QUALITY OF LIFE OF WOMEN WITH BREAST CANCER IN YAUNDE, CAMEROON

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ABSTRACT

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This study explored associations between sociodemographic and medical factors and quality of life (QOL) of 297 breast cancer patients at the Medical Oncology General Hospital in Yaunde, Cameroon. Data are from abstracted medical records, questionnaires and a QOL instrument, *FACT-B,* completed by participants. Summary QOL scores (*FACT-G, FACT-B, FACT-B-TOI)* include various combinations of subscales. Higher scores indicate higher self-reported QOL.

In adjusted models, total *FACT-G* scores were lower for women who; were ≥ 45 years, had stage II, III and IV disease and higher for women who; had an occupation, had monthly household income above 50,000 CFA/month, lived with husband/boyfriend and, who lived with families. Total *FACT-B* scores were lower for women ≥ 45 years and higher for women who; had an occupation, had monthly household income above 50,000 CFA/month, lived with husband/ boyfriend and, who lived with family. *FACTB-TOI* scores were lower for women who; were ≥ 45 years, had stage II, III and IV disease compared to stage 0/I and higher for women who; had an occupation, had monthly household incomes over 50,000 CFA/month, lived with husband/boyfriend and, who lived with families. Results suggest that clinicians should pay attention to QOL of African breast cancer cases who are older (> 45 years), live alone, have no occupation, have lower household income and who are diagnosed with advanced stage disease.

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CHAPTER 1

1.1 Background

1.1.1 Epidemiology of Breast Cancer

Breast cancer is a global major health burden in women. It is among the most frequent forms of cancer in women in both developed and developing countries. It accounts for over one million of the estimated 10 million neoplasms diagnosed globally each year. It is also a principal cause of cancer death among women globally [1].

Breast cancer is highly heterogeneous in pathology, in some cases occurring as a slow growth with clear prognosis and in other cases occurring as aggressive tumors [2]. Approximately, eighty-one percent (81%) of breast cancer cases are diagnosed among women of 50 years or older and about 90% of breast cancer-related deaths occur in this group of women[3].

There is an increased risk of developing breast cancer as a woman advances in age. Compared with lung cancer, breast cancer incidence is higher at all ages for women[3]. Of note, the risk of Estrogen Receptor (ER) positive breast cancer increases with age while the risk of ER negative breast cancer increases until age 50 and then remains constant. Therefore, postmenopausal women are more likely to develop Estrogen Receptor (ER) positive forms of breast cancer [4]. Some other factors which increase a woman's lifetime risk of developing breast cancer include inherited genetic mutations such as BRCA1 and BRCA2, personal history of certain non-cancerous breast disease as well as family history of breast cancer, having first pregnancy after

30 years, not breastfeeding and never having a full-term pregnancy, alcohol consumption and previous treatment using radiation therapy around the chest area, among others [5].

1.1.2 Global Incidence and Mortality of Breast Cancer

The burden of all cancer is expected to increase to 23.6 million new cases per year globally by the year 2030 if recent trends in major cancers continues. The continuing global transitions signal an ever-increasing burden of breast cancer especially in developing countries[6].

Among women in more developed countries (except Japan), world age standardized incidence rates of breast cancer are over four-fold higher than in women living in less developed countries. Breast cancer incidence rates increased rapidly in the 1980s largely due to the introduction of mammography screening. The overall rates stabilized by the 1990s followed by a slower increase during the latter part of the decade [7]. The rates of breast cancer in migrants from low-risk countries who relocate to high risk countries increase and eventually becomes similar to that in the high risk country over one or two generations[8].

Age adjusted breast cancer mortality rates in developed countries such as USA, UK, Canada and Netherlands are declining. Before the 1990s, there were stable or increasing breast cancer mortality rates in these countries. However, between 1990 and 1996, these countries started reporting a 5-17% decline in breast cancer mortality rates [9]. Since 1990 to 2010, there has been a decrease of 34% in breast cancer mortality rates in the US [7].

In a research by DeSantis et al., (2015), analyzing breast cancer incidence and mortality estimates from GLOBOCAN 2012, Asian countries which represent 59% of the global population accounted for 39% of incident breast cancer cases, 44% of breast cancer mortality and 37% of world's 5-year prevalent cases. The United States and Canada which represent 5% of the world's population accounted for 15% of world's breast cancer incident cases, 9% of breast cancer mortalities and 17% of 5-year prevalent cases. On the other hand, African countries which represent 15% of global population accounted for 8% incident breast cancer cases, 12% of breast cancer mortalities and 7% of 5-year prevalent cases [10].

