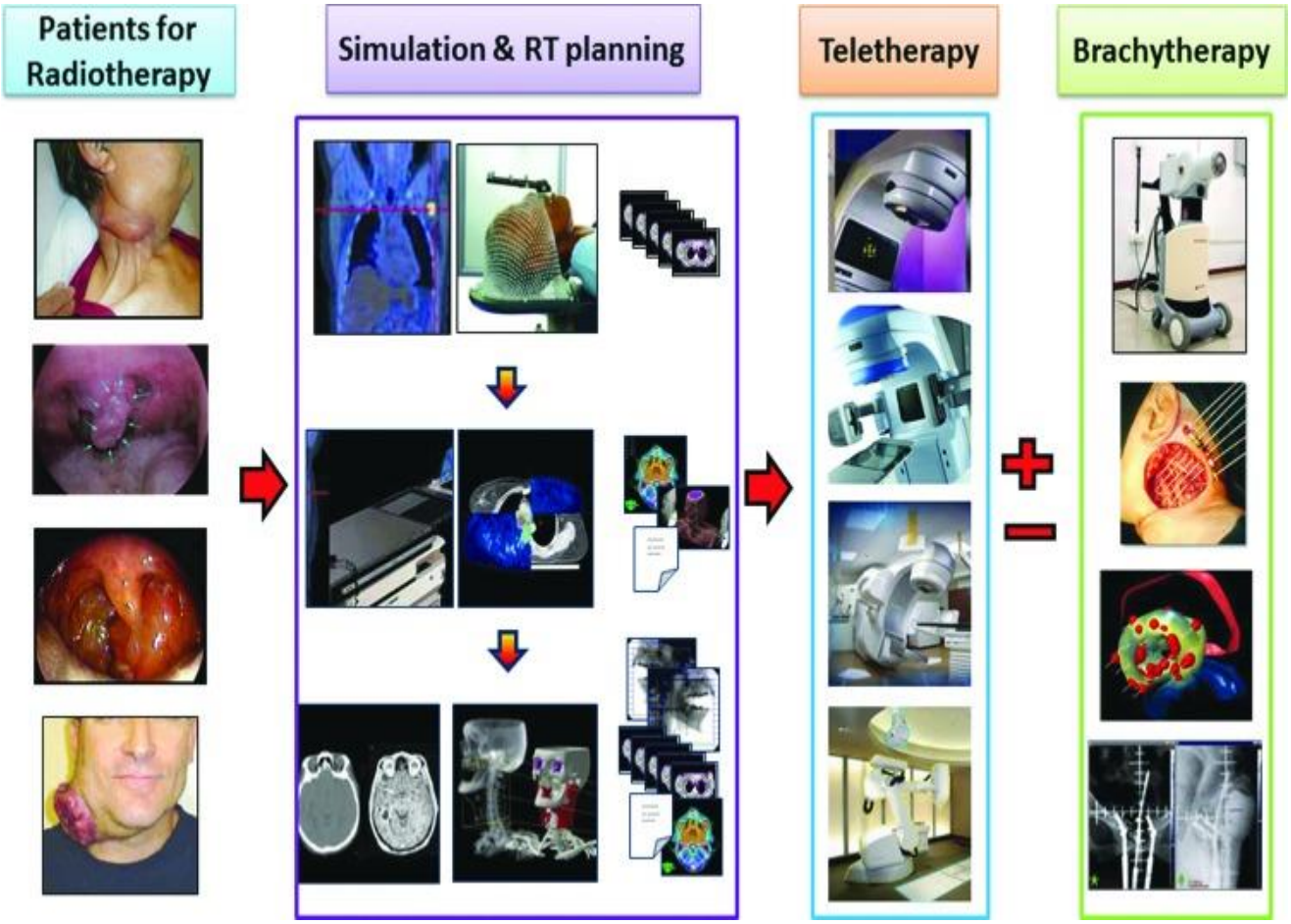


Figure 2.5 A schematic representation of the radiation therapy (RT) treatment process. (Datta *et al*, 2015)

Given the researchers experience through working as a professional in this field, to add to the above mentioned challenge, all these processes do not take happen in one day, especially in the low-and middle income countries where a high number of patients are being managed daily. Each process is allocated its date to a certain number of patients daily and normally 3 to 4 weeks apart to allow ample time to cover all patients before their actual treatment is given.

During radiation therapy treatment, the patients will either be traveling daily from home if they live closer to the treatment facility or they will be admitted in hospital if they live far away from the hospital. Either way, the patients still incur social-economic burdens as most often the cancer patient and family members are faced with the double dilemma of dealing with the diagnosis as well as meeting the financial burden that comes with the treatment (Mohanti *et al*, 2011).

2.5 The role of Chemotherapy as a treatment for cervical cancer

There have been a number of studies done to find improved ways of treating locally advanced cervical cancer, and the International Federation of Gynecology and Obsteretrics (FIGO) provided guidelines used to review the results of clinical trials done in the United States of America that investigated the role of chemotherapy when given concurrently with radiotherapy. (Todo and Watari, 2016). Rose (2006) has also concluded that a comparison of cisplatin based chemoradiation to radiation alone, showed a significant reduction in the risk of recurrence and death with cisplatin –based chemoradiation. Wang (2007) had also conducted to a group similar group of patients in Taiwan, and in his study he concluded that for locally advanced treatment of cervical cancer which is (stage IIB – IVA), when a combination of cisplatin and 5-flourouracil was used as radiosensitizers during the radiotherapy and brachytherapy treatment, there was improved local control rate, progressive-free survival and overall survival. This then proved that when chemotherapy is given concurrently with radiotherapy and brachytherapy for cervical cancer treatment commonly now known as concurrent chemoradiation therapy, there was better outcome in the disease management, hence the going trend since the results of that study has been a replacement of radiotherapy alone with concurrent chemoradiation therapy. (Todo and Watari, 2016).

The literature background provided above put a lot of emphasis on the incidence of cancer as well as the internationally recognised and prescribed standard of care and its treatment particularly for cervical cancer, the content also gave a clear picture on the urgent need to improve our health care system to provide for improved access to such available treatment options. It however still remains an unfortunate reality that the issue of health disparity has not been resolved to this point, hence continued research and more publications are a vital requirement to overcome this problem.

An aggressive health services research which largely concerns itself with the factors influencing the vital need for improved health services, better access to these services, quality and economic effectiveness, is vital to assist policy makers of the health system in making informed decisions when allocating health resources. (Hanna and Kangolle, 2010)

The content that follows aims therefore to give a picture of the need for more research in this area drawing from the little published literature available related to the researched topic. The following part of the literature review gives an overview of the of the different areas of concern which led to the research through a discussion and findings of various publications of similar research done previously by other researchers. The aim of the researcher with this section sought to integrate the findings of literature available which relates to the researchers topic, in order to strengthen the motivation for this research.

The following section of this chapter therefore covered the following topics:

2.6 Challenges of Access to Radiation Therapy treatment

Access to radiation therapy particularly for rural communities continues to be a global challenge and a research gap that has not been fully exhausted especially in South Africa. The majority of studies available relating to this research reflects mostly information published from international sources highlighting the challenges of access to better cancer care for their indigenous people. A study by international experts from leading global cancer organizations revealed that the odds of surviving cancer for individuals or even receiving any type of cancer treatment are strongly dependant on where that individual lives (Anderson, 2017). The Tripartite National Strategic Plan for Radiation Oncology (2012) also attested to the previous observation and stated in their report that one of the barriers to access of radiation therapy to patients is the proximity of patients to radiation treatment facilities. The report further highlighted that those remote and rural patients who often need to travel to the city daily to receive radiation treatment for weeks find the financial impact to be prohibitive (Tripartite National Strategic Plan for Radiation Oncology, 2012). The report also concluded that it was due to the lack of better access to radiation therapy treatment that people with cancer in the rural and regional areas were 35% more likely to die within 5 years of diagnosis compared to

those that lived in the city closer to those services (Tripartite National Strategic Plan for Radiation Oncology, 2012).

A study in New South Wales on improving radiotherapy in Australia reported the importance of radiation therapy as the most common cancer treatment such that internationally accepted benchmarks indicated that at least 50% of cancer patients will require radiotherapy during the cause of illness (Khor *et al*, 2013). The study further reported an estimated 36% of cancer patients in NSW that will receive radiation therapy treatment and that being largely due to lack of facilities in the rural NSW regions. The importance of receiving radiation therapy is also reported in this study to provide the maximum possible cure rates and the best quality of life (Khor *et al*, 2013).

Optimal location of radiation therapy facilities has always been a challenge and therefore historically these facilities were located in larger academic hospitals which were most often in the cities and to date the status quo remains especially in South Africa. The main problem encountered with this system is that the patients have to travel long distances to get their cancer treatment or alternatively stay away from their families for a prolonged period during their cancer treatment (Satibanez *et al*, 2014). The ultimate outcome to the challenges of difficult access to radiation therapy was therefore reported to have caused patient dissatisfaction due to the increased financial burden and reduced radiation therapy utilization (Satibanes *et al*, 2014).

A report by the American Society of Clinical Oncology (2014) reflected on the access of quality cancer care still being uneven despite the estimated 45% increase in new cancer cases by 2030 in America. The report further highlighted some of the challenges being not only urban geographical concentration and rural gap, but also the high shortage of the radiation oncology workforce especially the greater need for workforce diversity with the currently increasing racial and ethnic disparities in cancer care (American Society of Clinical Oncology, 2014).

In support of the above report, Econex (2010) also stressed in its findings that the demand side issues in South Africa are not the only factors affecting the market for cancer care, but in reality South Africa faces a severe supply constraints in the provision of cancer treatment. In

KwaZulu-Natal, the estimated population in the year 2010 was 10 449 300 with only 21 active radiation oncology doctors. The estimated ideal number of linear accelerators as radiation therapy machines was 32 to cover both private and public cancer facilities; however, only 11 were reported available and all located in the urban tertiary hospitals (Econex, 2010).

To help combat cervical cancer in KwaZulu-Natal, the United States Agency for International Development (USAID) donated more than 5 million worth of medical and surgical equipment which sought to improve the screening, prevention and treating up to 1 million women for cervical cancer (Embassy of the United State, 2010). The initiative was inspiring and judging from the estimated increasing demand figures by Bruni *et al* (2017), in sub Saharan Africa it was clear that the level of awareness had indeed increased with the help of effective screening and services that facilitated early detection (International Agency for Research on Cancer, 2013).

Hanna and Kangolle (2010) in their study also put a strong emphasis which supports that indeed there continue to be limitations in cancer care resources despite the frequently reported annual increasing incidence of cancer in the developing countries. Their finding also supported what was found by Barton *et al* (2006) which stated that there was a general inadequacy of radiation machine supply in the developing countries to meet the high demand. Furthermore, Hanna and Kangolle (2010) even gave an example of Tanzania as one of the developing countries where breast and cervical cancers were the most common killers of women yet the country with its population of 42.5million people, only had two radiotherapy machines when the need for such a population requires about 45 of those machines.

Datta *et al* (2015) in continuing to back up findings of studies that reflect challenges in access to cancer care, also pointed out in their study that over and above a global rise in new cancer cases of 57%, there is also another expected 40% increase in cancer deaths and that being mainly due to the lack of treatment facilities, especially radiotherapy. They also continued to attest to an earlier finding that, atleast 50% of patients diagnosed with cancer will require radiotherapy as their treatment of modality. (Datta *et al*, 2015)

Although ample data describe the benefits of radiotherapy for cancer control, the cost of equipment and development of skills seem an overwhelming challenge to provide these

services as the steep cost of radiotherapy equipment largely deters establishment of facilities that offer this vital cancer treatment. (Datta *et al*, 2015). In a study that looked at the need for radiotherapy in low and middle income countries, Zubizarreta *et al* (2014) reported that the challenge was so serious reflecting the range of the need for radiotherapy that was covered in Latin America and Africa between 0% and 4%.

Datta *et al*, (2014) in another study which looked at the Radiation Therapy infrastructure and human resources in low- and middle-income countries, mentioned that despite the major challenge in accessing radiotherapy to cancer patients being affordability, other challenges which play a significant role in the holistic management of cancer were intellectual capacity which include radiation oncologists, medical physicists and radiation therapy technologists. To overcome these challenges Datta *et al* (2014) reported an estimated need for the respective intellectual capacity to be 12149, 9915 and 29140 by 2020.

2.7 Distance as a factor to poor access of cancer care

The most common challenge which most developing countries face pertaining better access of cancer care is the issue of distance and the geographical locations of facilities that offer cancer treatment services especially the ones that also have radiation treatment machines. This observation was also made by Efstathiou *et al* (2016), where they mentioned that geography on special accessibility to cancer treatments remain a significant barrier to access because they continued to say, facilities with radiation treatment machines in most developing countries were often located at fewer sites and normally in the city.

Although radiation therapy could be used as a sole modality of treatment to cure cervical cancer or in combination to surgery or chemotherapy, in other cases where the doctors perceive a curative chance especially if the stage is early and to avoid any chance of spread, all three treatment modalities may be used, and if that is the case, the travelling to access all these treatments will increase and in cases of long distance traveling, this means high traveling costs to patients or if possible an even longer stay in the hospital away from family. (Bhatt *et al*, 2017)

Given all these challenges, a lot is likely to happen to different categories of these patients. Those who were working were at risk of losing their jobs, those with small children back

home had to pay nannies so that their children had someone to look after them. Other issues which were also social problems were of married women who also feared that they were likely to have challenges in their marriages while they were away from their homes receiving radiation treatment due to its length. To support the above statement, Pisu *et al* (2017) in their study further alluded that in addition to the travel costs which the Canadian rural cancer patients were reporting, they also incurred child care costs which were paid in different forms, either through hiring people care for their children or having to buy assisting family members gifts as a token of appreciation for staying home with their children while they were receiving cancer treatment.

2.8 The socio-economic impact of NCDs due to poor access to better health care

In their report, the WHO stated and showed in the form of flow diagrams the impact which the NCD epidemic exerted onto the socioeconomic wellbeing globally as well as how rapidly that impact was also rising in the low-income countries among the poor. (WHO, 2011). The flow diagram below (Figure 2.4), provides a description of how poverty contributes to NCDs and how NCDs also contribute to poverty.

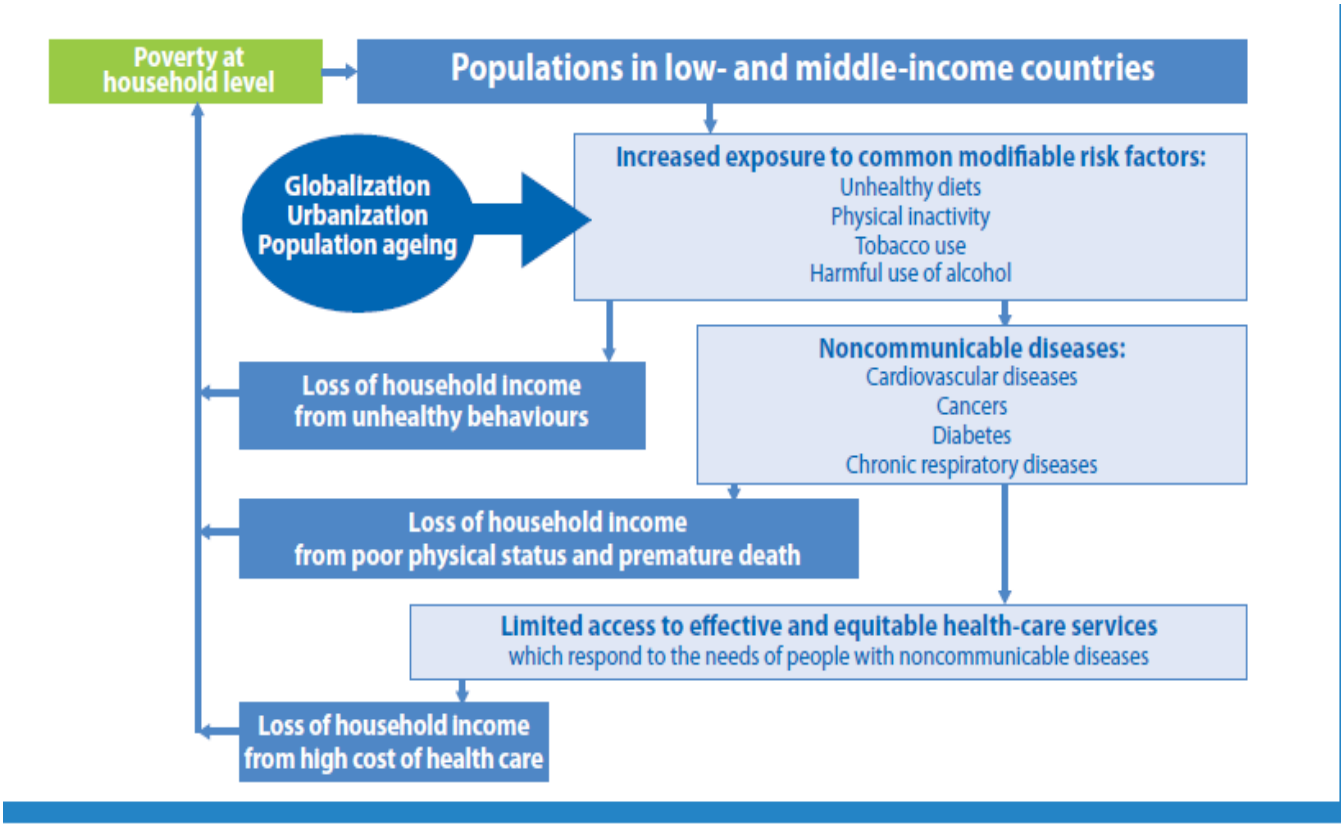


Figure 2.6 The flow diagram shows the contribution of poverty to NCDs as well as the contribution of NCDs to poverty. (WHO, 2011).