Among the six WHO regions (African Region, Region of the Americas, South-East Asia Region, European Region, Eastern Mediterranean Region and Western Pacific Region), GLOBOCAN breast cancer incidence had the highest rate (67.6) in the regional office for the Americas and the lowest rate (27.8) in the WHO regional office for South-East Asia. The highest standardized mortality (18.6) was observed in the WHO regional office for Eastern Mediterranean and the lowest rate (7) was observed in WHO regional office for the Western Pacific [11].

1.1.3 Breast Cancer in Africa

Most African countries have limited breast cancer incidence data in Population Cancer Registries [12]. Although population based cancer registries may cover national populations, most cancer registries in Africa and other developing countries only cover smaller, subnational or selected urban areas [13]. In the absence of population based cancer registries, most information on cancer epidemiology in Africa comes from small clinical and pathological case series and this

information could have some inherent selection bias, which can affect the understanding of cancer epidemiology in Africa [14].

According to a five-year breast cancer survival analysis by Allemani et al., (2015), from 1995-2009, the net survival rates in developed countries were over 85% while North Africa had lower survival rates, for example, 59.8% (95% CI:48.6–71.1) in Algeria, 76.6% (95% CI:55.5–97.7) in Libya and 68.4% (95% CI:64.5–72.2) in Tunisia. Data from three sub-Saharan African countries showed even lower survival rates. For example, South Africa had a 5 year survival rate of 53.4% (95% CI:35.5–71.3), while The Gambia had 11.9% (95% CI:0–24.7) and Mali had 13.6%(95% CI:0, 0–30.1) [15]. It is estimated that more than 50% of women diagnosed with breast cancer in Africa die of the disease [16].

1.1.4 Breast Cancer Screening

Breast screening is performed in women without breast cancer signs or symptoms in order to detect breast cancer as early as possible [17]. Breast cancer is a progressive disease and small, sub-clinical tumors can be detected as early stage breast cancer. Some methods of breast cancer screening include physical breast examinations and mammographic imaging.

Mammography is the best studied breast cancer screening method and is the only method recommended for screening the general population of women [18]. Clinical trials and observational studies have established the importance of regular mammography in preventing breast cancer [19]. The American Cancer Society recommends that women should begin annual

screening at age 45 while the United States Preventive Services Task Force, recommends that

women without additional risks undergo mammography biennially starting at age 50. Screening

at the population level aims to detect early stage breast cancer among asymptomatic women.

This can drastically reduce the rates of morbidity and mortality from breast cancer since

mammography is the most efficient way of identifying early stage breast cancer in women [20].

1.1.5 Breast Cancer Staging

The stage of breast cancer can be assessed in three ways; tumor size, presence of nodal

metastasis, and presence of distant metastasis, represented as the TNM staging [21]. These stages

determine whether a breast cancer case is assigned stage 0, I, II, III or IV, with stage 0 indicating

non-invasive abnormal cells and stage IV indicating invasive cancers, thus, the cancer cells have

spread to other areas of the body outside the breast. According to several clinical and

experimental observations, the final step in breast cancer progression is metastasis [22].

There is also the Surveillance, Epidemiology, and End Results (SEER) summary staging system [23].

This summary staging classifies breast cancer as in situ (presence of abnormal cells that have

not spread out of the milk duct), local (cancer is confined within the breast), regional (cancer

has spread to nearby lymph nodes) and distant (the cancer cells have spread to other parts of

the body) based on the extent of spread of breast cancer cells [24].

1.1.6 Breast Cancer Subtypes by Receptor Status

There is a striking difference in breast cancer subtype distribution across populations. According to Huo et al., 2009, in a research analyzing over 500 breast cancer patients from different geographic regions in West Africa, only 25% of the samples were ER positive. The Hormone Receptor Negative subtype was predominant, and Triple Negative Tumors represented a majority of the breast cancer cases in West Africa [25].

Stark et al.,2010, in a study analyzing 1008 white American, 581 African American and 75 Ghanaian women with breast cancer observed the highest prevalence of Triple Negative Breast Cancer (TNBC) in Ghanaian women (82.7%), followed by African American women (26.4%) and white American women (16.9%). The highest proportion of ER positive and/or PR positive, HER2 negative breast cancers were observed in white American women followed by African American and Ghanaian women [26]. Der et al., 2015, also analyzed 233 breast cancer cases from Ghanaian women in Korle Bu teaching hospital and observed that 58.3% of the samples were triple negative while 23.3% of the sample were negative for ER and PR but positive for HER2. It is speculated that hereditary factors may be contributing to the patterns in breast cancer subtypes in women of sub-Sahara-African descent [27].