The Centre for Disease Control and Prevention (CDC) provided factors that contribute to health disparities in cancer, and the one factor which was relevant to use as a better explanation to figure 2.4 above was the socioeconomic status (SES) and how it affected the health of people. (Bradshaw *et al*, 2017). The CDC categorised the SES into two groups, whereby the first group was a high SES group, in which people belonging to this group were said to have some form of tertiary education, earn an above average income and have a full time job thus were able to get better health care, and the second group was called a low SES group with people who have no education or may have not finished school, do not earn enough money and are either unemployed or have a low paying job and thus could not afford to easily access health care. (Coley and Nichols, 2016). The people with a low SES were said to be at a greater risk of acquiring NCDs because most would not worry much about any preventative measures available like cancer screening because they do not have money to seek medical intervention and yet they are likely to have behaviour like engaging in risky sexual

activity which increase their chances of acquiring NCDs which they will not be able to adequately treat due to being low SES. (Wyatt *et al*, 2017).

2.9 The out-of-pocket costs challenge

Financial barrier is an area which has shown a high impact in the lives of people diagnosed with cancer to a point whereby literature has drastically increased in this area. The issues mostly reported are similar and are related since they mostly address challenges faced by cancer patients in who are from the rural areas. Since this study also looks at the rural patients with cancer of the cervix, the researcher saw it necessary to highlight the various issues that looks as finance as a barrier to patients accessing cancer treatment, by sharing some of the findings in the literature available.

In the study where they looked at the perceptions of health care provider's strategies to limit out of pockets costs for cancer care, Mathews *et al* (2009), reported that rural patients who are scheduled to undergo radiation as their cancer treatment which was most often a common thing incurred considerably high costs due to long distance travel or cost pertaining to them having to use lodger facilities close to the hospital. Pisu *et al* (2017) in a similar study which looked at the out of pocket costs and burden among rural breast cancer survivors, reported findings that supported the one before, stating that accessing cancer care for rural patients in an uphill financial battle, due to the need travel long distances just to visit a doctor as well as receive care, a situation which they said also affects the choice of treatment which cancer patients end up making to avoid high cost. They further mentioned that given the long distance travel to treatment centres, most rural patients chose to obtain lees care so that they incurred lower cost. (Pisu *et al*, 2017).

A study on the financial toxicity of cancer treatment reported a behavioural change by patients when they were confronted with high out of pocket cost for their cancer treatment whereby most were reported to either sell their possessions or even work extra hours if they could just to be able to pay to access their cancer treatment facilities. Some patients were also reported in the same study to be replacing prescribed medication by using over the counter medication in order to defray costs. (Zafar *et al*, 2013).

Another significantly important area of concern as an added challenge to accessing cancer care for patients from rural areas was the issue of employment. Different studies do agree that most people from the rural areas are either self-employed or have part time employment. Mathew et al, (2009) reported that such patients often did not even have sick leave benefits which therefore ended up with the patients losing their income due to being absent from work during their cancer treatment or recuperation from illness. Pisu *et al*, (2017) also supported that statement by sharing reports from their study where rural cancer survivors had reported to have lost their employment due to deteriorating physical and mental health due to cancer.

A study by Zajacova *et al* (2016), which looked at the employed and income losses among cancer survivors, quantified this issue and showed that the effect of cancer and its treatment saw the probability of cancer patient being employed drop by 10% and that the hours those patients were capable of working dropped by 200 hours. They further reported that annual earnings for the cancer patients had dropped by 40% decreasing the total family income for these patients by 20%.

A similar study which looked at the out of pocket costs for accessing adjuvant radiotherapy among Canadian women with breast cancer, quantified the total cost to access radiotherapy treatment for these patients reported to be 445 Canadian dollars which is about R4300 if the patients are housed in hospital, 122 Canadian dollars weekly for women who had to travel daily to access their treatment which is approximately R1200 weekly. (Lauzier *et al*, 2011). Although the results of their study reported a 80% drop in costs when patients received their treatment while staying in hospital, Lauzier et al, (2011), however, the study also concluded that it was important that financial assistance be provided for both patients who had to travel daily as well as those who had to lodge closer to the cancer care centre to receive their treatment.

2.10 Resources required to improve access to Radiotherapy

Radiation therapy continues to be regarded as the most important component for treatment of cancer especially in the low income countries where the majority of people due to the inequities in the health systems in those countries always present at the late stages of the disease. It has been noted from the above narration that there is a strong relationship between

the socioeconomic state of people living with NCDs like cancer to poverty and it goes without saying that a paradigm shift is required if improvement was to be achieved. Datta *et al* (2014) reported on the affordable user fee for radiation therapy and social security, by suggesting that in the low income countries, governments could frame the budgets for the health care such that the social grants for the patients from the low socioeconomic strata could cover the treatment costs and rehabilitation as well as compensate for any salary losses.

The Directory of Radiotherapy Centres (DIRAC), which according to Abdel-Wahab *et al* (2013) was described as a computerised international registry of radiotherapy centres, a database which is controlled by the International Atomic Energy Agency (IAEA) and contained information on which countries have equipment that treat cancer with radiation therapy. Such a database plays a vital role because it was reported that it provided statistics which showed the availability of radiation treatment machines globally. Abdel-Wahab *et al* (2013) reported that the database in 2010 had reported 13250 registered radiotherapy machines worldwide to a population of 6.68 billion people. The statistics continued to report that an average number of radiation therapy machines per million people were 1.99 for the whole world, 0.71 was for the lower-middle income countries and only 0.21 for the low-income countries. (Abdel-Wahab *et al*, 2013).

These statistics therefore provided a clear indication of how disadvantaged the African countries were with respect to the availability of radiation therapy equipment hence the need or a strong joint collaborative effort to reduce the gap and come up with drastic measures to improve radiation treatment resources for better access. (Datta *et al*, 2014).

The flow diagram below, therefore provide a picture of how the collaboration could operate which comprised of a multicompartmental but interdependent and integrated approach for countries, manufactures and international agencies was put together. (Datta *et al*, 2014).

The Independent Clinical Oncology Network (ICON) (2012) also presented a similar concept which sought to resolve what the National Health Insurance regarded as the fragmented healthcare system, by introducing an approach aimed at integrating both the private and public sector for optimal cancer management given the complexity and cost of cancer management as shown in figures 2.8 and 2.9 below.

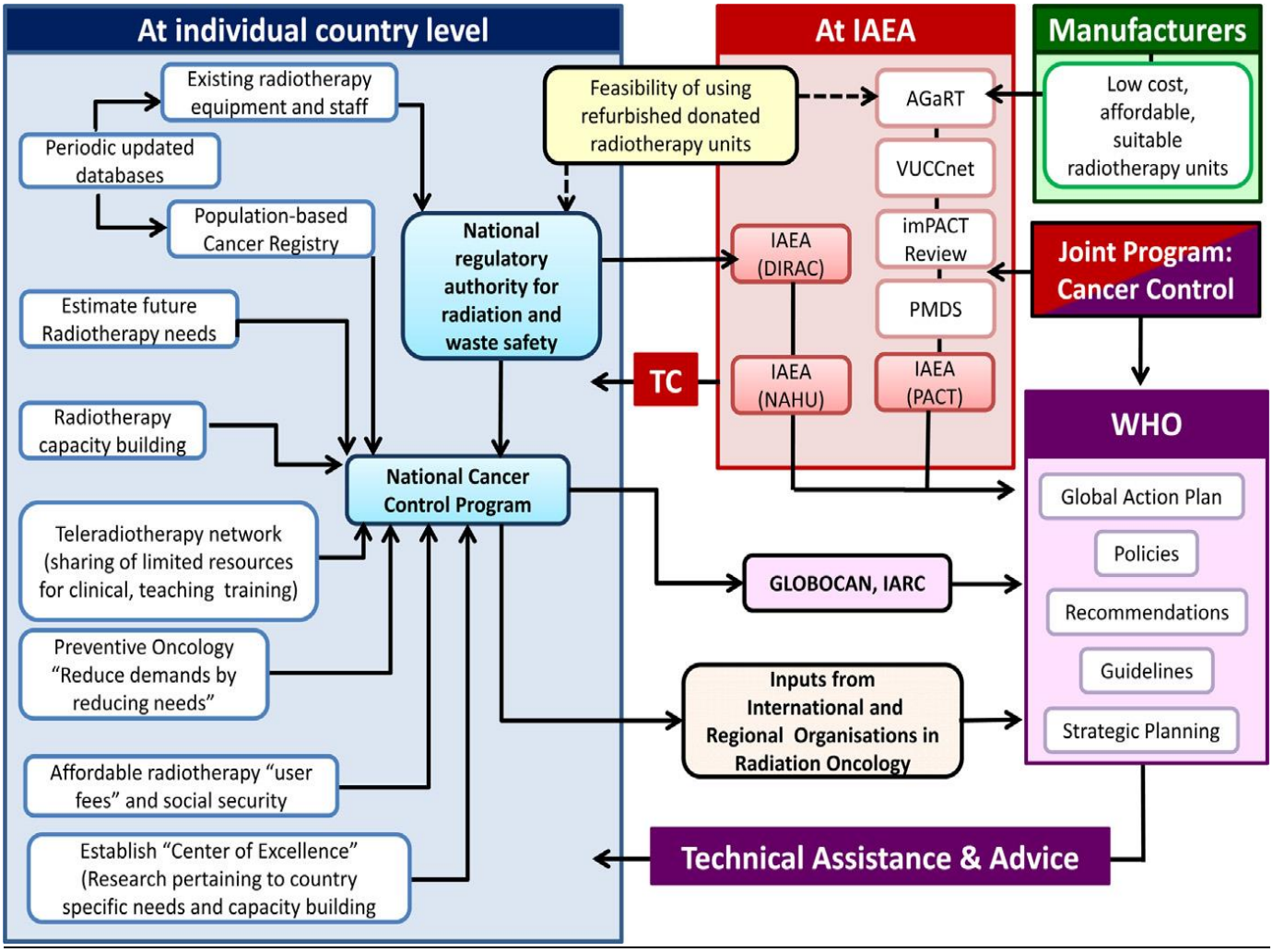


Figure 2.7 Flow chart shows the role and interplay of various national and international agencies in a joint collaborative effort to reduce the gap in radiation therapy services in low- and middle-income countries. (Datta *et al*, 2014).

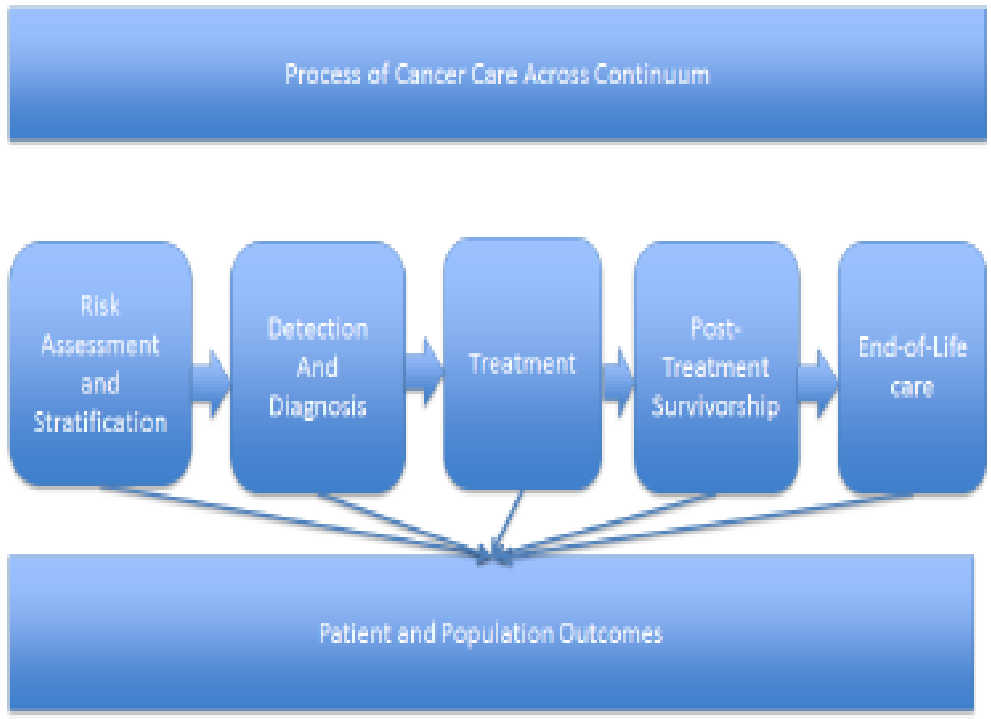


Figure 2.8 The flow chart showing the process of cancer care across continuum**.** (ICON, 2012).

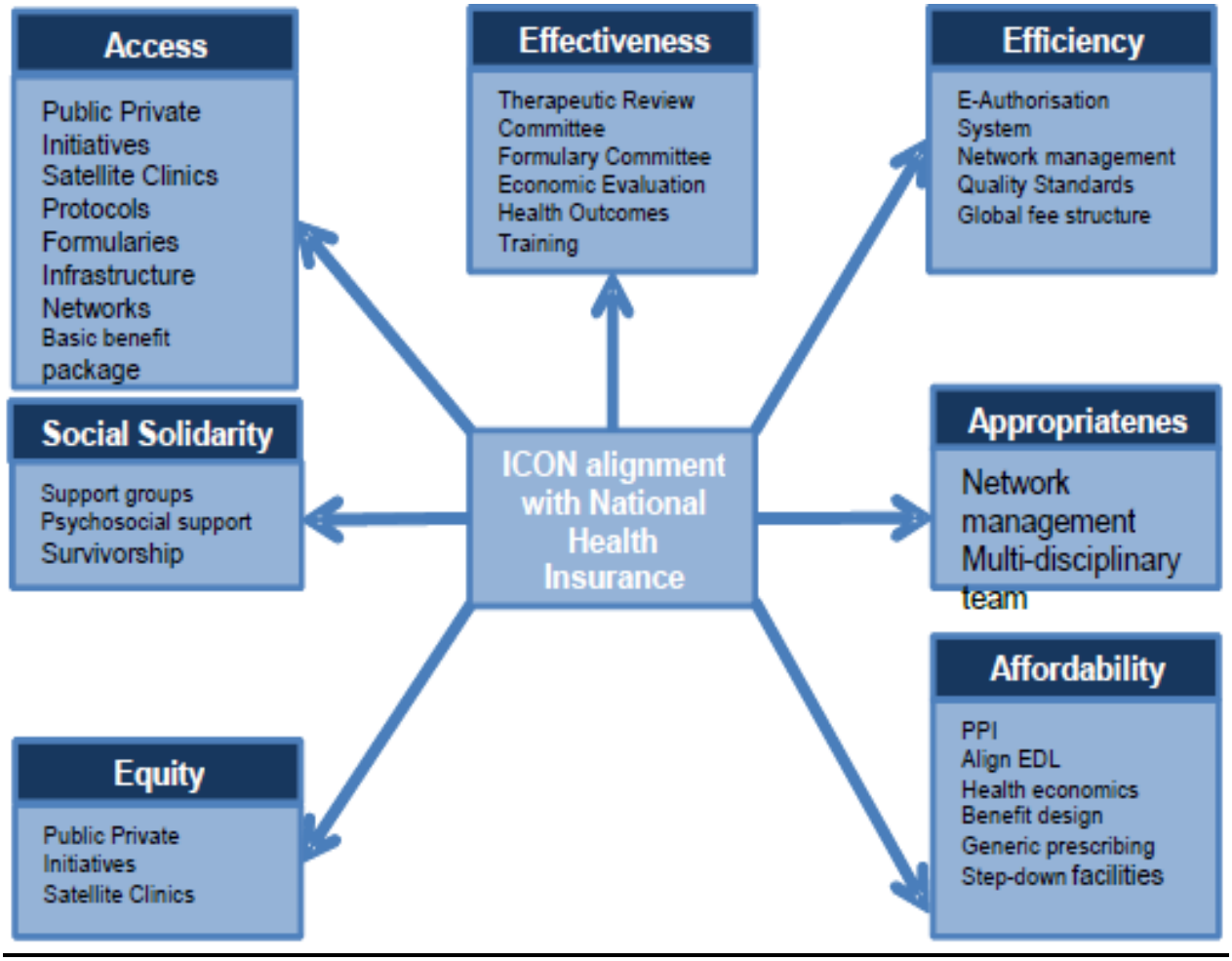


Figure 2.9 The schematic representation of how ICON sought to integrate the public sector and the private sector to improve access to cancer care in South Africa. (ICON, 2012).

The above ideas for collaborative efforts to improve cancer care continued to gain more support, with many articles being published which provided more information attesting to the importance of collaborative work between the public sector and the private sector in order to improve cancer treatment. Nosworthy (2012) in an article titled challenging multinational companies in healthcare and related fields to put their money where their profits are emphasized the need for a coordinated effort to share the burden of cancer management. And through the formation of the Innovative Cancer Care Foundation, Nosworthy (2012) and a multidisciplinary team of professionals started this non-profit organization with the aim to improve Oncology facilities in the public institutions through proving their time, intellectual

capacity and other needed benefits to lower the hardship experienced by cancer patients when accessing their treatment.

2.11 Summary

Concerns over the issue of rural cervical cancer patients are not novel; they go back a long way and have been investigated a lot. What is novel is the degree of attention focused on the issues pertaining to the poor access due to out-pocket cost and societal costs burdens to these patients. The issues that interrogate all the related costs to patients who have to receive radiation treatment as well as their societal burdens should be recognised so that discussions in the boardrooms of policy makers can focus on the optimal placements of radiation therapy machines to ensure access to appropriate care to this population and avoid unnecessary death from a curable disease. Although progress has been made in the establishment of radiation oncology services in most African countries, however, optimal placement of these services remain a challenge especially with the increase in cancer awareness in the rural settings. Since radiation therapy treatment remains a vital modality in the treatment of cervical cancer for the rural population due to the disease presenting at a late stage, comprehending the issue that render the improved access to radiation therapy services a success and interrogating more the issues of a collaborative approach to cancer management by all affected stakeholders can assist to pave a way for future investment in course to fighting cancer as well as improving the health care system in our setting. (Datta *et al*, 2015) (Peppercorn, 2017) (Abdel-Wahab *et al*, 2013).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In the content of this document the researcher has discussed the method used to conduct the study. The topics covered in this chapter include the study design, the target population, and the selection of the sample size, the data collection tool and the duration of the study.