1.1.7 Breast Cancer Treatment

Treatment of breast cancer depends on the kind and stage of the breast cancer. Treatments include, surgery (lumpectomy, mastectomy, sentinel node biopsy etc.), chemotherapy, radiation therapy, hormonal therapy and biological therapy etc. [28]. The major therapeutic

modalities are surgery, radiotherapy and systematic therapy. The selection of treatment or combination of treatments for a breast cancer patient is based on the best existing treatments given the resources available [29].

Breast conserving treatments have increased since the 1980s. Over the past 30 years, significant advances in modern radiotherapy equipment and techniques have been achieved which have contributed to a reduction in complications and improved survival rates among breast cancer patients. Moving from traditional mastectomy to breast conserving methods initially posed a challenge and took time as many physicians could not believe that breast conservation was as effective as the more extensive surgery [30]. In high income countries, breast conserving surgery (BCS) is the most preferred surgical option for managing non-metastatic breast cancer. However, the opposite may be said about developing countries. In a study by Cubasch et al., 2017[31], in Soweto (South Africa), comparing the determinants of BCS and total mastectomy (TM), 354 (80%) out of 445 patients underwent TM and 91 (20%) underwent BCS. Nearly 40% of surgical patients were below 50 years and women younger than 40 years were more likely to receive BCS. The research concluded that TM was more common than BCS among the breast cancer patients in Soweto, both in patients with more locally advanced disease at diagnosis and patients in stage I and II disease.

Taylor et al., assessed the predictors of mastectomy in the Greater Western Region of Sydney and found that after adjusting for the clinical stage of disease, mastectomy was less frequent in younger women (39 years or less) compared to older women (OR= 0.48, p=0.05). Patients with

high SES had a statistically lower odds ratio (0.5) for mastectomy after adjustment for age and stage. While patients with larger tumors and more advanced disease stage had higher rates of mastectomy, histologic type was not statistically significant in predicting mastectomy. Mastectomy rates also decreased as the number of patients treated by the surgeon increased ($p<0.01$) [32].

Diagnosing breast cancer by subtypes is important for both prognosis and treatment of breast cancer. ER positive and PR positive breast cancers can be treated with hormonal therapies while HER2 positive breast cancer can be treated with therapeutic agents. Triple Negative Breast Cancer is the worse in terms of prognosis and is typically treated with an assortment of chemotherapies [33].

In sub-Saharan Africa, social and cultural factors play a big role in breast cancer diagnosis and treatment. Some women in this region use traditional medicines and/alternative treatments first and only present at hospital when the symptoms have worsened [34].

1.1.8 Quality of Life (QOL) of Breast Cancer Patients

The World Health Organization (WHO) defines quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns [35]. Quality of life of breast cancer patients are an important outcome because breast cancer patients are now surviving longer due to early detection and improved treatments over the years [36].

Studies have reported predictors of long-term quality of life to include the stage of the tumor, adjuvant therapy, educational and marital status, comorbid conditions, and type of treatment; whether breast conserving or non-breast conserving [37]. Results of a five-year prospective study in Munich evaluating the quality of life of women with breast cancer who underwent breast conserving therapy or mastectomy, found that mastectomy patients had a significantly ($p < 0.01$) lower body image, role and sexual functioning compared to women who underwent breast conserving therapy. Even patients who were 70 years or more reported a higher body image when treated with breast conserving therapy. Emotional, financial, social and future health were significantly worse in younger patients ($p < 0.01$) [38].

Quality of life issues among breast cancer patients based on a study conducted by Brady et al., in 1997 include pain, fatigue, fear of recurrence, feelings of lesser body image and femininity [39]. Holzner et al., (2001), in a study of breast cancer patients in Austria assessed the quality of life of breast cancer patients categorized into three groups; 1-2 years after initial treatment, 2 to 5 years after initial treatment and more than 5 years after initial treatment. Results of the study indicated that patients within the early phase of treatment (1-2 years) clearly had a reduced quality of life in many areas of life more especially in emotional and social domains. However, women in their third year of initial treatment had the highest quality of life compared to women within the first 2 years. Surprisingly, women who survived 5 years after initial treatment had a reduced quality of life in their emotional, social, cognitive, sexuality and role functions compared to women within 3-5 years [40].

Several instruments have been used for measuring quality of life of breast cancer patients. The most widely used are the European Organization for Research and Treatment of Cancer-Breast Cancer Quality of Life Questionnaire (EORTC QLQ-BR23), Functional Assessment of cancer therapy-Breast cancer (FACT-B)/ Functional Assessment of Chronic Illness Therapy-Breast (FCIT-B), Breast Cancer Chemotherapy Questionnaire (BCQ), the Satisfaction with Life Domains Scale for Breast Cancer (SLDS-BC), the Medical Outcomes Study Short Form Survey (SF-36) and the Hospital Anxiety and Depression Scale (HADS) [36].