The researcher requested permission to conduct the study from the University of KwaZulu-Natal Ethics Committee and from the management of Greys hospital, which is one of the Tertiary institutions under the KwaZulu-Natal Department of Health where the cervical cancer patients from the rural Western region of KwaZulu-Natal receive Radiation treatment.

The participants were selected using the judgement sampling method which is one of the types of purposive sampling. This method involves the choice of subjects who are conveniently available to provide the desired information for the study and according to its definition it was perceived as the viable sampling method for this research. For the study, the researcher used specifically cervical cancer patients who have received radiation treatment at the Greys Hospital Oncology unit (Sekaram and Bougie, 2013).

The decision in terms of choosing cervical cancer patients as a population for sampling was informed by the statistical information of the incidence of this type of cancer amongst rural patients referred to Greys Oncology for treatment and the high volume of these patients currently being treated at Greys Hospital.

The researcher conducted the research by the use of a questionnaire as a tool. The choice of using a questionnaire was informed by the fact that majority of the cervical cancer patients treated at Greys Oncology from rural Western KwaZulu-Natal are elderly and illiterate, therefore, the researcher with the help of a bilingual staff of member assisted the participants by reading out the questions and a selection of optional answers to choose from. The research was conducted in isiZulu.

The researcher used an office in the institution where she called each participant and face to face read out the questions to the participants and the Zulu speaking assistant then explained to the patient what the question is asking as well as assisted the participants in selecting the answers which was relevant to the participant by ticking in the box allocated next to the answer.

This method was beneficial to the study because it allowed the researcher to explain complex questions to the interviewee where necessary and also allowed the researcher to control the context and the environment in which the interview took place. The setting used to collect the data was conducive to obtain accurate responses from interviewees because they were familiar to it therefore they were comfortable. The data was collected over a period of twelve months (June 2015 to June 2016).

3.2 Research Objectives

The study will be guided by the following objectives:

- To investigate the socio-economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal.
- To investigate the out of pocket cost to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit

3.3 The research design

A descriptive quantitative research study design was used because it allowed the researcher to provide a broad overview of the representative sample since the participants surveyed were a broad large group and its descriptive nature made it feasible to use because the data was collected mainly to acquire public opinion (Mouton, 2015). This study aimed to describe how the cervical cancer patients that were selected as a sample after permission was granted from the Greys Hospital management would benefit socio-economically should they be granted better access to Radiotherapy for their cancer treatment.

3.4 Target population

The target population for the study was patients diagnosed with cervical cancer whose prescribed primary treatment option was radiation therapy. The patients selected were the ones that reside in the rural Western KwaZulu-Natal. The target population was only cervical cancer patients treated at Greys Hospital Oncology unit, who come from the following districts: uThukela District Municipality (DC23), UMzinyathi District Municipality (DC24) and Amajuba District Municipality (DC25).

3.5 Selection of sample size

The sample size for the research was worked out using the confidence interval approach. The confidence interval approach is defined as a more enlightened approach for sample size estimation and it is an approach that allows the researcher to put acceptable bounds on the estimate of the population from the sample size computed (Sekaram and Bougie, 2013).

The cervical cancer patients at Greys Oncology are always booked for first consultation every Monday. A maximum 10 patients are booked weekly and at least 6 do show up for the appointment.

According to the National Comprehensive Cancer Network guidelines for cervical cancer version 2 (2014), the primary treatment for cervical cancer of clinical stage IA to stage IVA with lymph vascular space involvement should be treated with radiation therapy.

Cervical cancer was a disease type of choice for this study because a majority of patients referred to Greys Oncology are diagnosed with cervical cancer and most of which present between stages II to stage IV. Radiotherapy therefore becomes the first line treatment of choice for these patients.

3.6 The research instrument and data collection

Data was collected using a self- designed structured questionnaire. The questionnaire was formulated in English and translated by the data assistant who is bilingual into isiZulu being the language spoken by the target sample. The questionnaire used closed-ended questions. The questionnaire was legibly typed and it was divided into the following sections:

Section 1: Socio-demographics. This section looked at the age, marital status, and number of children, educational status, employment status and earnings of the participants.

Section 2: Costs incurred due to geographic location. This section was used to acquired information regarding the out of pocket cost incurred for traveling to treatment site as well as the well-being of the family members who were left back home during the 5 – 7 weeks course of radiation treatment.

Section 3: Preferences and options for better access. This section acquired information which looked at the participant's response to whether they preferred being treated closer to home or not if that option was made available to them.

The researcher read out the questions to the interviewee in their preferred language and the interviewee was then assisted by the data assistant to select the answer they wanted from the option of answers listed in the questionnaire.

3.7 The pilot study

The pilot study is defined as the mini-version of a full-scale study done before the complete study (Ndlovu, 2011). Prior to the formal data collection exercise, a pre-testing of this method was piloted by the researcher to 6 participants to check if the questionnaire was understandable to the participants. The pilot study was done on a small size sample with cervical cancer patients comparable to the actual sample of the bigger research. This was conducted at the same venue as the bigger research during the early stages of the questionnaire formulation to identify any possible mistakes or items in questionnaire that might have needed to be corrected ahead of the bigger study.

3.8 Ethical considerations

Since the research involves human subjects, the researcher's responsibility was to follow good clinical practice guidelines and human right principles to make sure participants are protected (Ndlovu, 2011). The researcher therefore needed to maintain participant's privacy, needed obtain informed consent from the participants, needed to allow voluntary participation as well as explain in detail to

the participants what the study was for, how the information was going to be used and whether there was any potential risk to the participants (Ndlovu, 2011). Ethical clearance approval was requested by the researcher from the University of KwaZulu-Natal Ethics Committee as well as from the KwaZulu-Natal Department of Health prior to conducting the study.

3.9 Confidentiality and anonymity

For the purpose of the participant's anonymity, the researcher did not use the names of the participants on the questionnaire. The participants were however asked to fill in informed consent forms which was only there where their names were written and a signature or thumb print was done by the participants as proof that they were willing to participate and not put under any obligation by the researcher or the data assistant. The consent forms were then kept and locked in a separate placed from the questionnaires. Both documents were kept in a safe locked place by the researcher for confidentiality purpose for the duration of the study.

3.10 The consent

The informed consent was obtained from the participants in either written form for those that can write or by putting a thumb print for participants who could not write.

3.11 Limitations of the study

Since access to radiation therapy for rural KwaZulu-Natal (KZN) communities continues to be a challenge for the whole province, for a better generalization of the research, it would have carried more weight for the study to select participants from all the KZN districts. For convenience therefore, the researcher only selected participants from only three districts which have been indicated in a map (see attached annexure A).

Patients from the rural KZN present with many different cancer types which are also treated with radiation therapy which the researcher could have included in the study to allow for the generalization, however, the researcher only used cervical cancer as a specific type for the study. This gives leaves a gap which may require further research using other cancer types for a similar research topic.

The researcher's choice of data collection approach could be viewed as bias because of the way in the questions were asked, since some questions were interpreted to the participants for more clarity in a way that seemed to lead the participants in selecting answers due to the literacy barrier.

3.12 Summary

The content of this chapter has provided a comprehensive description of the chosen research method used by the researcher which included the research objectives which were used to guide the study, the full outline of the research design, the target population and the method for the selection of the sample size.

The researcher has also given a full description of the research instrument used and the data collection method which the research had first piloted before resuming the full research. Ethical consideration being the vital part of conducting any research has been included with an indication of how the confidentiality, anonymity and informed consent were administered by the researcher.

Finally, the researcher also indicated limitations to the study, which highlighted the need for further research in this area.

CHAPTER FOUR

PRESENTATION OF RESULTS

4.1 Introduction

The aim of this analysis is to estimate the socio-economic status (SES) impact of better access to cancer treatment for cervical cancer patients. SES has been correlated with an individual's skill development, academic achievement, work and life outcomes, and overall psychological and behavioural well-being. Therefore, this statistical analysis will access education attainment, wealth, and income and employment to derive a uni-dimensional measure of SES.

4.2 Data analysis

Data analysis was performed using IBM SPSS Statistics version 23. First, we described components of the study sample using frequencies and measures of central tendency. Then a descriptive analysis of each component was generated by means of the average and standard deviation, median, mode, and 25^{th} to 75^{th} percentile.

4.3 Socio-demographic

Table 4.3.1 Age of participants

		Frequency	Percent
Valid	30-40years	16	21.6
	41-50years	17	23.0
	51-60years	15	20.3
	Above 60 years	26	35.1
	Total	74	100.0

A total of 74 participants completed the questionnaire. With regards to their socio-demographic information, it was found that more than half of the participants (56%) were older than 50 years.

Table 4.3.2 Marital status of participants

		Frequency	Percent
Valid	Married	29	39.2
	Single	32	43.2
	Divorced	5	6.8
	Widowed	8	10.8
	Total	74	100.0

It was found that 43% of the participants were single and another 39% were married.

Table 4.3.3 Dependants

		Frequency	Percent
Valid	none		3
	1		11
	2		9
	3		19
	More than 3		32
	Total		74

Almost all the participants were Black (n=73) and only one was coloured. When asked number of dependents they had, 43% mentioned of having more than three (03) dependents.

Table 4.3.4 Educational status of participants

		Frequency	Percent
Valid	None	16	21.6
	Primary Schooling (1-7)	22	29.7
	Secondary Schooling (8-11)	30	40.5
	Completed Matric	6	8.1
	Total	74	100.0

With regards to participants' educational status, 22% had no education and only 8% completed matric.

Table 4.3.5 Employment status of the participants

		Frequency	Percent
Valid	Employed Full Time	10	13.5
	Employed Part Time	6	8.1
	Unemployed	15	20.3
	Pensioner	43	58.1
	Total	74	100.0

More than half of them (58%) were found to be pensioners and 14% had full time employment.

Table 4.3.6 Income distribution of the participants

		Frequency	Percent
Valid	Less or equal R500	3	4.1
	R501-R1000	6	8.1
	R1001-R2000	46	62.2
	R2001-R3000	5	6.8
	More than 3000	3	4.1
	Total	63	85.1
Missing	System	11	14.9
Total		74	100.0

4.4 Cost incurred to and from treatment site

Table 4.4.1 Amount of money used for transport

		Frequency	Percent
Valid	R0-50/day	21	28.4
	R51-R60/day	12	16.2
	R61-R70/day	4	5.4
	Above R70/pay	36	48.6
	Total	73	98.6
Missing	System	1	1.4
Total		74	100.0

When asked how much they spend on their transport, half of them (49%) indicated of >R70/day.

Table 4.4.2 Have nanny or not

		Frequency	Percent
Valid	Yes	12	16.2
	No	53	71.6
	Total	65	87.8
Missing	System	9	12.2
Total		74	100.0

82% reported that they do not have Nanny at home.

Table 4.4.3 Receive family assistance

		Frequency	Percent
Valid	Yes	28	37.8
	No	46	62.2
	Total	74	100.0

About two-thirds reported that they do not receive any family assistance.

Table 4.4.4 Receive help with grocery

		Frequency	Percent
Valid	They buy food	9	12.2
	They do not buy food	1	1.4
	I still have to provide food for family	64	86.5
	Total	74	100.0

The majority (87%) also highlighted that they to provide food for the family.

Table 4.4.5 Amount of money spent on grocery per month

		Frequency	Percent
Valid	R200-R500	11	14.9
	R501-R700	12	16.2
	R701-R1000	28	37.8
	More than R1000 per month	23	31.1
	Total	74	100.0

More than two thirds (69%) indicated that they spend >R700 per month on grocery for the family.

4.5 Results Analysis

Table 4.5.1 Association between having nanny and transport fare

			Transport Fare		Pearson Chi-Square	p-value
			<=60 rand per day	>60 rand per day		
Has Nanny	Yes	Count	8	4	2.124	0.145
		% within Transport Fare	25.8%	11.8%		
	No	Count	23	30		
		% within Transport Fare	74.2%	88.2%		

Results had shown that 88% of the participants who spend >R60 on transport did not have any nanny at home whereas 74% had nanny but this difference was not significant (p=0.145).

Table 4.5.2 Association between Family Assistance and Transport Fare

			Transport Fare		Pearson Chi-Square	p-value
			<=60 rand per day	>60 rand per day		
Family Assistance	Yes	Count	13	15	0.061	0.804
		% within Transport Fare	39.4%	36.6%		
	No	Count	20	26		
		% within Transport Fare	60.6%	63.4%		

It was found that those who spend more money on transport few of them helped with their family (37% vs 39%). This difference was not statistically significant (p=0.804).

Table 4.5.3 Association between help with Groceries and Transport Fare

			Transport Fare		Pearson Chi-Square	p-value
			<=60 rand per day	>60 rand per day		
Help With Groceries	They buy food	Count	4	5	1.261	0.532
		% within Transport Fare	12.1%	12.2%		
	They do not buy food	Count	1	0		
		% within Transport Fare	3.0%	0.0%		
	I still have to provide food for family	Count	28	36		
		% within Transport Fare	84.8%	87.8%		

Results found no association between transport fare and helping with grocery (p=0.532). For example, those who spend >R60 88% mentioned that they provide food for the family compared to 85% who spend R60 or less in the transport.

Table 4.5.4 Association between Grocery Costs and Transport Fare

			Transport Fare		Pearson Chi-Square	p-value
			<=60 rand per day	>60 rand per day		
Grocery Costs	R200-R500	Count	7	4	5.758	0.124
		% within Transport Fare	21.2%	9.8%		
	R501-R700	Count	5	7		
		% within Transport Fare	15.2%	17.1%		
	R701-R1000	Count	15	13		
		% within Transport Fare	45.5%	31.7%		
	More than R1000 per month	Count	6	17		
		% within Transport Fare	18.2%	41.5%		

The present study found that spend on grocery >R1000, 42% spend >R60 on transport. It could also be seen that those spend more on grocery also spend more on transport.

Table 4.5.5 Association between income and transport fare

			Transport Fare		Pearson Chi-Square	p-value
			<=60 rand per day	>60 rand per day		
Income Per Month	Less or equal R500	Count	0	3	2.878	0.578
		% within Transport Fare	0.0%	8.6%		
	R501-R1000	Count	3	3		
		% within Transport Fare	10.7%	8.6%		
	R1001-R2000	Count	22	24		
		% within Transport Fare	78.6%	68.6%		
	R2001-R3000	Count	2	3		
		% within Transport Fare	7.1%	8.6%		
	More than 3000	Count	1	2		
		% within Transport Fare	3.6%	5.7%		

It was found that income of the participants were similar when comparing with their transport cost (p=0.578).

4.6 Summary

This chapter presented the results of the study which were laid out to firstly outline the socio-demographic. That section covered the age, marital status, number of dependants, educational status, employment and the income statuses of the participants. The results of the first section were aimed at revealing the socio-demographics of the participants so that the findings would assist in answering the first objective of the study. The second section of the result presentation was aimed at showing the costs incurred by the participants when going to and from the treatment site. These results sought to assist the researcher in responding to the second objective of the study which was to investigate the out-of-pocket costs of patients who received radiation treatment. The final section of the results presentation presented a statistical analysis which showed the comparisons of the variables and whether or not they have any statistical significance to assist with achieving the research objectives. The following chapter will provide a narrative discussion which interprets the result findings.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.1 Introduction

The aim of this study was to investigating the economic benefit of better access to radiation therapy treatment to women with cervical cancer in rural KwaZulu-Natal, South Africa. This chapter discusses the research findings presented in the previous chapter to show if the objectives as set out in chapter one were achieved. The discussion below will provide a narrative that aims to collate the research objectives with the result findings to reach an informed decision as to whether the objectives set out were met and also to see if the researcher was able to answer the research sub-questions through this research.

5.2 Discussion

The study was divided into three sub-components which aimed to provide information about the socio-demographic of the participants and under that section, the researcher requested the age of the participants. In as far as age was concerned, the researcher looked at other similar studies to find out if the average proportion of women who were likely to be diagnosed with cervical cancer and were to be referred for radiotherapy treatment were similar in other less developed countries. In a study that was conducted in Zambia, which looked at the population level scale up of cervical cancer prevention services, most of the women who were screened were between the ages of 30 to 50 years. (Parham *et al*, 2015). Another similar research which looked to explore the knowledge of cervical cancer amongst HIV-positive women in South African also used women within the same ages as the ones used for this study ranging between 20 and 59 years of age. (Maree and Moitse, 2014). Given that information, it is clear that women who are diagnosed with cervical cancer are of similar age in different settings especially in the less developed countries. This information therefore justifies the selection criteria of the researcher for this study.

Other significant variables looked at in the socio-demographical section, were marital status, educational background and the employment status of the participants. For these variables, the researcher found that the study had 39.3% of married women, 43.2% single, 6.8% divorced

and 10.8% widowed. In this research, it was also found that 22% of the participants had no education and only 8% had completed matric. On the employment variable, 58% were pensioners while 14% had full time employment. A study on cervical cancer screening at a tertiary care centre in Rwanda, for the same variables, their participants differed slightly in that it had 72% of married women, 5.3% whom were single, 6.7% who were divorced and 16%nwho were widowed (Ruzigana *et al*, 2017). Although there were vast differences in the outcome of the statistical findings in both studies, however, it still remains justifiable to have looked at those variables which could mean that women in different settings who are likely to undergo similar challenges have similar demographical profiles.

5.2.1 Objective one: To investigate the socio-economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal.

Cervical cancer is a female disease and a leading cancer type treated at Greys radiation oncology with a maximum of 10 women booked weekly for their cancer treatment at the institution. The reason to investigate the socio-economic burden of poor access to radiation treatment for these women stem from their geographical background as all the participants were from the Western rural KZN, and because of their geographical setting they are regarded as underprivileged. These participants are said to be underprivileged because they live far away from the resources they require for their cervical cancer treatment and because of other factors such as poor referral patterns and long waiting time between consultation dates and poor screening programmes. These women often present in the late stages of the disease.

The socio-demographic section of the results showed that 56% of the participants were above the age of 50years, 92% were a combination of illiterate and those that did not complete school. 43% of these participants were single women and 43% had more than 3 children while 58% were pensioners. These socio-demographics clearly give us a picture that the study had participants who were uneducated and likely to be unemployed and are single parents as well as sole bread winners in their homes. According to the WHO (2016) report, it was stated that there was a relationship between poverty and NCDs and the results of the study provided a quantified presentation to prove the above statement as well

as the definition for low socio-economic status. The results of the study did however find that 88% of the participants who spend >R60 on transport did not have any nanny at home whereas 74% had nanny but this difference was not significant (p=0.145).

Gillan *et al* (2012) in their study on barriers to accessing radiation therapy in Canada alluded to the importance of considering the geographical distribution of radiation therapy treatment centres to improve their accessibility to rural patients. The study further indicated that the education level or status of the patients with cancer also posed a barrier to access cancer treatment due to lower levels of awareness as well as low income because a majority are unemployed or live on social grants, this could be related to lower rates of consultation thereby further increasing the socio-economic burden. (Gillan *et al*, 2012).

Given the results of the study in the socio-demographic section, there is a strong possibility that the families of the participants will also suffer financial distress given that a majority of the participants were sole bread winners in the families. This statement was also reported by Delgado-Guay *et al* (2015), where they reported that the trajectory of illness to a family member does affect the family's financial status and they further mentioned that there are often direct out-of-pocket expenses related to buying new clothes for the sick person due to weight fluctuations related to cancer as well as diet and nutritional supplement required for the patient during and after the cancer treatment.

The study therefore has answered the question related to the first objective and the objective was achieved in that regard.

5.2.2 Objective two: To investigate the out-of- pocket-cost (OOPC) to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit

A study by Grover *et al* (2015) titled the systematic review of radiotherapy capacity in low-and middle-income countries, reported an update by the DIRAC database stating that South Africa and Egypt are the only two countries in the whole of Africa where 60% of the radiation therapy centres are found and that South Africa is the second country with the highest capacity. This information is true given the reliable source where it comes from, however, it does not provide the important information needed by the health care

policy makers and other researchers about the poor geographical placements of these centres and the poor accessibility of these facilities to the population which lives in the rural parts of the country where there is usually no mechanism in place for improving access to these facilities since they are all concentrated only in the urban areas of the country.

The statement above sought to introduce the reason why the second objective of this research was to investigate the out-of-pocket-costs (OOPC) incurred by the cervical cancer patients given their geographical displacement to the required radiation treatment for their illness. Pisu *et al* (2017) had indicated in their study as mentioned in chapter two that people affected with cancer, particularly those from the rural communities, need special attention with regards to the OOPC they incur from the time of diagnosis to the end of their treatment and what the side effects of these costs may be to this population. As Grover *et al* (2015) had mentioned that radiation therapy is the first line treatment for cervical cancer and considering the geographical placements of the radiation therapy facilities in relation to the distance where our rural cervical patients live, the issue of OOPC could not be avoided as part of this study.

The results of the study for this section showed that 49% of our participants spent more than R70 per day on transport traveling to the treatment site. 82% reported not having a nanny to take care of their children while going for treatment, while 62% said they had no family assistance. 87% of the participants reported that they are the primary and sole providers of food for their families and 69% said they spent more than R700 on food for their household every month. It was found that those who spend more money on transport few of them helped with their family (37% vs 39%). This difference was not statistically significant ($p=0.804$). The results of the study also showed that 88% of the participants who spend >R60 on transport did not have any nanny at home whereas 74% had nanny but this difference was not significant ($p=0.145$). The study also found that spend on grocery >R1000, 42% spend >R60 on transport. It could also be seen that those spend more on grocery also spend more on transport.

In view of these results and given the length of the course of radiation treatment for cervical cancer as mentioned in chapter one, if the patient has to be away receiving radiation treatment for the duration mentioned, their families suffer especially if the patient as a majority had stated being the sole providers of food for their families. To avoid families from suffering, the patient will then be forces to travel home every weekend to make sure their families have food and given the transport fare indicated in the results, it is evident that these patients will also suffer a great deal of financial distress.

An article by Sartorius *et al* (2016) about the future cost of cancer in South Africa, reported the financial toxicity of cancer to have affected 62% of the American population to a point of personal bankruptcy and that South Africa was also not immune to this pandemic given the shortage of radiotherapy treatment machines in the public sector especially in the poorer provinces. The increasing incidence of newly diagnosed cancers and the cost of cancer care in South Africa is said to have yielded incredible direct healthcare cost to the affected individuals coupled with loss of productivity as well as family income. (Sartorius *et al*, 2016).

The results of the research therefore provide a significant relationship between the poverty and cancer management and therefore opens a much bigger platform to more research in this area to interrogate more similar research which addresses the feelings of the South African cancer patients especially given the unstable economic status and the increasing unemployment in the country.

5.3 Summary

In this chapter a full discussion of the research findings was done using relevant data presented in the previous chapter. The discussion was aimed at responding to the research objectives and the data presented was able to assist in achieving that. The following chapter will present the limitations of the study; recommendations based on the findings as well as provide a conclusion to the study.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The content of this chapter aims to reflect and provide a holistic detailed summary of the study, the research findings and how they tie up with the study objectives. Over and above that, the chapter also narrates the implication of the research and whether or not the objectives were achieved as well as the limiting factors which affected the generalisation of the study. Finally, an overview of some of the identified recommendations to further assist in solving the research problems and encouraging future studies are also narrated as well as the summary of the chapter.

6.2 Conclusion

Based on the investigation undertaken to identifying the main issues encountered by the cervical cancer patients in accessing radiation therapy, our data confirmed that the problems which are detrimental to achieving a good quality of life for the participants despite the availability of good treatment regimens and improved ways to treat the disease are due to their socio-economic background which deprive them easy access to their treatment facilities due to the geographical distance and its cost implications.

The study population as indicated earlier, reside in the areas declared as rural according the report from the Strategic Plan of the Kwa-Zulu-Natal Department of Health which stated that there was an estimated 306 076 number of households which resided in informal settlements and further alluded that such was one of the significant reason to the detriment of service delivery as well as access to better health care. (Dhlomo and Zungu, 2015).

Through conducting this research, it was evident in view of the related published literature reports, that the issue of access to radiation therapy was indeed an area of concern especially to cancer patients from rural settings globally. These were a number of reported cases from different articles which were similar and in agreement that there was a need for the entire health system to transform in order to address improved ways of accessing cancer treatment

facilities as well as improving the infrastructure of these facilities to solve the problem of poor access.

Various strategies were also suggested from the different publications from which the researcher has also drawn some inspiration and related ideas. The most common focal point in the various suggested strategies was one which saw a collaborative effort between the public sector and private health companies as an important pathway to resolving the existing disparities in the treatment of cancer in order to reduce the existing socio-economic burden to cancer patients.

6.3 Limitations of the study

Since access to radiation therapy for rural KwaZulu-Natal (KZN) communities continues to be a challenge for the whole province, for a better generalization of the research, it would have carried more weight for the study to select participants from all the KZN districts. For convenience therefore, the researcher only selected participants from only three districts which have been indicated in a map (see attached annexure A).

Patients from the rural KZN present with many different cancer types which are also treated with radiation therapy which the researcher could have included in the study to allow for the generalization, however, the researcher only used cervical cancer as a specific type for the study. This gives leaves a gap which may require further research using other cancer types for a similar research topic.

The researcher's choice of data collection approach could be viewed as bias because of the way in the questions were asked, since some questions were interpreted to the participants for more clarity in a way that seemed to lead the participants in selecting answers due to the literacy barrier. The descriptive quantitative method used has been described to lack depth and insider perspective. (Mouton, 2015). The analysis of the results could have carried more weight had the researcher used a qualitative method because during data collections, the participants had more to say but were limited by the type of the data collection tool used, therefore, the study lost a lot of the emotional content that could have been presented if it was a qualitative study.

6.4 Recommendations to solve the research problems

Long-term systemic planning is needed to ensure that Radiotherapy services keep in pace with the expected demand in the face of the growing cancer burden.

The institution's future strategic plan should include a comprehensive cancer plan with a long-term goal programme to increase the number of linear accelerators at specific locations, a programme to increase the Radiotherapy workforce; a programme of quality improvement in Radiotherapy; a programme for new reporting processes for key operational data for Radiotherapy and a review of access to Radiotherapy.

The KZN Department of Health should in its strategic plan include and publicly release the Radiotherapy strategic pathway which will outline how optimal placement of radiotherapy machines will be achieved based on the geography and population distribution in the KwaZulu-Natal.

The compilation of this document should be done through consultation with Radiotherapy professionals, Medical Physics and Heads of Oncology units at the current existing Radiotherapy Components in the province to put together an optimal comprehensive plan.

Collaboration with other developed Countries is vital in order to create partnerships which can assist strengthening the knowledge of health care providers around cost effective methods of managing cancer for the rural communities.

Formation of collaborative partnerships between private and the public sector in order to have access to more cancer treatment radiotherapy machines, as well as to strengthen the work force.

The researcher was able to deduce similarities that affected cancer patients as a whole which were out-of-pocket costs, missed work days during treatment which led to loss of income as well as psychological distress due to lack of coping mechanisms. From these issues, the researcher recommends that the KwaZulu-Natal given their awareness of the disparities within the health system, draw up a policy which will be specific on how to financially assist rural cancer patients from the time a diagnosis is made to the end of their related treatment.

Given the research findings, the researcher recommends that the Health sector develop programs that encourage horizontal integration between the different noncommunicable diseases as a control mechanism as opposed to having stand-alone disease control interventions.

If accepted, action on these recommendations would enable a more streamlined and coherent planning process for Radiotherapy services, with subsequent improvements in efficiency and effectiveness.

6.5 Recommendations for future studies

The recommendation for future studies would be to conduct more research around a similar topic but cover the entire Province to allow better generalization of the population of cancer patients.

Another recommendation will be to a qualitative study which will better present the true feelings of the affected individuals as well as the perceptions of the healthcare providers around a similar research problem; this will assist in proving stronger evidence which can better influence healthcare policy makers in addressing the challenges faced in the management of cancer.

6.6 Summary

Radiotherapy treatment has been proven in many studies to play a positive role in the increase of cancer survival. Radiotherapy service deficiencies have been reported in many studies worldwide, for which the two major challenges of greatest concern are capital costs of establishing Radiotherapy facilities and Radiotherapy workforce shortages. KwaZulu-Natal currently only has only 3 public Radiotherapy components all of which are situated in the urban areas making it difficult to access by the rural communities. For these communities, there are specific burdens associated with access to treatment some of which include the out of pocket costs associated with travel and accommodation.

Recognition of this study could benefit the KwaZulu-Natal Department of Health to establish better ways of improving access to radiation therapy taking into consideration it geography and population distribution.

REFERENCES

American Cancer Society, (2016). Cancer Facts and Figures [Online]. Available at: https://www.cancer.org/cancer/cervical-cancer/references.html

Abel-Wahab, M.; Bourque, J. M.; Pynda, Y.; Izewska, J.; Van der Merwe, D.; Zubizarreta, E and Rosenblatt, E. (2013). Status of radiotherapy resources in Africa: an International Atomic Energy Agency analysis. The lancet Oncology. Vol. 14. No. 4, pp. 168-175.

American Society of Clinical Oncology, (2014). The State of Cancer Care in America [Online]. Available at: http://jop.ascopubs.org/content/early/2014/03/10/JOP.2014.001386

Anderson, B. O. (2017). Cancer Research in Low- and Middle-Income Countries: Consortiums, Implementation Science and Healthcare Delivery. Annals of Surgical Oncology. Vol. 24. No. 3, pp. 624-626. Published March 2017.

Barton, M.; Morgan, G.; Crossing, S. and Bull, C. (2009) Improving Radiotherapy. Where to from here? A roadmap for the NSW Government [Online]. Available at: http://www.cancercouncil.com.au/wp-content/uploads/2011/10/Improving-Radiotherapy_Roadmap_May-2009.pdf

Botha, M. H. and Richter, K. L. (2015). Cervical cancer prevention in South Africa: HPV vaccination and screening both essential to achieve and maintain a reduction in incidence. South African Medical Journal. Vol. 105. No. 1, pp. 33-34.

Bradshaw, M.; Kent, B. V.; Henderson, W. M. and Setar, A. C. (2017). Subjective social status, life course SES, and BMI in young adulthood. Health Psychology. Vol. 36. No. 7, pp. 682-694. Published July 2017.

Bruni, L.; Barrionuevo-Rosas, L.; Albero, G.; Serrano, B.; Mena, M.; Gómez, D.; Muñoz, J.; Bosch, F. X. and de Sanjosé S. (2017). ICO Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in the World. Summary Report 19 May 2017

Cancer Association of South Africa, (2014) Fact Sheet on Cervical Cancer [Online]. Available at: http://www.cansa.org.za/files/2014/06/Fact-Sheet-Cervical-Cancer-June-2014.pdf

Coley, S. L. and Nichols, T. R. (2017). Race, Age, and Neighbourhood Socioeconomic Status in Low Birth Weight Disparities Among Adolescent Mothers: *An Intersectional Inquiry*. Journal of Health Disparities Research and Practice. Vol. 9. Issue. 4, pp. 1-16.

Comai, A. (2014) Barriers to Successful Cervical Cancer Screening in Rural Kwazulu-Natal, Cato Manor and Cape Town [Online]. Available at: http://digitalcollections.sit.edu/cgi/viewcontent.cgi?article=2787&context=isp_collection

Datta N. R.; Heuser M.; Samiei M.; Shah R.; Lutters G. and Bodis S. (2015). Teleradiotherapy Network: Applications and Feasibility for Providing Cost-Effective Comprehensive Radiotherapy Care in Low- and Middle-Income Group Countries for Cancer Patients: Telemedicine and e-Health. Vol. 21. No. 7, pp. 523-532.

Datta N. R.; Heuser M.; Samiei M.; Shah R. and Bodis S. (2014). Radiation Therapy Infrastructure and Human Resources in low-and middle-income countries: Present Status and Projections for 2020. Internationa Journal of Radiation Oncology Biology and Physics. Vol 89. No. 3, pp. 448-457.

Disaia, P. J.; Creasman, W. T.; Mannel, R. S.; McMeekin, D. S. and Mutch, D. G. (2017). Clinical Gynecology Oncolgy. Ninth edition. Elsevier: Canada.

Delgado-Guay, M.; Ferrer, J.; Rieber, A. G.; Rhondali, W.; Tayjasanant, S.; Ochoa, J.; Cantu, H.; Chisholm, G.; Williams, J.; Frisbee-Hume, S. and Bruera, E. (2015). Financial distress and its association with physical and emotional symptoms and quality of life among advanced cancer patients. The Oncologist. Vol. 20. No. 9, pp. 1092-1098.

Dhlomo, S. M. and Zungu S. M. (2015). Strategic Plan 2015 -2019 KwaZulu-Natal Department of Health.

Du, X. L.; Tao, J.; Sheng, X. G.; Lu, C. H.; Yu, H.; Wang, C.; Song, Q. Q.; Li, .Q. S. and Pan, C. X. (2012) Intensity-modulated radiation therapy for advanced cervical cancer: A

comparison of Dosimetric and Clinical Outcomes with Conventional Radiotherapy [Online]. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22198339

Efstathiou, J. A.; Heunis, M.; Karumekayi, T.; Makufa, R.; Bvochora-Nsingo, M.; Gierga, D. P.; Suneja, G.; Grover, S.; Kasese, J.; Mmalane, M.; Moffat, H.; Van Paleske, A.; Makhema, J. and Dryden-Pterson, S. (2016). Establishing and delivering quality radiation therapy in resource-constrained settings: The story of Botswana. Journal of Clinical Oncology. Vol. 34. No. 1, pp. 27-35. Published January 1 2016.

Econex, Trade, Competition and Applied Economics, (2010) NHI Note 6 [Online]. Available at: http://www.mediclinic.co.za/about/Documents/ECONEX%20NHI%20note%206.pdf

El Saghir, N. S., Farhat, R. A., Charara, R. N. and Khoury, K. E. (2014). Enhancing cancer care in areas of limited resources: Our next step. Future Oncology. Vol. 10. No. 12, pp. 1953-1965.

Embassy of the United State, (2010) Major boost in KZN's battle against cervical cancer: BroadReach Healthcare, USAID give equipment to screen and treat a million women for cervical cancer [Online]. Available at: http://www.southafrica.info/about/health/usaid-120810.htm

Gillan, C.; Briggs, K.; Pazos; A. G.; Maurus, M.; Harnett, N.; Catton, P. and Wiljier, D. (2012). Barries to accessing radiation therapy in Canada: a systematic review. Radiation Oncology. Vol. 7. No. 1, pp.167.

Grover, S.; Xu, M. J.; Yeager, A.; Rosman, L.; Groen, R. S.; Chackungal, S.; Rodin, D.; Mangaali, M.; Nurkic, S.; Fernandes, A.; Lin, L. L.; Thomas, G. and Tergas, A. I. (2015). A systematic review of radiotherapy capacity in low-and middle-income countries. Frontiers in Oncology. Vol. 4. Article 380.

Hanna T. P. and Kangolle A. C. T. (2010). Cancer control in developing countries: using health data and health services research to measure and improve access, quality and efficiency. BioMed Central. International Health and Human Rights. Vol. 10. No. 24, pp. 1186-1472.

Hunter, D. J. and Reddy, K. S. (2013). Global Health Noncommunicable diseases. The New England Journal of Medicine. Vol. 369. No. 14, pp. 1336-1343.