The EORTC QLQ-BR23 was developed in 1987 and designed to be multidimensional in assessing the quality of life of cancer patients and also easy for self-administration. It includes five functional scales; physical, social, emotional, cognitive and role functions, three symptoms scale; pain, fatigue, nausea and vomiting and a global health and quality life scale [41]. The FACT-B assesses wellbeing of cancer patients in terms of Physical, Emotional, Social, and Functional domains [39].

Bonsu et al., 2014, in a qualitative exploratory study assessed the Emotional and Psychosocial experiences of 10 Ghanaian women with Advanced Breast Cancer (ABC). The women reported fear, anxiety and sadness. They described the pain as continuous, piercing and burning. The fear of death and high cost of treatment were also reported among the women [42].

Jaiyesimi et al., (2007), also assessed the Health-Related Quality of Life of 35 Nigerian women receiving radiotherapy for Breast cancer at the University College Hospital, Ibadan using the EORTC. In this analysis, they found that Physical, Emotional and Cognitive functioning scores were above average (76.9 +/- 20.6, 61.9 +/- 30.3 and 60.0 +/- 32.1 respectively). Role and Social functioning scores were below average (46.2 +/- 36.6 and 40.9 +/- 42.8 respectively). Symptom scale scores were high for fatigue, pain and financial difficulties (52.7 +/- 32.8, 59.1 +/- 34.4 and 71.4 +/- 38.8 respectively). Age was not significantly associated with any of the functional and symptom scale scores. The overall QOL was significantly associated with Physical, Cognitive and Social functioning and also significantly and inversely related to fatigue, vomiting, nausea, pain, insomnia and financial difficulties [43].

Anarado et al., also explored the experiences and nursing support need of 20 women undergoing out- patient breast cancer chemotherapy in two teaching hospitals in Southeastern Nigeria through Focus Group Discussions. All participants reported inadequate preparation for chemotherapy before the commencement of treatment. Most participants felt they were not provided with adequate information on side effects of the drug and what to expect. Participants also reported that chemotherapy is scary, distressing and financially demanding. Nearly all participants reported experiencing no less than five side effects from chemotherapy. The most commonly reported side effects were loss of appetite, hair loss, fatigue, nausea and vomiting, diarrhea or constipation, and skin discoloration. Hope, faith and courage were the mediating factors between perceived distress of chemotherapy and the likelihood of completing the treatment [44].

These studies could have an inherent selection bias in them as women who were in very critical stages of breast cancer were less likely to be part of the study. Quality of life experiences might differ among women according to the stage of the tumor. The small sample sizes of most studies also limit the generalizability of findings to larger populations. Some studies were limited to only a small proportion of the population which may affect the generalizability of results. However, it will not be surprising to record low QOL for breast cancer patients in Africa as most breast cancer patients in Africa report to the hospital with advanced stages of the disease.

In addition, some breast cancer patients follow alternative treatment pathways such as traditional healers as they are usually cheaper and less invasive and only report to the hospital when the disease is advanced. Soliman et al., (2012), found that traditional herbalists play an important role in cancer management in sub Saharan Africa which indicate the widespread trust and belief in herbal and spiritual treatment [45].

Given the low physician-to-patient ratio in most African countries, some patients will prefer traditional healers as they offer a much more intimate patient-practitioner relationship[46]. The fear of mastectomy is also one of the major reasons for delayed care and/or seeking alternative treatments. Also, considering that the treatment of breast cancer is expensive, it could be financially draining for some patients which can affect their QOL.

Chapter 2

2.1 Quality of Life of Women with Breast Cancer in Yaunde, Cameroon

2.1.1 Introduction

Breast cancer remains the most frequent form of invasive cancer among women. On average, one out of eight women will be diagnosed with breast cancer in her lifetime[4]. In 2012, there was an estimated 1,671,149 new cases of breast cancer and 521,907 breast cancer related deaths globally. The incidence rate of breast cancer for this same year was 882.9/100,000 in developing countries and 793.7/100,000 in developed countries [11]. In 2018, the GLOBOCAN estimated 2,088,849 new cases of breast cancer and 626,679 breast cancer deaths [47].