International Agency for Research on Cancer, (2013) Latest world cancer statistics. *Global cancer burden rises to 14.1 million new cases in 2012*: Marked increase in breast cancer must be addressed [Online]. Available at: http://www.iarc.fr/en/media-centre/pr/2013/pdfs/pr223_E.pdf

Independent Clinical Oncology Network, (2012) Innovative Solutions for Equitable Cancer Management in South Africa [Online]. Available at: http://www.cancernet.co.za/?p=1553

Khor, R.; Bressel, M.; Tai, K. H.; Ball, D.; Duchesne, G.; Rose, W.; Tedesco, J.; Gill, S.; Fitzpatriack, C. and Foroudi, F. (2013). Patterns of retreatment with radiotherapy in a large academic centre. Journal of Medical Imaging and Radiation Oncology. Vol 57. No. 5, pp. 610-616.

Lauzier, S.; Levesque, P.; Drolet, M.; Coyle, D.; Brisson, J.; Masse, B.; Robidoux, A.; Robert, J. and Maunsell, E. (2011). Out-of –pocket costs for accessing adjuvant radiotherapy among Canadian women with breast cancer. American Society of Clinical Oncology. Vol. 29. No. 30, pp. 4007-4013.

Mathews, M.; Buehler, S. and West, R. (2009). Perceptions of health care providers concerning patient and health care provider strategies to limit out-of-pocket costs for cancer care. Medical Oncology. Vol. 16. No. 4, pp. 3.

Maree, J. E. and Moitse, K. A. (2014). Exploration of knowledge of cervical cancer and cancer screening amongst HIV-positive women. Curationis. Vol. 37. No. 1, pp. 1-7. Published October 10 2014.

Mohanti, B. K.; Mukhopadhyay, A.; Das, S.; Sharma, K. and Dash, S. (2011) Discussion Papers in Economics. *Estimating the Economic Burden of Cancer at a Tertiary Public Hospital:* A Study at the All India Institute of Medical Science [Online]. Available at: http://www.isid.ac.in/~abhiroop/res_papers/WORKING_PAPERS_files/cancer.pdf. Indian Statistical Institute, Delhi Planning Unit.

Mouton, J. (2015). How to succeed in your master's and doctoral studies. A South African guide and resource book. Van Schaik: South Africa.

Ndlovu, B. H. (2011) Awareness, Knowledge and Experiences of Women Regarding Cervical Cancer in Rural KwaZulu-Natal, South Africa [Online]. Available at: http://scholar.sun.ac.za/handle/10019.1/6801

National Comprehensive Cancer Network, (2017) Guidelines Version 2. Cervical Cancer [Online]. Available at: http://www.tri-kobe.org/nccn/guideline/gynecological/english/cervical.pdf

Nosworthy, A. (2012). Challenging Multinational Companies in Healthcare and related fields to put their money where their profits are. Oncology News South Africa. Issue 5.

Parham, G. P.; Mwanahamuntu, M. H.; Kapambwe, S.; Muwonge, R..; Bateman, A. C.; Blevins, M. and Sahasrabuddhe, V. V. (2015). Population-Level Scale-Up of Cervical Cancer Prevention Services in a Low-Resource Setting: *Development, Implementation, and Evaluation of the Cervical Cancer Prevention Program in Zambia*. Vol. 10. No. 4. Published April 17 2015.

Phellas, C. N.; Bloch, A. and Seale, C. (2011). Structured methods: Interviews, Questionnaires and Observation [Online]. Available at: http://www.sagepub.com/upm-data/47370_Seale_Chapter_11.pdf

Pillay, M. (2009). KwaZulu-Natal Department of Health. Provincial Oncology Plan [Online]. Available at: http://www.kznhealth.gov.za

Pieterse, C. (2017). Cancers spread as patients queue, Radiotherapy machines unused at Addington since 2013. The Witness, 08 May 2017: 1.

Pisu, M.; Azuero, A.; Benz, R.; McNees, P. and Meneses, K (2017). Out-of-pocket costs and burden among rural breast cancer survivors. Cancer Medicine. Vol. 6. No. 3, pp. 572-581.

Rose P. G. (2006). Concurrent chemotherapy for locally advanced carcinoma of the cervix: where are we in 2006? Annals of Oncology. Vol. 17. Supplement 10, pp 224-229.

Ruzigana, G.; Bazzet-Matabele, L.; Rulisa, S.; Martin, A. N. and Ghebre, R. (2017). Cervical cancer screening at a tertiary care center in Rwanda. Vol. 21, pp. 13-16.

Santibanez, P.; Gaudet, M.; French, J.; Liu, E. and Tyldesley, S. (2014) Optimal Location of Radiation Therapy Centers with Respect to Geographic Access: International Journal of Radiation Oncology Biology Physics. Vol. 89. No. 4, pp. 745-755.

Sartorius, K.; Sartorius, B.; Govender, P. S.; Sharma, V. and Sheriff, A. (2016). The future cost of cancer in South Africa: *An interdisciplinary cost management strategy*. South African Medical Journal. Vol. 106. No. 10, pp.949-950.

Sekaran, U. and Bougie, R. (2013). Research Methods for Business. A Skill-Building Approach. 6th ed. Wiley: Britain.

Shaikh, N. (2017). KZN cancer service approaches crisis, Oncologists who leave are not replaced and machines are broken. Sunday Tribune, 05 February 2017: 4.

Todo, Y. and Watari, H. (2016). Concuttent chemoradiotherapy for cervical cancer: *Background including evidence-based data, pitfalls of the data, limitation of treatment in certain groups.* Chinese Journal of Cancer Research.Vol. 28. No. 2, pp. 221-227. Published April 2016.

Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-Tieulent, J., & Jemal, A. (2015). Global cancer statistics, 2012. CA: A Cancer Journal for Clinicians. Vol. 65. No. 2, pp. 87-108.

Tripartite National Strategic Plan for Radiation Oncology, (2012) *Providing a Quality Radiation Oncology Service* [Online].Available at: http://www.radiationoncology.com.au/supporting-docs/PlanningForTheBest-SupportingRegionalAndRuralAccessToRadiationOncologyServices.pdf

Wang K. L. (2007). Current Trends in Treating Cervical Cancer. International Journal of Gerontoogy. Vol. 1. No. 2, pp. 98-102.

World Health Organization (2016). Global status report on noncommunicable diseases. *Description of the global burden of NCDs, their risk factors and determinants*.

Published April 2011 [Online]. Available at: http://www.who.int/nmh/publications/ncd_report2010/en/

World Health Organization (2016). Guide to Introducing HPV Vaccine into National Immunization Programmes. *Department of Immunization*, Vaccines and Biologicals. Published December 2016 [Online]. Available at: www.who.int/immunization/documents

Wyatt, T. E.; Pernenkil, V. and Akinyemiju, T. F. (2017). Trends in breast and colorectal cancer screening among U.S. adults by race, healthcare coverage, and SES before, during, and after the great recession. Preventative Medicine Reports.

Zafar, Y. S.; Peppercorn, J. M.; Schrag, D.; Taylor, D. H.; Goetzinger, A. M.; Zhong, X. and Abernethy, A. P. (2013). The Financial Toxicity of Cancer Treatment: *A Pilot Study Assessing Out-of-Pocket Expenses and the Insured Cancer Patient's Experience.* The Oncologist. Vol. 18. No. 4, pp. 381-390.

Zajacova, A.; Dowd, J. B.; Schoeni, R. F. and Wallace, R. B. (2015). Employment and Income Losses among Cancer Survivors: Estimates from a National Longitudinal Survey of American Families. Vol. 121. No. 24, pp. 4425-4432.

Zietman A. (2014). Bridging Radiation Therapy to Underserved Nations: An Increasingly Global Responsibility in an Ever-Shrinking World. International Journal of Radiation Oncology

Zubizarreta E. H., Fidarova E., Healy B. and Rosenblatt E. (2014). Need for Radiotherapy in Low and Middle Income Countries – The Silent Crisis Continues. Clinical Oncology. Vol. 27. No. 2, pp. 107-114.

APPENDIX 1

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

GREYS HOSPITAL
OFFICE OF THE CEO
Private Bag X 9001, Pietermaritzburg, 3200
Town Bush Road, Chase Valley, Pietermaritzburg, 3201
Tel.:033 – 897 3321 Fax.: 033 - 8973398
www.kznhealth.gov.za

To:	**Mrs. M. M. Mbhele** **Dept. of Oncology and Radiotherapy** **Grey's Hospital**
From:	**Dr. K. B. Bilenge** **CEO - Greys Hospital**
Date:	**11 May 2015**
Re:	**Request for permission to conduct research at Grey's Hospital:** ***Investigating the economic benefit of better access to radiation therapy treatment to women with cervical cancer in rural KwaZulu-Natal, South Africa***

Dear Mrs. Mbhele

Your request to conduct research at Grey's Hospital refers.
Permission to conduct the above study is hereby granted under the following conditions:

- Your provisional ethics approval and research protocol are assumed to be valid;
- Confidentiality of hospital information, including staff and patient medical and/or contact information, must be kept at all times;
- You are to ensure that your data collection process will not interfere with the routine services at the hospital;
- You are to ensure that hospital resources are not used to manage your data collection, e.g. hospital staff collating data; photocopying; telephone; facsimile, etc.;
- Informed consent is to be obtained from all participants in your study, if applicable;
- Policies, guidelines and protocols of the Department of Health and Grey's Hospital must be adhered to at all times;
- Professional attitude and behaviour whilst dealing with research participants must be exhibited;
- The Department of Health, hospital and its staff will not be held responsible for any negative incidents and/or consequences, including injuries and illnesses that may be contracted on site, litigation matters, etc. that may arise as a result of your study or your presence on site;
- You are required to submit to this office a summary of study findings upon completion of your research.
- You are requested to make contact with the Head of Department - Oncology & Radiotherapy, **Dr. O. El-Koha,** at Grey's Hospital once you are ready to commence data collection.

Recommended by:

[redacted]

Dr L. Ngidi
Senior Manager: Medical Services

Approved by:

[redacted]

Dr. K. B. Bilenge
Hospital CEO

APPENDIX 2

The Questionnaire

Dear Participants

Thank you for agreeing to participate in the study. Your participation in this study is completely voluntary without any pressure. There are no unforeseeable risks or incentives fo taking part, however, if you feel uncomfortable to answer the questionnaire, you are free to withdraw and you will not be penalized or prejudiced in any way. You information will be strictly kept confidential.

Consent Form

Declaration by participant

By signing below, I ……..…… agree to take part in a research study entitled *(Economic Benefit of Better Access to Radiotherapy to Women with Cervical Cancer in Rural KZN)*.

I declare that:

- I have read or had this information and consent form read to me and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…….. on (*date*) ……...…….. 2015.

…… ……..

Signature of participant Signature of witness

Declaration by investigator

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above.
- I did/did not use a translator. (*If a translator is used then the translator must sign the declaration below.*

Signed at (*place*) .....…….. on (*date*) ……...…….. 2015

…… ……..

Signature of investigator Signature of witness

Declaration by translator

I (*name*) ……..…… declare that:

- I assisted the investigator (*name*) ……. to explain the information in this document to (*name of participant*) ……..…….. using the language medium of IsiZulu.
- We encouraged her to ask questions and took adequate time to answer them.
- I conveyed a factually correct version of what was related to me.
- I am satisfied that the participant fully understands the content of this informed consent document and has had all her questions satisfactorily answered.

Signed at (*place*) .....…….. on (*date*) ……...…….. 2015

…… ……..

Signature of translator Signature of witness

Interviewer (the researcher) will read all questions verbatim with their allocated optional answers to the participant translated to the local language as appropriate. The participant will verbally select the answer from the options called out by the interviewer and the interviewer will mark an "X" next to the selected answer.

Section1: Socio-demographic

	Questions	Optional Answers	X
1.	Which age group do you fall into?	30 – 40years	☐
		41 – 50year	☐
		51 – 60years	☐
		Above 60years	☐
2.	What is your marital status?	Married	☐
		Single	☐
		Divorced	☐
		Widowed	☐
		Other	☐
		Specify……	☐
3.	Which race do you regard yourself as?	Asian	☐
		Black	☐
		Coloured	☐
		White	☐
4.	Do you have children?	Yes	☐
		No	☐
4a.	If yes how many?	1	☐
		2	☐
		3	☐
		More than 3	☐

5.	What is the highest standard of education attained?	None	☐
		Primary (Grade 1- 7)	☐
		Secondary (Grade 8 – 10)	☐
		Completed Matric	☐
		Completed Tertiary	☐
		Student	☐
6.	How can you describe your employment status at present?	Employed full time	☐
		Employed part-time	☐
		Unemployed	☐
		Pensioner	☐
		Other	☐
		Specify……	☐
6a.	If answer to question 5 is option 1, 2 or 4, how much do you earn per month?	R500 and less	☐
		R501 – R1000	☐
		R1001 – R2000	☐
		R2001 – R3000	☐
		More than R3000	☐
		Specify……..	☐

Section 2: Cost incurred to and from treatment site

7.	How much do you spend to get to the radiation treatment hospital?	R0 – R50 a day R51 – R60 a day R61 – R70 a day Above R70 a day Specify……	☐ ☐ ☐ ☐ ☐
8.	Who takes care of the children for the duration of your radiation treatment?	Spouse Relatives Neighbours Local social services No one Other Specify……	☐ ☐ ☐ ☐ ☐ ☐ ☐
9.	Do you pay to have your kids taken care of?	Yes No	☐ ☐
9a.	If the answer to 8 is yes, specify how much?	Specify……..	☐
10.	Do you have any other family members assisting you with your household duties during your daily hospital visits?	Yes No	☐ ☐

10a.	If the answer to 9 is yes, do they also buy food or do you still have to buy food for the family?	They buy food They do not buy food I still have to provide food for the family	□ □ □
10b.	How much do you spend on groceries every month?	R200 – R500 R500 – R700 R700 – R1000 More than R1000 per month	□ □ □ □

Section 3: Preferences and options for better access

11.	Would you prefer that radiation treatment access be improved?	Yes No	□ □
11a.	If the answer to 10 is yes, select from the options given how access should be improved	Radiation treatment machines should be installed in the rural: - regional hospitals - district hospital - district clinic	□ □ □

12.	Free transport should be provided for cancer patients.	Yes No	□ □

APPENDIX 3

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

12 July 2017

Mrs Mpho Mabale Mbhele (209520594)
Graduate School of Business & Leadership
Westville Campus

Dear Mrs Mabale Mbhele,

Protocol reference number: HSS/0115/015M
New project title: Investigating the economic benefit of better access to radiation therapy treatment to women with cervical cancer in rural KwaZulu-Natal, South Africa

Approval Notification – Amendment Application

This letter serves to notify you that your application and request for an amendment received on 05 July 2017 has now been approved as follows:

- Change in Title

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form; Title of the Project, Location of the Study must be reviewed and approved through an amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for period of 3 years from the date of original issue. Thereafter Recertification must be applied for on an annual basis.

Best wishes for the successful completion of your research protocol.

Yours faithfully

[redacted]

pp **Dr Shenuka Singh (Chair)**

/ms

Cc Supervisor: Mr Mohammed Hoque
cc Academic Leader Research: Dr Emmanuel Mutambara
cc School Administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
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Website: www.ukzn.ac.za

APPENDIX 4

turnitin **Turnitin Originality Report**

INVESTIGATING THE ECONOMIC BENEFIT OF BETTER ACCESS TO RADIATION THERAPY TREATMENT TO WOMEN WITH CERVICAL CANCER IN RURAL KWAZULU-NATAL, SOUTH AFRICA by MPHO MBHELE

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http://www.hpcsa-blogs.co.za/cancer-vaccination-campaign-under-way/

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Timothy P Hanna. "Cancer control in developing countries: using health data and health services research to measure and improve access, quality and efficiency", BMC International Health and Human Rights, 2010

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http://www.cancer.org/treatment/treatmentsandsideeffects/treatmenttypes/chemotherapy/how-is-chemotherapy-used-to-treat-cancer

20 < 1% match (publications)
Pan, Deng-Hua, Mei-Lin Zhu, Xiao-Miao Lin, Xing-Gu Lin, Rong-Quan He, Yan-Xin Ling, Shi-Tao Su, Madushi Mihiranganee Wickramaarachchi, Yi-Wu Dang, Kang-Lai Wei, and Gang Chen. "Evaluation and clinical significance of cyclin-dependent kinase5 expression in cervical lesions: a clinical research study in Guangxi, China", European Journal of Medical Research, 2016.

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UNIVERSITY OF KWAZULU-NATAL INVESTIGATING THE ECONOMIC BENEFIT OF BETTER ACCESS TO RADIATION THERAPY TREATMENT TO WOMEN WITH CERVICAL CANCER IN RURAL KWAZULU-NATAL, SOUTH AFRICA BY MPHO MABALE MBHELE 209520594

6**A dissertation submitted in partial fulfilment of the** requirement **for the degree of Masters of Business Administration Graduate School of Business & Leadership College of Law and Management Studies SUPERVISOR:**

DR MOHAMMED HOQUE June 2017 CHAPTER 1 INTRODUCTION 1.1 Introduction Noncommunicable diseases (NCD) have been globally reported to have a significant socioeconomic impact as it increases individual and household poverty and hinders social and economic development. ("World Health Organization", 2011). One such disease which is rapidly growing both in its incidence as well as with its current crisis in management especially in the

5**low-and –middle-income countries** (LMIC) is cancer. **According to the World** Health Organization (WHO) **report**

in 2011, cancer was recorded as the second leading (NCD) with its death toll estimated at 7.6 million and also that more than two thirds of the cancer deaths were occurring in the LMIC. The rapidly increasing number of new cancer cases, marks cancer as an increasingly cause of morbidity and mortality in all the regions of the world and due to the challenges in tackling this disease, the increases in cancer prevalence therefore are highly unavoidable hence its global incident rate was estimated to rise from 12.7million new cancer cases to 21.4million by 2030. (WHO, 2011). The world health organization in its report also mentioned that the impact caused by NCD's to LMIC is such that 150million of the people affected such a financial catastrophe yearly and that 100 million of these affected people are eventually pushed under the poverty line due to payments incurred for health care. As a consequence, the rapidly growing burden of NCD's especially cancer, has been reported to cause the vulnerable and socially disadvantaged people to be more sicker and to likely die sooner than people of higher social positions given the reported existing inequity in the health care system (WHO, 2011). Cancer is the disease that touches a larger proportion of the KwaZulu-Natal population most of which are from rural setting with little or no educational background. In view of that, many of the cases that present to Greys Hospital Oncology are a majority of late stage cancers. Cancer comprises of over 100 different tumor types growing at different sites of the body and has a wide variability in scientific knowledge about their causes and modality of treatment (ROJIG Final Report, 2003). The registry estimates that the current lifetime risk of developing cancer in South Africa is 1 male in 6 and 1 female in 8 (SA Cancer Statistics, 2012). The primary objective therefore for optimal cancer control, is to provide optimal cancer management which integrates cancer services, outreach programs as well as improving better access to cancer treatment available. Among the various types of cancers seen, cancer of the cervix is the highest common cancer type treated at Greys Hospital Oncology Unit, with an average of 199 cases seen in the clinics and an average of 126 booked to receive Radiotherapy as a treatment modality yearly. The results of the study that was conducted by Comai (2014), reported that access to screening and high early detection were not adequate as most of the women from KwaZulu-Natal that she interviewed in her study felt that even after early detection and increased awareness of cervical cancer, the

system did not favour them. Patients in that study alluded that they had to travel far to get to urban radiation treatment centres only to be returned with a further appointment date for radiation treatment due to long waiting lists. Greys Hospital is one of the only three public Hospitals in KwaZulu-Natal that offer cancer treatment services. Greys Hospital is a referral hospital100% tertiary service to the UMgungundlovu district which has an approximate population of 1million to the Western half of KwaZulu-Natal which include 5 health districts with a total population of 3.5million. Greys Hospital offer 18 main services, among which is the cancer management and treatment service offered by the Radiation Oncology Department. The location of the hospital does pose challenges to the rural community to access the cancer treatment service due to its geographical placement. The study was conducted to highlight the challenges that cervical cancer patients encountered during the time they were undergoing Radiotherapy which is one of the treatment modalities used to treat cervical cancer. The diagram below shows a global statistical description of the supply and demand of the resources required to improve the status of the radiation therapy treatment for cancer patients given the rapidly increasing incidence of cancer. 1.2 Motivation of the study During a full course of radiation therapy, most cervical cancer patients who are from the rural areas have no choice but to stay in hospital for the entire treatment due to distance. This means that those who work stay out of work and away from their homes and families. Many of these patients have young children who go to school and still need taking care of, while others rely on Government pension to survive. Due to all these challenges, these patients most often choose not to come for treatment, this has therefore brought the KwaZulu-Natal Province to have an increase in the death toll of women with cervical cancer. For some, the fear of losing their jobs and thinking of the safety of their children, these patients therefore chose to travel daily which becomes another challenge since they incur very high out of pocket costs. These costs are substantial concern for patients and their health care providers therefore, it was highly essential to do a study that sought to investigate effective and efficient ways to provide radiation therapy to alleviate high costs to patients, in particular those diagnosed with cervical cancer since

1it is the most common cancer type in the

Province as well as in the institution where the research is conducted. The overall motivation of the study was therefore to highlight the following key areas: I. Justification of treating cervical cancer with radiation therapy II. The importance of developing cost saving strategies to encourage patients to attend cancer treatment to lower the increasing death toll due to cancer of the cervix III. Addressing the issue of optimal placement of radiation therapy machines to allow rural patients better access. The benefit of the study was that cervical cancer patients were to be provided with a platform to communicate directly to their health care providers regarding their challenges. The study was also sought to give the patients with cancer of the cervix hope that there could be some improvement in the health care system which was to likely improve their quality of life while they went through cancer treatment. In turn, it was also a motivation that if such information was researched and published, it could assist the KwaZulu-Natal Health system to improve the access to better cervical cancer care and treatment for patients could be more effective. The Kwa-Zulu Natal Department of Health will therefore also benefit because when patients are motivated to attend treatment, there will be a decrease in the death toll due to cervical cancer, but most of all, the policy makers will have evidence to assist them to improve their strategies to combat deaths caused by cervical cancer in the rural areas. 1.3 Focus of the study The study was conducted at the Greys Hospital Oncology unit which is one of the three tertiary hospitals of the KwaZulu-Natal Department of Health that offer Radiation Therapy as a the treatment of cervical cancer. The Kwa-Zulu Natal Department of Health has embarked on a mission to minimize the increasing death toll due to cancer of the cervix, this emanating from the statement made by Dr Motswaledi, the current National Minister of Health which stated that the

14severity, complications, human suffering and loss of life from cervical cancer were

worsening

14due to poorly resourced infrastructure, limited access to early screening, treatment and management of complications.

(http://www.health24.com/Medical/Cervical- cancer/Cervical-cancer-vaccine/Cervical-cancer-vaccination-for-SA-schoolgirls-20140313) The participants of the study are women diagnosed with cervical cancer who have received radiation treatment at the Greys Hospital Oncology unit, who come from the rural communities of the Western Kwa-Zulu Natal. 1.4 Problem Statement As one of the professionals who work at the Oncology unit at Greys Hospital delivering radiation to treat cancer, I get to be at the receiving point of all the concerns that patients share on a daily basis during their course of radiation treatment. The most common challenge especially from women who received radiation treatment for cervical cancer was the length of their treatment. The whole course of radiation treatment for cancer of the cervix for curative intent takes up to 8 weeks. For these clients it therefore warrants staying in hospital for 8weeks to receive the full treatment. Some patients would complain about their children being left alone back home, while others had to give up their jobs. These challenges built up to point that there was an increase of cervical cancer cases that were not showing up to resume their radiation treatment from the fear being away from their families for a long time or while for some being the fear of losing their jobs. The researcher therefore decided to pursue the study in order to acquire evidence that will be form part of literature which sought to assist the KwaZulu-Natal department of Health in improving better access to cancer treatment with radiation therapy as well as address disparities that exist in the Health system in as far the rural communities are concerned. According to a report by The Independent Clinical Oncology Network (ICON) (2012) reported a publication by The Green Paper, Policy on National Health Insurance published on 12 August 2011, suggesting that the current ills of an underperforming National Health system could be attributed to a fragmented health care system as well as a reported low increase of the equipment used to deliver radiation therapy in South Africa as shown in tables 1 and 2 below. We continue to see more evidence which proves the reality of the aforementioned report through more publications which have further eluded on the severity of the poor Health system mainly in the KwaZulu-Natal Province. Reported in the Sunday Tribune newspaper article, Shaikh (2017 pg. 4) alluded on the cancer service crisis faced by the KwaZulu-Natal Department of Health which he claimed was through the high resignation of Oncologists from the public sector institutions that offer cancer care. He further reported on the cancer machines that were not repaired in the same Province and this Shaikh called it a dire situation since it increased the radiotherapy treatment back log for cancer patients. Another similar report was made recently by Pieterse (2014 pg.1) which was published as a front page article in the Witness newspaper, wherein it more emphasis was on patients dying while waiting access their required Radiation treatment at Greys Hospital due to the back log caused because the institution only had one radiation machine to cover a large population. The researcher's motivation to conduct this study was to make sure that research around the impact of better access to Radiotherapy treatment was to voice out the concerns of these patients by acquiring evidence through gathering of data directly from the affected clients through the use of a questionnaire. The research was therefore aimed to project quantifiable data which was going to reflect the socio-economic challenges that cervical cancer patients incur from accessing radiation treatment for their illness. 1.5 Objectives The study was guided by the following objectives: ? To investigate the socio-

economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal. ? To investigate the out of pocket cost to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit ? To investigate ways of improving access to radiation treatment for cervical cancer patients to minimize the socio-economic burden to the cervical cancer patients from the rural Western KwaZulu-Natal ? To investigate strategies available for recommendation to improve access to radiation therapy to cervical cancer patients from the rural Western KwaZulu-Natal 1.6 Research Sub-Questions The research answered the following questions: ? What are the socio-economic burdens of poor access to optimal cancer treatment for cervical patients who are from the rural Western Kwa-Zulu Natal? ? What are the out of pocket costs to cervical cancer patients who received radiation therapy treatment at Greys Hospital Oncology unit? ? What resources are available to improve access to radiation treatment for cervical cancer patients to minimize the socio-economic burden to the cervical cancer patients from the rural Western Kwa-Zulu Natal? ? What strategies are available to recommend for improving access

4to radiation therapy for cervical cancer patients from the

rural Western Kwa-Zulu Natal? 1.7 Limitations of the study Since access to radiation therapy for rural KwaZulu-Natal (KZN) communities continues to be a challenge for the whole province, for a better generalization of the research, it would have carried more weight for the study to select participants from all the KZN districts. For convenience therefore, the researcher will only select participants from only three districts as indicated on annexure A. Patients from the rural KZN present with many different cancer types which are also treated with radiation therapy which the researcher could have included in the study to allow for the generalization, however, the researcher has only used cervical cancer as a specific type for the study. This has therefore left a gap which requires more similar research using other cancer types in this research area. 1.8 Summary This chapter aimed to provide the background of the study as well as outline the motivation of the study, the problem statement and the

6focus of the study. The Objectives of the study including the significance of

the study were also outlined. The study also had limitations which were also mentioned in this chapter. The next chapter will be presenting the review of literature on the challenges of access to cancer treatment.

12CHAPTER 2 LITERATURE REVIEW 2.1 Introduction Cancer is a

complex, life-threatening disease

17caused by abnormal and uncontrolled cell division which may spread to other parts of the body through the lymphatic system or blood stream

if not treated on time. The more dangerous cancers are called malignant cancers, which can rapidly spread to other parts of the body, a process called metastasis. (http://www.medicalnewstoday.com/info/cancer-oncology). The incidence of cancer was reported by the World Health Organization report on preventing chronic diseases: Avital investment, to be rapidly increasing with projections of over 7.5million people who

would die from cancer if it is not prevented. ("World Health Organization", 2016). Among the various types of cancers known globally, cervical cancer is mentioned to be the fourth most common type among women worldwide, and with its malignant nature, it has been reported to be responsible for the death of over 266 000 women in the developing countries, most of whom are in their prime of their lives. It was also reported that each year there is an estimated 528 000 new cervical cancer cases seen with more than 85% of these new cases occurring in less developed countries ("World Health Organization", 2016). Cervical cancer is a neoplasm arising from cells originating in the cervix, the cervix being the

11narrow part of the lower uterus also referred to as the neck of the womb.

("American Cancer Society", 2016). Cervical cancer has many different types of causes, however, the human papilloma virus (HPV) is reported as the main predisposing factors and that 70% of cervical cancers are due to HPV. ("World Health Organization", 2016). Although cervical cancer is described to be a slowly progressing local disease, however, once it occurs after 5-30 years of the development of the intraepithelial neoplasm (CIN) lesions and not detected nor treated early, the lesions can develop into invasive cancer and the treating modalities become more complicated. (Wang, 2007). Cervical cancer mortality still remains a huge global burden, which reflects that there is still a high level of inequities in wealth, gender and access to good quality health care ("Cervical Cancer Action", 2012). Although statistics show an approximate 528 000 new cases every year worldwide, research continues to regard cervical cancer as an avoidable cause of death ("International Agency for Research on Cancer", 2013). Cervical cancer is said to be the second most common cancer among women in the developing countries, with the vast majority of these unnecessary deaths occurring in the disadvantaged communities within developed countries ("Cervical Cancer Action", 2012). The prevalence of cervical cancer in South Africa is higher compared to the global estimates with the highest rate reported to be 30.2 per 100 000 females as well as the highest in women between the ages of 15 – 44 years (Ndlovu, 2011). In KwaZulu-Natal cervical cancer was also reported as the second cause of female mortality contributing about 14% of deaths (Ndlovu, 2011). Most local studies around cervical cancer have focused solely on the screening for prevention and detection of the disease with minimal information in the area of treatment with Radiation therapy yet this is one of the highly used modality for treating cervical cancer globally. For women from low and middle income settings, the screening models available have performed poorly due to poor test performants, poor follow up systems, financial implications and other social challenges that prevent many of these women from traveling repeatedly to these screening facilities. Despite the screening methods available, to further combat mortality from cervical cancer, the available prevention programmes need to be integrated with good referral systems to higher level treatment facilities for effective clinical outcome ("Cervical Cancer Action", 2012). Below is a statistical pie diagram from the GLOBOCAN (2012) which displays the estimated number of new cancer cases by regions. The two regions displayed are the more developed as well as the less developed regions. From the figure below, we see that cancer of the cervix (cervix uteri), accounts for 5.5% of the population of all the less developed regions while nothing is recorded in the more developed regions. (Torre et al, 2015). This information adds more emphasis on the fact that cervical cancer can indeed be cured if diagnosed and treated early. This also gives an indication that with better access to cervical cancer treatment as well as its detection and prevention methods, it is possible not to have any new emerging cervical cancer cases. In their analysis, Torre et al, (2015), reported

20an estimated 527 600 new cervical cancer cases and 265 700 deaths worldwide in

the year 2012, with 90% of the deaths being in the developing countries. Of these developing countries reported, Africa has 60 100 deaths by cervical cancer and one of the leading country is the Southern Africa. 2.2 Treatment of Cervical cancer It is estimated that by 2030, approximately 800 000 new cervical cancer cases will be diagnosed annually if preventative and treatment measures are not successfully implemented. ("World Health Organization", 2016). Although HPV vaccination is known to be part of the comprehensive approach to cervical cancer prevention which was initiated by the WHO in 2009, the fact remains that it will not reach all the people who need it due to the diverse geographical settings and the cost to roll it out to those settings especially in the rural KwaZulu-Natal. It is therefore important to also put more emphasis in making sure that treatment measures in place are used effectively to allow for optimal control of cervical cancer. Treatment for cervical cancer includes surgery, radiotherapy, chemotherapy or a combination of all three; however, the decision to select the type of treatment modality to use

> 11depends on various **factors such as the stage of the cancer, the** age of the patient **and** the **general** health condition **of**

the patient. ("American Cancer Society", 2016). The progression of cervical cancer ranges from the early stage which is defined as FIGO clinical stages IA1 to IIA which mean that the disease is confined within the cervical portion to the upper vagina with no invasion to other surrounding structures. For these stages treatment will be conisation to preserve fertility or a simple hysterectomy without pelvic node dissection if fertility is not of concern. (Wang, 2007). For stages above the early stages mentioned, which are anything from the locally advanced clinical stages IIB to IVA which mean that the disease is likely to have invaded other surrounding structures, the treatments are either the class III Wertheim's radical hysterectomy with bilateral pelvic lymph node dissection, postoperative radiotherapy, concurrent chemo radiotherapy (CCRT) or a combination of all. (Wang, 2007). 2.3 The role of surgery as a treatment of cervical cancer Surgery is defined as

> 3**an ancient medical specialty that uses operative manual and instrumental techniques on a patient to investigate or treat a pathological condition such as disease or injury, to help improve bodily function or appearance or to repair unwanted ruptured areas. The** indications of **surgery**

for the management of cervical cancer are to diagnose and confirm the presence of the disease, to determine how far the disease has spread if confirmed to be present and lastly to remove the tumour mainly for early stage cervical cancers. Removal of the tumour for early stage cervical cancer is often dependent on whether the patient wants to preserve fertility or not. The stages suitable for surgery as an option for cervical cancer treatment are include stage 0 also known as carcinoma in-situ (CIN), where the

> 16cancer cells are only in the surface layer of the cervix and have not grown into deeper layers

of cells; stage IA1, where the treatment option is largely dependent on the wish of the patient to preserve fertility but only if the cancer has not grown into the blood or lymph vessels, in these cases a cone biopsy will be done after which the woman will only be watched with no further treatment

16as long as the cancer does not come back.

8(https://www.cancer.org/cancer/cervical- cancer/treating/by-stage.html)

For women who do not want to preserve fertility despite of the early stage, then a simple hysterectomy will be done where there is no lymph node invasion or a radical hysterectomy with removal of pelvic nodes will be done where lymphovascular invasion is evident.

8(https://www.cancer.org/cancer/cervical-cancer/treating/by-stage.html)

2.4 The role of radiotherapy for cervical cancer treatment As the prevention and treatment of infectious diseases such as AIDS continue to improve over the years, on the other hand cancer treatment continues to grow as a concern. (Zietman, 2014). Radiation therapy as one of the modalities required to treat cancer continue to play a vitally important role especially

1for the treatment of cervical cancer

to patients in the low- and middle income countries despite that its underuse still remains staggering. (Zietman, 2014). The important role that radiotherapy plays as a cancer treatment modality and the emphasis of its scarcity to the developing countries has become popular for many researchers in this field of study. Hanson, Stjernsward, Nofal and Durosinmi-Etti (1990) had long ago described the importance of radiotherapy as a treatment modality to the overall health programme as strongly related and highly influential to the social, economic and educational development of the population that needs the service. They further stressed that many people still had no access to this service in the developing countries despite the rapidly increasing incidence of cancer in those countries. (Hanson et al, 1990).

1The treatment of cervical cancer using radiotherapy is

indicated

1according to the American Cancer Society for clinical

stage 1A2 up to stage IVB.

8(https://www.cancer.org/cancer/cervical-cancer/treating/by-stage.html)

Radiotherapy as a treatment option is given both as external beam as well as using Brachytherapy which is radiation given internally, together both treatments will generally take 5 -7 weeks to complete (Mohanti,

Mukhopadhyay, Das, Sharma and Dash, 2011). "The National Comprehensive Cancer Network" (NCCN) (2013) supported the statement through a report that stated that for optimal coverage of microscopic nodal disease for cervical cancer, the course of radiation treatment requires a dose of 45Gy in conventional daily treatment doses of 1.8Gy - 2Gy and a boost to the gross disease of another 10 – 15Gy. This in total is delivered over 5 – 7 weeks.