Breast cancer burden is expected to grow worldwide particularly in developing countries due to growth and aging of population as well as increased prevalence of risk factors associated with economic transition such as smoking, obesity, and some reproductive behaviors [48]. Despite the growing burden of cancer in Africa, it continues to receives a relatively low public health attention mostly because of other pressing public health issues such as malaria, tuberculosis and HIV/AIDS [16].

The reported high rates of curative treatment and long-term survival of breast cancer patients indicates that research should not only be focused on acute phase of cancer treatment and survival rates but also on the long term effective functioning and life satisfaction of the patient [49]. New therapeutic interventions are now evaluated by their ability to extend survival as well as improve the quality of life of cancer patients [50].

Assessing public health related quality of life in cancer patients could contribute to improved treatment and could also be an important prognostic factor [36]. Also, information on the quality of life of breast cancer patients could help determine patient services that should either be developed or maintained. Assessing long term quality of life of breast cancer patients could help identify late psycho-social secondary outcomes of breast cancer which can help physicians target possible late effects that should be given special attention in follow up care [49].

There have been a relatively large number of studies on assessing the quality of life of breast cancer patients in the U.S and other developed countries. However, there is a limited number of studies on the quality of life of breast cancer patients in Africa. Even for such studies that were done in Africa, there were a number of limitations in these studies which include small sample sizes, selection bias, not using validated quality of life instruments, using family members as proxy when patients were too ill to participate in the study, and limiting the studies to small proportions of the population which could all affect generalizability of the results.

The aim of this study is to explore the associations between sociodemographic and medical factors and how they relate to the overall quality of life of breast cancer patients in an urban setting in Cameroon (Yaunde) using the FACT-B instrument.

Chapter 3

3.1 Methods

3.1.1 Study population

The case-control African Breast Cancer Study originally started in Nigeria in 1998 and then

expanded to Uganda and Cameroon in 2011 using the same questionnaires and protocols [51].

The data for these analyses includes only breast cancer cases from the Yaounde, Cameroon

component of African Breast Cancer Study. The study protocol was reviewed and approved by

the Institutional Review Board of the University of Chicago (University of Chicago Biological

Sciences Division Institutional Review Board (13304B and 10-023-B) and the Cameroon National

Ethics Committee (N141/CNE/SE/2010).

Breast cancer cases were enrolled at the Department of Medical Oncology at the

General Hospital in Yaounde, Cameroon, which serves a population of 2.5 million. All

consecutive cases who visited the medical oncology clinic between 2011 and 2016 were

invited to participate and all breast cancer stages were eligible. Participants ranged from 20 to

80 years of age. A total of 297 breast cancer cases were enrolled. The study participants

provided written informed consent prior to their enrollment.

3.1.2 Data collection and measures

Trained interviewers administered the Functional Assessment of Cancer Therapy–Breast Cancer

(FACT-B, Version 4) to assess health and quality of life of breast cancer cases. The FACT-B

instrument includes the following subscales; Physical Well-being (*PWB*), Functional Well-being

(*FWB*), Emotional Well-being (*EWB*), Social Well-being (*SWB*), and Breast Cancer–Specific

concerns (*BCS*). The instrument has a total of 37 items asking respondents to rate how true

each statement is for the last 7 days. A total *FACT-B, FACT-G* and *FACT-B* TOI score is calculated

by summing scores from the relevant subscales; total *FACT-B= PWB +SWB+ EWB+FWB+BCS*,

FACT-B TOI=PWB+FWB+BCS, *FACT-G* total=*PWB+SWB+FWB+EWB*. Response scales range from

0 (not at all) to 4 (very much). The *FACT-B* is a well-validated instrument with high internal

consistency and reliability [52].

Participants also completed a questionnaire regarding demographics, family history of breast

cancer and history of benign breast disease, lifestyle factors, gynecological history, reproductive

history, and alcohol consumption patterns. Information on the medical history of the

participants was abstracted from hospital records and included treatment received

(chemotherapy, radiation, hormonal, surgery, hormonal therapy), Tumor, Nodes involvement

and Metastasis (TNM) stage, type of surgery received (lumpectomy, mastectomy,

reconstruction), date of first breast cancer diagnosis, basis of diagnosis (clinical, histological,

cytology), and start date of treatment. A new variable called 'time from diagnosis to interview'

was constructed which indicates the length of time from when the case was first diagnosed

with breast cancer to the FACT-B interview.