> 2Radiation therapy treatment is often used in the management of patient with cervical cancer either as definitive for those with locally advanced disease or for those who are poor surgical candidates or as adjuvant therapy following radical hysterectomy for those who have one or more pathologic risk factors

("NCCN", 2013). According to the "NCCN" (2013) the use of radiation therapy is considered the standard of care for treatment of cervical cancer. This view was also supported through a study conducted by Du, Tao, Sheng, Lu, Yu, Wang, Song, Li and Pan (2012) which concluded that the use of radiation therapy in the form of intensity modulated radiation therapy technique improved dose distribution, gave lower toxicities and a significantly higher disease progression free survival. With all of the above said, it is also important for the purpose of this research to mention that much as this mode of treatment is vitally important for cervical cancer, it involves very complicated sequence of processes prior to its delivery all of which cannot be avoided for treatment to be undertaken. (Datta, 2015). The challenging part with these processes which especially form part of poor access to such facilities being accessible anywhere, are that each process has its own equipment different from the other to put together a required radiation dose of treatment. (Datta, 2015). To produce cancer treatment using radiation therapy, all patients would have to undergo all the processes as shown in figure 2.3 below which are: treatment simulation using

> 5a conventional simulator or computed tomography-based simulation

machine used to provide digitally reconstructed images of the area to be treated; tumour and normal structure contouring and calculation computers with special software called the treatment planning system and then finally, the patient goes to the actually treatment delivery machines which are offered in different models depending on the affordability to that specific facility where they are available. (Datta, 2015). Given the researchers experience through working as a professional in this field, to add to the above mentioned challenge, all these processes do not take happen in one day, especially

> 5in the low-and middle income countries where a high number of

patients are being managed daily. Each process is allocated its date to a certain number of patients daily and normally 3 to 4 weeks apart to allow ample time to cover all patients before their actual treatment is given. During radiation therapy treatment, the patients will either be traveling daily from home if they live closer to the treatment facility or they will be admitted in hospital if they live far away from the hospital. Either way, the patients still incur social-economic burdens as most often the cancer patient and family members are faced with the double dilemma of dealing with the diagnosis as well as meeting the financial burden that comes with the treatment (Mohanti et al, 2011). 2.5 The role of Chemotherapy as a treatment for cervical cancer Chemotherapy is defined as

19the use of any drug to treat any disease. But to most people, the word chemotherapy means drugs used for cancer treatment.

There have been a number of studies done to find improved ways of treating locally advanced cervical cancer, and in

41998, the "National Cancer Institute" convened to review the results of clinical trials done in the United States of

America that investigated the role of chemotherapy when given concurrently with radiotherapy. After 20 years that investigations had been running, Rose (2006) concluded that a comparison of

4cisplatin based chemoradiation to radiation alone, showed a significant reduction in the risk of recurrence and death with cisplatin –based chemoradiation.

This discovery therefore brought about a paradigm shift from radiotherapy alone as a standard of care for locally advanced cervical cancer treatment to concurrent chemoradiation therapy as a goal standard of care where chemotherapy was then given weekly as a concurrent treatment to radiotherapy. (Rose, 2006). A similar study by Wang (2007), was also conducted to a group similar group of patients in Taiwan, and in his study he concluded that for locally advanced treatment of cervical cancer which is (stage IIB – IVA), when a combination of cisplatin and 5-flourouracil was used as radiosensitizers during the radiotherapy and brachytherapy treatment, there was improved local control rate, progressive-free survival and overall survival. This then proved that when chemotherapy is given concurrently with radiotherapy and brachytherapy for cervical cancer treatment commonly now known as concurrent chemoradiation therapy, there was better outcome in the disease management, hence the going trend since the results of that study has been a replacement of radiotherapy alone with concurrent chemoradiation therapy. (Wang, 2007). The literature background provided above put a lot of emphasis on the incidence of cancer as well as the internationally recognised and prescribed standard of care and its treatment particularly for cervical cancer, the content also gave a clear picture on the urgent need to improve our health care system to provide for improved access to such available treatment options. It however still remains an unfortunate reality that the issue of health disparity has not been resolved to this point, hence continued research and more publications are a vital requirement to overcome this problem. An aggressive

15health services research which largely concerns itself with the factors influencing the vital need for improved health services, better access to these services, quality and economic effectiveness, is vital to assist policy makers of the

health system in making informed decisions when allocating health resources. (Hanna and Kangolle, 2010) The content that follows aims therefore to give a picture of the need for more research in this area drawing from the little published literature available related to the researched topic. The following part of the literature

review gives an overview of the of the different areas of concern which led to the research through a discussion and findings of various publications of similar research done previously by other researchers. The aim of the researcher with this section sought to integrate the findings of literature available which relates to the researchers topic, in order to strengthen the motivation for this research. The following section of this chapter therefore covered the following topics: 2.6 Challenges of Access to Radiation Therapy treatment Access to radiation therapy particularly for rural communities continues to be a global challenge and a research gap that has not been fully exhausted especially in South Africa. The majority of studies available relating to this research reflects mostly information published from international sources highlighting the challenges of access to better cancer care for their indigenous people. A study by international experts from leading global cancer organizations revealed that the odds of surviving cancer for individuals or even receiving any type of cancer treatment are strongly dependant on where that individual lives ("CanTreat", 2010). The "Tripartite National Strategic Plan for Radiation Oncology" (2012) also attested to the previous observation and stated in their report that one of the barriers to access of radiation therapy to patients is the proximity of patients to radiation treatment facilities. The report further highlighted that those remote and rural patients who often need to travel to the city daily to receive radiation treatment for weeks find the financial impact to be prohibitive ("Tripartite National Strategic Plan for Radiation Oncology", 2012). The report also concluded that it was due to the lack of better access to radiation therapy treatment that people with cancer in the rural and regional areas were 35% more likely to die within 5 years of diagnosis compared to those that lived in the city closer to those services ("Tripartite National Strategic Plan for Radiation Oncology", 2012). A study in New South Wales on improving radiotherapy in Australia reported the importance of radiation therapy as the most common cancer treatment such that internationally accepted benchmarks indicated that at least 50% of cancer patients will require radiotherapy during the cause of illness (Barton, Graeme, Crossing and Bull, 2009). The study further reported an estimated 36% of cancer patients in NSW that will receive radiation therapy treatment and that being largely due to lack of facilities in the rural NSW regions. The importance of receiving radiation therapy is also reported in this study to provide the maximum possible cure rates and the best quality of life (Barton et al, 2009). Optimal location of radiation therapy facilities has always been a challenge and therefore historically these facilities were located in larger academic hospitals which were most often in the cities and to date the status quo remains especially in South Africa. The main problem encountered with this system is that the patients have to travel long distances to get their cancer treatment or alternatively stay away from their families for a prolonged period during their cancer treatment (Satibanez, Gaudet, French, Liu and Tyldesley, 2014). The ultimate outcome to the challenges of difficult access to radiation therapy was therefore reported to have caused patient dissatisfaction due to the increased financial burden and reduced radiation therapy utilization (Satibanes et al, 2014).

1A report by the

"American Society of Clinical Oncology" (2014) reflected on the access of quality cancer care still being uneven despite the estimated 45% increase in new cancer cases by 2030 in America. The report further highlighted some of the challenges being not only urban geographical concentration and rural gap, but also the high shortage of the radiation oncology workforce especially the greater need for workforce diversity with the currently increasing racial and ethnic disparities in cancer care ("American Society of Clinical Oncology", 2014). In support of the above report, "Econex" (2010) also stressed in its findings that the demand side issues in South Africa are not the only factors affecting the market for cancer care, but in reality South Africa faces a severe supply constraints in the provision of cancer treatment. In KwaZulu-Natal, the estimated population in the year 2010 was 10 449 300 with only 21 active radiation oncology doctors. The estimated ideal number of linear accelerators as radiation therapy machines was 32 to cover both private and public

cancer facilities; however, only 11 were reported available and all located in the urban tertiary hospitals ("Econex", 2010). To help combat cervical cancer in KwaZulu-Natal, the United States Agency for International Development (USAID) donated more than 5 million worth of medical and surgical equipment which sought to improve the screening, prevention and treating up to 1 million women for cervical cancer ("Embassy of the United State", 2010). The initiative was inspiring and judging from the estimated increasing demand figures by "GLOBOCAN" (2012), in sub Saharan Africa it was clear that the level of awareness had indeed increased with the help of effective screening and services that facilitated early detection ("International Agency for Research on Cancer", 2013). Hanna and Kangolle (2010) in their study also put a strong emphasis which supports that indeed there continue to be limitations in cancer care resources despite the frequently reported annual increasing incidence of cancer in the developing countries. Their finding also supported what was found by Barton et al (2006) which stated that there was a general inadequacy of radiation machine supply in the developing countries to meet the high demand. Furthermore, Hanna and Kangolle (2010) even gave an example of Tanzania as one of the developing countries where breast and cervical cancers were the most common killers of women yet the country with its its population of 42.5million people, only had two radiotherapy machines when the need for such a population requires about 45 of those machines. Datta, Heuser, Samiei, Shah, Lutters and Bodis (2015) in continuing to back up findings of studies that reflect challenges in access to cancer care, also pointed out in their study that over and above a global rise in new cancer cases of 57%, there is also another expected 40% increase in cancer deaths and that being mainly due to the lack of treatment facilities, especially radiotherapy. They also continued to attest to an earlier finding that, atleast 50% of patients diagnosed with cancer will require radiotherapy as their treatment of modality. (Datta et al, 2015) Although ample data describe the benefits of radiotherapy for cancer control, the cost of equipment and development of skills seem an overwhelming challenge to provide these services as the steep cost of radiotherapy equipment largely deters establishment of facilities that offer this vital cancer treatment. (Datta et al, 2015). In a study that looked at the need for radiotherapy in low and middle income countries, Zubizarreta, Fidarova, Healy and Rosenblatt (2014), reported that the challenge was so serious reflecting the range of the need for radiotherapy that was covered in Latin America and Africa between 0% and 4%. Datta et al, (2014) in another study which looked at the

> 21Radiation Therapy infrastructure and human resources in low- and middle-income countries,

mentioned that despite the major challenge in accessing radiotherapy to cancer patients being affordability, other challenges which

> 1play a significant role in the holistic management of cancer

were intellectual capacity which include

> 21radiation oncologists, medical physicists and radiation therapy technologists.

To overcome these challenges Datta et al (2014) reported an estimated need for the respective intellectual capacity to be 12149, 9915 and 29140 by 2020. 2.7 Distance as a factor to poor access of cancer care The

most common challenge which most developing countries face pertaining better access of cancer care is the issue of distance and the geographical locations of facilities that offer cancer treatment services especially the ones that also have radiation treatment machines. This observation was also made by Hanna and Kangolle (2010), where they mentioned that geography on special accessibility to cancer treatments remain a significant barrier to access because they continued to say, facilities with radiation treatment machines in most developing countries were often located at fewer sites and normally in the city. Although

5radiation therapy could be used as a sole modality of treatment

to cure cervical cancer or in combination to surgery or chemotherapy, in other cases where the doctors perceive a curative chance especially if the stage is early and to avoid any chance of spread, all three treatment modalities may be used, and if that is the case, the travelling to access all these treatments will increase and in cases of long distance traveling, this means high traveling costs to patients or if possible an even longer stay in the hospital away from family. Given all these challenges, a lot is likely to happen to different categories of these patients. Those who were working were at risk of losing their jobs, those with small children back home had to pay nannies so that their children had someone to look after them. Other issues which were also social problems were of married women who also feared that they were likely to have challenges in their marriages while they were away from their homes receiving radiation treatment due to its length. To support the above statement, Pisu et al (2017) in their study further alluded that in addition to the travel costs which the Canadian rural cancer patients were reporting, they also incurred child care costs which were paid in different forms, either through hiring people care for their children or having to buy assisting family members gifts as a token of appreciation for staying home with their children while they were receiving cancer treatment. 2.8 The socio-economic impact of NCDs due to poor access to better health care In their report, the WHO stated and showed in the form of flow diagrams the impact which the NCD epidemic exerted onto the socioeconomic wellbeing globally as well as how rapidly that impact was also rising in the low-income countries among the poor. (WHO, 2011). The flow diagram below (Figure 2.4), provides a description of how poverty contributes to NCDs and how NCDs also contribute to poverty. The Centre

9for Disease Control and Prevention (CDC) provided factors that contribute to health disparities in cancer,

and the one factor which was relevant to use as a better explanation to figure 2.4 above was the socioeconomic status (SES) and how it affected the health of people. (https://www.cdc.gov/cancer/healthdisparities/basic_info/challenges.htm). The CDC categorised the SES into two groups, whereby the first group was a high SES group, in which people belonging to this group were said to have some form of tertiary education, earn an above average income and have a full time job thus were able to get better health care, and the second group was called a low SES group with people who have no education or may have not finished school, do not earn enough money and are either unemployed or have a low paying job and thus could not afford to easily access health care. (https

9://www.cdc.gov/cancer/healthdisparities/basic_info/challenges.htm).

The people with a low SES were said to be at a greater risk of acquiring NCDs because most would not

worry much about any preventative measures available like cancer screening because they do not have money to seek medical intervention and yet they are likely to have behaviour like engaging in risky sexual activity which increase their chances of acquiring NCDs which they will not be able to adequately treat due to being low SES. (https

> 9://www.cdc.gov/cancer/healthdisparities/basic_info/challenges.htm).

2.9 The out-of-pocket costs challenge Financial barrier is an area which has shown a high impact in the lives of people diagnosed with cancer to a point whereby literature has drastically increased in this area. The issues mostly reported are similar and are related since they mostly address challenges faced by cancer patients in who are from the rural areas. Since this study also looks at the rural patients with cancer of the cervix, the researcher saw it necessary to highlight the various issues that looks as finance as a barrier to patients accessing cancer treatment, by sharing some of the findings in the literature available. In the study where they looked at the perceptions of

> 7health care provider' s strategies to limit out of pockets costs for cancer care,

Mathews, Buehler and West (2009), reported that rural patients who are scheduled to undergo radiation as their cancer treatment which was most often a common thing incurred considerably high costs due to long distance travel or cost pertaining to them having to use lodger facilities close to the hospital. Pisu, Azuero, Benz, McNees and Meneses (2017) in a similar study which looked at the out of pocket costs and burden among rural breast cancer survivors, reported findings that supported the one before, stating that accessing cancer care for rural patients in an uphill financial battle, due to the need travel long distances just to visit a doctor as well as receive care, a situation which they said also affects the choice of treatment which cancer patients end up making to avoid high cost. They further mentioned that given the long distance travel to treatment centres, most rural patients chose to obtain lees care so that they incurred lower cost. (Pisu et al, 2017). A study on the financial toxicity of cancer treatment reported a behavioural change by patients when they were confronted with high out of pocket cost for their cancer treatment whereby most were reported to either sell their possessions or even work extra hours if they could just to be able to pay to access their cancer treatment facilities. Some patients were also reported in the same study to be replacing prescribed medication by using over the counter medication in order to defray costs. (Zafar, Peppercorn, Schrag, Taylor, Goetzinger, Zhong and Abernethy, 2013). Another significantly important area of concern as an added challenge to accessing cancer care for patients from rural areas was the issue of employment. Different studies do agree that most people from the rural areas are either self-employed or have part time employment. Mathew et al, (2009) reported that such patients often did not even have sick leave benefits which therefore ended up with the patients losing their income due to being absent from work during their cancer treatment or recuperation from illness. Pisu et al, (2017) also supported that statement by sharing reports from their study where rural cancer survivors had reported to have lost their employment due to deteriorating physical and mental health due to cancer. A study by Zajacova, Dowd, Schoeni and Wallace, (2016), which looked at the employed and income losses among cancer survivors, quantified this issue and showed that the effect of cancer and its treatment saw the probability of cancer patient being employed drop by 10% and that the hours those patients were capable of working dropped by 200 hours. They further reported that annual earnings for the cancer patients had dropped by 40% decreasing the total family income for these patients by 20%. A similar study which looked at the

7out of pocket costs for accessing adjuvant radiotherapy among Canadian women with breast cancer,

quantified the total cost to access radiotherapy treatment for these patients reported to be 445 Canadian dollars which is about R4300 if the patients are housed in hospital, 122 Canadian dollars weekly for women who had to travel daily to access their treatment which is approximately R1200 weekly. (Lauzier, Levesque, Drolet, Coyle, Brisson, Masse, Robidoux, Robert and Maunsell, 2011). Although the results of their study reported a 80% drop in costs when patients received their treatment while staying in hospital, Lauzier et al, (2011), however, the study also concluded that it was important that financial assistance be provided for both patients who had to travel daily as well as those who had to lodge closer to the cancer care centre to receive their treatment. 2.10 Resources required to improve access to Radiotherapy Radiation therapy continues to be regarded as the most important component for treatment of cancer especially in the low income countries where the majority of people due to the inequities in the health systems in those countries always present at the late stages of the disease. It has been noted from the above narration that there is a strong relationship between the socioeconomic state of people living with NCDs like cancer to poverty and it goes without saying that a paradigm shift is required if improvement was to be achieved. Datta et al, (2014) reported on the affordable user fee for radiation therapy and social security, by suggesting that in the low income countries, governments could frame the budgets for the health care such that the social grants for the patients from the low socioeconomic strata could cover the treatment costs and rehabilitation as well as compensate for any salary losses. The Directory of Radiotherapy Centres (DIRAC), which according to Abdel-Wahab et al (2013) was described as a computerised international registry of radiotherapy centres, a database which is controlled by the International Atomic Energy Agency (IAEA) and contained information on which countries have equipment that treat cancer with radiation therapy. Such a database plays a vital role because it was reported that it provided statistics which showed the availability of radiation treatment machines globally. Abdel-Wahab et al (2013) reported that the database in 2010 had reported 13250 registered radiotherapy machines worldwide to a population of 6.68 billion people. The statistics continued to report that an

10average number of radiation therapy machines per million people were 1.99 for the whole world, 0.71 was for the lower-middle income countries

and only 0.21 for the low-income countries. (Abdel-Wahab et al, 2013). These statistics therefore provided a clear indication of how disadvantaged the African countries were with respect to the availability of radiation therapy equipment hence the need or a strong joint collaborative effort to reduce the gap and come up with drastic measures to improve radiation treatment resources for better access. (Datta et al, 2014). The flow diagram below, therefore provide a picture of how the collaboration could operate which comprised of a multicompartmental but interdependent and integrated approach for countries, manufactures and international agencies was put together. (Datta et al, 2014). The Independent Clinical Oncology Network (ICON) (2012) also presented a similar concept which sought to resolve what the National Health Insurance regarded as the fragmented healthcare system, by introducing an approach aimed at integrating both the private and public sector for optimal cancer management given the complexity and cost of cancer management as shown in figure 5 and 6 below. The above ideas for collaborative efforts to improve cancer care continued to gain more support, with many articles being published which provided more information attesting to the importance of collaborative work between the public sector and the private sector in order to

improve cancer treatment. Nosworthy (2012) in an article titled challenging multinational companies in healthcare and related fields to put their money where their profits are emphasized the need for a coordinated effort to share the burden of cancer management. And through the formation of the Innovative Cancer Care Foundation, Nosworthy (2012) and a multidisciplinary team of professionals started this non-profit organization with the aim to improve Oncology facilities in the public institutions through proving their time, intellectual capacity and other needed benefits to lower the hardship experienced by cancer patients when accessing their treatment. 2.11 Summary Concerns over the issue of rural cervical cancer patients are not novel; they go back a long way and have been investigated a lot. What is novel is the degree of attention focused on the issues pertaining to the poor access due to out-pocket cost and societal costs burdens to these patients. The issues that interrogate all the related costs to patients who have to receive radiation treatment as well as their societal burdens should be recognised so that discussions in the boardrooms of policy makers can focus on the optimal placements of radiation therapy machines to ensure access to appropriate care to this population and avoid unnecessary death from a curable disease.

10Although progress has been made in the establishment of radiation oncology services in most African countries,

however, optimal placement of these services remain a challenge especially with the increase in cancer awareness in the rural settings. Since radiation therapy treatment remains

20a vital modality in the treatment of cervical cancer

for the rural population due to the disease presenting at a late stage, comprehending the issue that render the improved access to radiation therapy services a success and interrogating more the issues of a collaborative approach to cancer management by all affected stakeholders can assist to pave a way for future investment in course to fighting cancer as well as improving the health care system in our setting. (Datta et al, 2015) (Peppercorn, 2017) (Abdel-Wahab et al, 2013).

12CHAPTER 3 RESEARCH METHODOLOGY 3.1 Introduction In the content of this document the

researcher has discussed the method used to conduct the study. The topics covered in this chapter include the study design, the target population, and the selection of the sample size, the data collection tool and the duration of the study. The researcher requested permission to conduct the study from the

13University of KwaZulu- Natal Ethics Committee and from the management of

Greys hospital, which is one of the Tertiary institutions under the

13KwaZulu-Natal Department of Health where the

cervical cancer patients from the rural Western region of KwaZulu-Natal receive Radiation treatment. The

participants were selected using the judgement sampling method which is one of the types of purposive sampling. This method involves the choice of subjects who are conveniently available to provide the desired information for the study and according to its definition it was perceived as the viable sampling method for this research. For the study, the researcher used specifically cervical cancer patients who have received radiation treatment at the Greys Hospital Oncology unit (Sekaram and Bougie, 2013). The decision in terms of choosing cervical cancer patients as a population for sampling was informed by the statistical information of the incidence of this type of cancer amongst rural patients referred to Greys Oncology for treatment and the high volume of these patients currently being treated at Greys Hospital. The researcher conducted the research by the use of a questionnaire as a tool. The choice of using a questionnaire was informed by the fact that majority of the cervical cancer patients treated at Greys Oncology from rural Western KwaZulu-Natal are elderly and illiterate, therefore, the researcher with the help of a bilingual staff of member assisted the participants by reading out the questions and a selection of optional answers to choose from. The research was conducted in isiZulu. The researcher used an office in the institution where she called each participant and face to face read out the questions to the participants and the Zulu speaking assistant then explained to the patient what the question is asking as well as assisted the participants in selecting the answers which was relevant to the participant by ticking in the box allocated next to the answer. This method was beneficial to the study because it allowed the researcher to explain complex questions to the interviewee where necessary and also allowed the researcher to control the context and the environment in which the interview took place. The setting used to collect the data was conducive to obtain accurate responses from interviewees because they were familiar to it therefore they were comfortable. The data was collected over a period of twelve months (June 2015 to June 2016). 3.2 Research Objectives The study will be guided by the following objectives: ? To investigate the socio-economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal. ? To investigate the out of pocket cost to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit ? To investigate ways of improving access to radiation treatment for cervical cancer patients to minimize the socio-economic burden to the cervical cancer patients from the rural Western KwaZulu-Natal ? To investigate strategies available for recommendation to improve access to radiation therapy to cervical cancer patients from the rural Western KwaZulu-Natal 3.3 The research design A descriptive quantitative research study design was used. This study aimed to describe how the cervical cancer patients that were selected as a sample after permission was granted would benefit socio-economically should they be granted ways to better access Radiotherapy for their cancer treatment. 3.4 Target population The target population for the study was patients diagnosed with cervical cancer whose prescribed primary treatment option was radiation therapy. The patients selected were the ones that reside in the rural Western KwaZulu-Natal. The target population was only cervical cancer patients treated at Greys Hospital Oncology unit, who come from the following districts: uThukela District Municipality (DC23), UMzinyathi District Municipality (DC24) and Amajuba District Municipality (DC25). 3.5 Selection of sample size The sample size for the research was worked out using the confidence interval approach. The confidence interval approach is defined as a more enlightened approach for sample size estimation and it is an approach that allows the researcher to put acceptable bounds on the estimate of the population from the sample size computed (Sekaram and Bougie, 2013). The cervical cancer patients at Greys Oncology are always booked for first consultation every Monday. A maximum 10 patients are booked weekly and at least 6 do show up for the appointment.

1According to the National Comprehensive Cancer Network guidelines

for cervical cancer version 2 (2014), the primary treatment for cervical cancer of clinical stage IA to stage IVA with lymph vascular space involvement should

1be treated with radiation therapy. Cervical cancer

was a disease type of choice for this study because a majority of patients referred to Greys Oncology are diagnosed with cervical cancer and most of which present between stages II to stage IV. Radiotherapy therefore becomes the first line treatment of choice for these patients. 3.6 The

22research instrument and data collection Data was collected using a self-designed structured

questionnaire. The

22questionnaire was formulated in English and translated by the data assistant who is

bilingual into isiZulu being the language spoken by the target sample. The questionnaire used closed-ended questions. The questionnaire was legibly typed and it was divided into the following sections: Section 1: Socio-demographics. This section looked at the age, marital status, and number of children, educational status, employment status and earnings of the participants. Section 2: Costs incurred due to geographic location. This section was used to acquired information regarding the out of pocket cost incurred for traveling to treatment site as well as the well-being of the family members who were left back home during the 5 – 7 weeks course of radiation treatment. Section 3: Preferences and options for better access. This section acquired information which looked at the participant's response to whether they preferred being treated closer to home or not if that option was made available to them. The researcher read out the questions to the interviewee in their preferred language and the interviewee was then assisted by the data assistant to select the answer they wanted from the option of answers listed in the questionnaire. 3.7 The pilot study The pilot study is defined as the mini-version of a full-scale study done before the complete study (Ndlovu, 2011). Prior to the formal data collection exercise, a pre-testing of this method was piloted by the researcher to 6 participants to check if the questionnaire was understandable to the participants. The pilot study was done on a small size sample with cervical cancer patients comparable to the actual sample of the bigger research. This was conducted at the same venue as the bigger research during the early stages of the questionnaire formulation to identify any possible mistakes or items in questionnaire that might have needed to be corrected ahead of the bigger study. 3.8 Ethical considerations Since the research involves human subjects, the researcher's responsibility was to follow good clinical practice guidelines and human right principles to make sure participants are protected (Ndlovu, 2011). The researcher therefore needed to maintain participant's privacy, needed obtain informed consent from the participants, needed to allow voluntary participation as well as explain in detail to the participants what the study was for, how the information was going to be used and whether there was any potential risk to the participants (Ndlovu, 2011). Ethical clearance approval was requested by the researcher from the

13University of KwaZulu-Natal Ethics Committee

as well as from the

13KwaZulu-Natal Department of Health prior to conducting the

study. 3.9 Confidentiality and anonymity For the purpose of the participant's anonymity, the researcher did not use the names of the participants on the questionnaire. The participants were however asked to fill in informed consent forms which was only there where their names were written and a signature or thumb print was done by the participants as proof that they were willing to participate and not put under any obligation by the researcher or the data assistant. The consent forms were then kept and locked in a separate placed from the questionnaires. Both documents were kept in a safe locked place by the researcher for confidentiality purpose for the duration of the study. 3.10 The consent The informed consent was obtained from the participants in either written form for those that can write or by putting a thumb print for participants who could not write. 3.11 Limitations of the study Since access to radiation therapy for rural KwaZulu-Natal (KZN) communities continues to be a challenge for the whole province, for a better generalization of the research, it would have carried more weight for the study to select participants from all the KZN districts. For convenience therefore, the researcher only selected participants from only three districts which have been indicated in a map (see attached annexure A). Patients from the rural KZN present with many different cancer types which are also treated with radiation therapy which the researcher could have included in the study to allow for the generalization, however, the researcher only used cervical cancer as a specific type for the study. This gives leaves a gap which may require further research using other cancer types for a similar research topic. The researcher's choice of data collection approach could be viewed as bias because of the way in the questions were asked, since some questions were interpreted to the participants for more clarity in a way that seemed to lead the participants in selecting answers due to the literacy barrier. 3.12 Summary The content of this chapter has provided a comprehensive description of the chosen research method used by the researcher which included the research objectives which were used to guide the study, the full outline of the research design, the target population and the method for the selection of the sample size. The researcher has also given a full description of the research instrument used and the data collection method which the research had first piloted before resuming the full research. Ethical consideration being the vital part of conducting any research has been included with an indication of how the confidentiality, anonymity and informed consent were administered by the researcher. Finally, the researcher also indicated limitations to the study, which highlighted the need for further research in this area.

12CHAPTER 4 PRESENTATION OF RESULTS 4.1 Introduction The aim of

this analysis is to estimate the socio-economic status (SES) impact of better access to cancer treatment for cervical cancer patients.

18SES has been correlated with an individual's skill development, academic achievement, work and life outcomes, and overall psychological and behavioural well-being.

Therefore, this statistical analysis will access education attainment, wealth, and income and employment to derive a uni-dimensional measure of SES. 4.2 Method Data analysis was performed using IBM SPSS Statistics version 23. First, we described components of the study sample using frequencies and measures of central tendency. Then a descriptive analysis of each component was generated by means of the average

and standard deviation, median, mode, and 25th to 75th percentile. The first step to derive uni-dimensional measure of SES was to perform a principal component analysis. 4.3 Socio-demographic 4.3.1 Age of participants A total of 74 participants completed the questionnaire. With regards to their socio- demographic information, it was found that more than half of the participants (56%) were older than 50 years 4.6 Summary This chapter presented the results of the study which were laid out to firstly outline the socio-demographic. That section covered the age, marital status, number of dependants, educational status, employment and the income statuses of the participants. The results of the first section were aimed at revealing the socio-demographics of the participants so that the findings would assist in answering the first objective of the study. The second section of the result presentation was aimed at showing the costs incurred by the participants when going to and from the treatment site. These results sought to assist the researcher in responding to the second

7objective of the study which was to investigate the out-of-pocket costs

of patients who received radiation treatment. The final section of the results presentation presented a statistical analysis which showed the comparisons of the variables and whether or not they have any statistical significance to assist with achieving the research objectives. The following chapter will provide a narrative discussion which interprets the result findings. CHAPTER 5 DISCUSSION OF RESULTS 5.1 Introduction The aim of this study was to investigating the economic benefit of better access to radiation therapy treatment to women with cervical cancer in rural KwaZulu-Natal, South Africa. This chapter discusses the research findings presented in the previous chapter to show if the objectives as set out in chapter one were achieved. 5.2 Discussion The discussion below will provide a narrative that aims to collate the research objectives with the result findings to reach an informed decision as to whether the objectives set out were met and also to see if the researcher was able to answer the research sub-questions through this research. 5.2.1 Objective one: To investigate the socio-economic burdens of poor access to optimal cancer treatment for cervical cancer patients who are from the rural Western KwaZulu-Natal. Cervical cancer is a female disease and a leading cancer type treated at Greys radiation oncology with a maximum of 10 women booked weekly for their cancer treatment at the institution. The reason to investigate the socio-economic burden of poor access to radiation treatment for these women stem from their geographical background as all the participants were from the Western rural KZN, and because of their geographical setting they are regarded as underprivileged. These participants are said to be underprivileged because they live far away from the resources they require for their cervical cancer treatment and because of other factors such as poor referral patterns and long waiting time between consultation dates and poor screening programmes. These women often present in the late stages of the disease. The socio-demographic section of the results showed that 56% of the participants were above the age of 50years, 92% were a combination of illiterate and those that did not complete school. 43% of these participants were single women and 43% had more than 3 children while 58% were pensioners. These socio-demographics clearly give us a picture that the study had participants who were uneducated and likely to be unemployed and are single parents as well as sole bread winners in their homes. Given those statistical findings, it is evident that the participants were of a low SES as described in chapter two and it was for that reason that they had poor access to radiation treatment for their cancer. According to the WHO (2011) report, it was stated that there was a relationship between poverty and NCDs and the results of the study provided a quantified presentation to prove the above statement as well as the definition for low socio-economic status. Gillan et al (2012) in their study on barriers to accessing radiation therapy in Canada alluded to the importance of considering the geographical distribution of radiation therapy treatment centres to improve their accessibility to rural patients. The study further indicated that the education level or status of the patients with cancer also posed a barrier to access cancer treatment due to lower levels of awareness as well as low income because a majority are

unemployed or live on social grants, this could be related to lower rates of consultation thereby further increasing the socio-economic burden. (Gillan et al, 2012). Given the results of the study in the socio-demographic section, there is a strong possibility that the families of the participants will also suffer financial distress given that a majority of the participants were sole bread winners in the families. This statement was also reported by Delgado-Guay et al (2015), where they reported that the trajectory of illness to a family member does affect the family's financial status and they further mentioned that there are often direct out-of-pocket expenses related to buying new clothes for the sick person due to weight fluctuations related to cancer as well as diet and nutritional supplement required for the patient during and after the cancer treatment. The study therefore has answered the question related to the first objective and the objective was achieved in that regard. 1.2.2 Objective two: To investigate the out-of- pocket-cost (OOPC) to cervical patients who received radiation therapy treatment at Greys Hospital Oncology unit A study by Grover et al (2015) titled the systematic review of radiotherapy capacity in low-and middle-income countries, reported an update by the DIRAC database stating that South Africa and Egypt are the only two countries in the whole of Africa where 60% of the radiation therapy centres are found and that South Africa is the second country with the highest capacity. This information is true given the reliable source where it comes from, however, it does not provide the important information needed by the health care policy makers and other researchers about the poor geographical placements of these centres and the poor accessibility of these facilities to the population which lives in the rural parts of the country where there is usually no mechanism in place for improving access to these facilities since they are all concentrated only in the urban areas of the country. The statement above sought to introduce the reason why the second objective of this research was to investigate the out-of-pocket-costs (OOPC) incurred by the cervical cancer patients given their geographical displacement to the required radiation treatment for their illness. Pisu et al (2017) had indicated in their study as mentioned in chapter two that people affected with cancer, particularly those from the rural communities, need special attention with regards to the OOPC they incur from the time of diagnosis to the end of their treatment and what the side effects of these costs may be to this population. As Grover et al (2015) had mentioned that radiation therapy is the first line treatment for cervical cancer and considering the geographical placements of the radiation therapy facilities in relation to the distance where our rural cervical patients live, the issue of OOPC could not be avoided as part of this study. The results of the study for this section showed that 49% of our participants spent more than R70 per day on transport traveling to the treatment site. 82% reported not having a nanny to take care of their children while going for treatment, while 62% said they had no family assistance. 87% of the participants reported that they are the primary and sole providers of food for their families and 69% said they spent more than R700 on food for their household every month. In view of these results and given the length of the course of radiation treatment for cervical cancer as mentioned in chapter one, if the patient has to be away receiving radiation treatment for the duration mentioned, their families suffer especially if the patient as a majority had stated being the sole providers of food for their families. To avoid families from suffering, the patient will then be forces to travel home every weekend to make sure their families have food and given the transport fare indicated in the results, it is evident that these patients will also suffer a great deal of financial distress. An article by Sartorius et al (2016) about the future cost of cancer in South Africa, reported the financial toxicity of cancer to have affected 62% of the American population to a point of personal bankruptcy and that South Africa was also not immune to this pandemic given the shortage of radiotherapy treatment machines in the public sector especially in the poorer provinces. The increasing incidence of newly diagnosed cancers and the cost of cancer care in South Africa is said to have yielded incredible direct healthcare cost to the affected individuals coupled with loss of productivity as well as family income. (Sartorius et al, 2016). The results of the research therefore provide a significant relationship between the poverty and cancer management and therefore opens a much bigger platform to more research in this area to interrogate more similar research which addresses the feelings of the South African cancer patients especially given the unstable economic status and the increasing unemployment in the country. 5.3 Summary In this chapter a full discussion of the

research findings was done using relevant data presented in the previous chapter. The discussion was aimed at responding to the research objectives and the data presented was able to assist in achieving that. The following chapter will present the limitations of the study; recommendations based on the findings as well as provide a conclusion to the study.