The demographic exposure variables of interest in this analysis included living/relationship

status, highest educational level, occupation, religion, region, ethnic group, income level, and

current age. These variables initially were categorized as follows:

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- <u>Current age;</u> less than 40 years**;** from 40 to 44 years; from 45 to 50 years; greater than 50 years

- <u>Educational level</u>; None/Primary; Secondary or vocational/technical; some university/ bachelor's/ postgraduate degree

- <u>Occupation</u>; None/ housewife**;** Trader/ farmer**;** Artisan/ professional/ technician/clerical; Other

- <u>Household income level;</u> Less than or equal to 50000 CFA; greater than 50000 to 110000 CFA; greater than 110000 to 5000000 CFA

- <u>Living status</u>; Living alone; living with husband or boyfriend; not married and living with family.

- <u>Religion</u>; Christianity; Islam/other

- <u>Region;</u> Central; Outside Central

- <u>Ethnic group;</u> Bantous; Semi-Bantous; Sudanese/Semites/other.

Preliminary analyses revealed similar mean Fact-B total and subscale scores for some of the categories within each variable. To limit the number of categories, and thereby reduce the degrees of freedom in our analyses, we performed pairwise comparisons and combined categories with mean scores that were not significantly different. This led to the following categorization scheme:

- <u>Current age;</u> Less than 45 years; and greater than 45 year

- <u>Educational level;</u> None/Primary; Secondary or vocational/technical; and some university/ bachelor's/ postgraduate degree

- Occupation; None/ housewife; and Trader/ farmer**/**Artisan/ professional/ technician/clerical/Other

- Household income level; Less than or equal to 50000 CFA; greater than 50000 CFA; and 'missing'.

- Living status; Living alone; living with husband/boyfriend; not married and living with family.

- Religion; Christianity; and Islam/other

- Region; Central; and outside Central

- Ethnic group; Bantous/Semi-Bantous; and Sudanese/Semites/other,

The medical exposure variables of interest in this analysis include the time from diagnosis to interview, chemotherapy (yes/no), surgery (yes/no) and TNM stage of disease. Abstracted variables indicating presence/absence of chemotherapy and surgery had 13% (39 cases) and 25% (73 cases) missing data respectively. We used other variables, i.e. start dates of specific treatments, in an attempt to reconcile missing data. Those with a start date were assigned a 'yes', and those with no start dates were assigned a 'no' for each of the two treatments. TNM classification had about 25% (74 cases) of its data missing and we preserved these missing data in a category called 'missing'. Two other potentially relevant variables, radiotherapy and hormone therapy, contained a large proportion of missing data, i.e. 80% and 86% respectively, and therefore were not analyzed. Time from diagnosis to interview was categorized as less than 6 months, greater than or equal to 6 months but less than one year, greater than or equal to one year but less than two years and greater than or equal to two years.

3.1.3 Statistical methods

Characteristics of the cases in this study sample were summarized with means for continuous variables and percentages for categorical variables. Our sample's mean Fact-B scores were compared with Fact-B mean scores from previous breast cancer studies, although no formal testing of differences was performed. Bivariate analyses using one-way ANOVA were used to assess exposure variables listed above in relation to Fact-B total scores and subscale scores, i.e. *PWB*, *SWB, EWB, FWB, BCS, FACTG, FACTB-Total* and *FACTB TOI.*

In ANOVA analyses of variables with more than two categories, a global p value of <0.15 (more liberal than a p<0.05 cutoff because of multiple categories and small numbers in some categories) was followed by an exploration of pairwise comparisons among categories. Categories with no statistically significant difference in mean Fact-B scores were combined (as described above). Multivariable linear regression models included variables associated with Fact-B total and subscale scores in the bivariate analyses according to the criterion of p< 0.05. Based on this criterion, different variables were selected for each subscale and total score multivariable model. We chose not to adjust our p value criterion for multiple comparisons because each of the variables under study have been associated with quality of life in breast cancer patients in previous studies.

Chapter 4

4.1 Results

A total of 297 women with various stages of breast cancer constituted the analytic sample of this study. The sample characteristics are presented in table 1. Women ranged from 20 to 80 years of age and more than half (54.27%) were married and living with their husband or boyfriend. About half of the women (52.05%, n=152) had completed only secondary or a vocational school and most were engaged in some form of occupation (66.44%, n=192). Christianity was the dominant religious group, i.e. 92.54% (n=273). More than half (57.63%, n=170) of the women lived in the central region of Cameroon and a little over half (53.87%, n=160) had a household income of over 50,000 CFA per month.

About 60% of the women were interviewed within the first 6 months of breast cancer diagnosis, but 13% were interviewed over 2 years after initially diagnosed. The largest proportion of women, approximately 42% (n=122) had 'stage two' breast cancer at diagnosis; for about 10% (n=31) of women cancer stage was not recorded. The majority (69.42%, n=202) underwent surgery as part of their treatment; two women received a bilateral mastectomy and 126 women (43.30%) had a unilateral mastectomy. A large proportion of cases received chemotherapy 86.25% (n=251). Data suggest only 12% of the women received radiotherapy, but missing data for this treatment modality make this estimate uncertain.

4.2 Distribution of Quality of Life Scores (QOL) scores

The means and distributions of the Fact-B quality of life scales in our study sample and in other

studies are shown in Table 2. Although a formal statistical test was not performed to compare

results across studies, it appears the mean SWB for our study was similar to that of other

studies. Our study recorded lower means for PWB, EWB, FWB, BCS and FACT-B total when

compared with the other studies.[52]

4.3 Sociodemographic factors and QOL scores

Sub-scales: *PWB* mean scores were higher among women with a secondary/vocational

education (compared to none/primary), women with a household income of more than 50,000

CFA per month, and women who lived with their husband/boyfriend (compared to those who

lived alone) (Table 3). *SWB* mean scores were lower for women 45 years of age or older and

women with none/primary education only. Higher mean *SWB* scores were reported by women

involved in an occupation, women with a household income over 50,000 CFA per month, and

women who lived with their husband/boyfriend. *EWB* mean score were associated with both

incomes i.e. higher mean score among women who earned more than 50,000 CFA per month

and occupation (women who were engaged in an occupation had higher mean scores). *FWB*

mean scores were lower for women 45 years of age or older, but higher for women involved in

an occupation, women with a household income of over 50,000 CFA per month, and women

who lived with their husband/boyfriend or with their family (compared to women who lived

alone). *BCS* mean scores were higher for women less than 45 years, women engaged in an

occupation, women with incomes over 50,000 CFA per month, and women living with husband/boyfriend and lower among women with none/primary education only.

Composite scales: mean *FACT-G* scores (PWB+SWB+EWB+FWB) were lower among women 45 years of age or older and women with non/primary education only. Higher mean *FACT-G* scores were reported among women with an occupation, women with a household income of over 50000 CFA per month, and women who lived with husband/boyfriend or with their families (compared to those who lived alone). Results for *FACT-B* total scores (PWB+SWB+EWB+FWB+BCS) were similar to those of the *FACT–G*. For both composite scores women living with husband/boyfriend also had higher mean scores than women living with their families. *FACT-B TOI* (PWB+FWB+BCS) results paralleled those of the *FACT-G* composite scores.

4.4 Medical factors and QOL scores

Subscales: Mean *PWB* scores were higher among women who did not receive chemotherapy compared to women who receive chemotherapy. Mean *EWB* scores were higher for women who received surgery and women who received chemotherapy compared to those who did not. FWB mean scores were higher for women with stage 0/I compared to women with stage III/IV breast cancer. BCS means scores were significantly higher for women with stage II breast cancer compared to women with stage IV.

Composite scores: Mean *FACT-G* scores were significantly higher for women with stage 0/I compared to women with stage IV breast cancer. *FACT-B TOI* mean scores were significantly lower for women with stage IV breast cancer compared to women with stage 0/I .

4.5 Multivariable models of sociodemographic and medical factors associated with QOL

Subscales: In adjusted models some variables were no longer statistically significantly related to QOL. The following factors remained statistically significant in the various models (Table 5): *PWB* scores were lower for women 45 years of age and older and women who received chemotherapy (betas = -2.25, and -1.98 respectively). *PWB* scores were higher for women with secondary or vocational /technical education, women with an occupation, women with incomes over 50,000 CFA per month, and women living with husband or boyfriend (betas = 1.52, 1.19, 1.85, and 2.13 respectively). *SWB* scores were lower for women of 45 years or older (betas=-2.36) and higher for women who were engaged in an occupation, earned more than 50,000 CFA per month, women who lived with their husbands/boyfriends and women who lived with their families (betas=1.45, 1.86, 6.97 and 5.09 respectively). *EWB* scores were higher for women who were engaged in an occupation, women who had a monthly household income greater that 50 000CFA and women who received surgery (Betas: 1.41, 1.20, 3.29). *FWB* scores were lower for women 45 years or older and women with stage III and stage IV disease (betas=-1.67, -3.72 and -4.51 respectively). *FWB* scores were higher for women with an occupation, women with incomes over 50,000 CFA per month, women who lived with their husband/boyfriend and women who lived with their families (beats=1.79, 3.04, 3.35, 3.14 respectively). *BCS* scores were lower for women 45 years and older (betas= -1.36) and higher

for women with an occupation and women with incomes more than 50,000 CFA per month

(betas=0.60, 1.26 respectively)

Composite scores:

In adjusted models the following were significantly associated with QOL: *FACT-G* scores were lower for women who were 45 years or older and women with stage II, stage III and stage IV disease (betas=-3.83,-6.09, -10.28 and -8.02 respectively) and higher for women who had an occupation, women with incomes above 50,000 CFA per month, women who lived with their husband or boyfriend and women who lived with their families (betas=5.76, 8.85, 13.41, 11.59). *FACT-B* total scores were lower for women 45 years or older (beta=-4.97). *FACT-B* total scores were higher for women with an occupation, women with a monthly household income above 50,000 CFA per month, women who lived with their husband or boyfriend and women who lived with their family (betas=6.96, 9.43, 14.38, 11.20 respectively). *FACTB-TOI* scores were lower for women of 45 years or more and women with stage II, stage III and stage IV disease compared to stage 0/I (betas=-2.65, -2.26, -4.47, -5.70) and higher for women with an occupation, women with incomes over 50,000 CFA per month, women who lived with their husband or boyfriend and women who live with their families (betas=3.96, 6.65, 6.09 and 4.53 respectively).

Chapter 5

5.1 Discussion

In this study, we examined the quality of life among women with breast cancer who presented

to an oncology clinic in Cameroon, 2011-2016. Our results indicate that *total Fact-B* quality of

life scores were significantly associated with women's age, occupational status, household

income level and living/relationship status.

There are many studies on factors linked to quality of life among breast cancer patients living in

high income countries. There are fewer studies, however, of quality of life conducted among

African women with breast cancer. Some examples are Jaiyesimi et al who studied 35 Nigerian

women using the EORTC quality of life scale and found lower QOL scores among women with

financial concerns [53]. Bonsu et al focused on 10 Ghanaian women with advanced breast cancer

and attempted to describe their physical and emotional experiences [42]. In a study by Anarado,

focus groups were used to capture QOL experiences and need for nursing support among 20

Nigerian women with breast cancer [44]. Women felt inadequately prepared for chemotherapy

and expressed desires for more nursing support.

Of all factors included in our analyses, household income level was the one most consistently

associated with Fact-B quality of life subscales and composite scales, i.e. higher household

income level was positively associated with a better self-reported quality of life. This finding

agrees with results of a systemic review by Mols et al., 2005, which concluded that a higher

quality of life was positively related to a higher household income [54]. This is not surprising as

women with a higher household income may be able to afford early diagnosis, better

treatments and more supportive care compared to their counterparts with lower income. Older

women (greater than 45 years) in our sample reported a lower quality of life (lower total Fact-B

scores) compared with younger women (less than 45 years). This is somewhat different from

the Avis et al., 2005 finding of lower quality of life scores in younger vs older breast cancer

cases [52].

Relationship/living status also is noteworthy because it was related to almost all the quality of

life subscales. Our results indicate that women who lived alone had the lowest quality of life

scores, followed by women who lived with other family members but not husband/boyfriend.

Women who lived with their husbands/boyfriends reported the highest quality of life. These

results are consistent with a study by Carvert et al., 2005, which showed that women with

partners at the time when first treated reported less frequent negative feelings and more

frequent positive feelings [55]. However, in Chen's study of Chinese breast cancer cases, single

women had the highest QOL scores [56]. More studies are needed that explore breast cancer

patients' experiences under these different living circumstances across different geographic

settings and cultures; this may help determine specific types of support that can maximize

quality of life for these women.

Women engaged in an occupation reported a better quality of life compared to those who did

not list an occupation. Studies by Engel et al and Chen et al observed a similar finding [37] [56].

Working outside the home may have benefits such as taking one's mind off the illness, greater

income and resource stability, and more support from co-workers. It is also possible that

women with the most advanced disease or debilitation from treatment or general despair

dropped out of the workforce and this partially explains the observed associations. Women

with advanced stage disease (stage IV) had the lowest Fact-B quality of life scores in FACT-G and

FACTB-TOI. However, there was no significant difference among the TNM stages under FACTB

total.   Studies by Sharma et al., 2017, and Chen et al likewise noted that patients with

advanced stage of breast cancer performed worse on QOL scores [56].

A striking observation from our results is that BCS was not significantly associated with the

stage of disease, despite BCS being the most breast cancer-specific subscale that directly

queries about symptoms. Low scores in other subscales among women with advanced disease

tap into both physical and psychological 'pain,' both likely to increase with more aggressive

treatments and worse prognosis. After accounting for other factors, educational level, ethnic

group and region did not have any significant associations with the quality of life scores of these

breast cancer patients.

Strengths of this study include the relatively larger sample size compared to previous studies,

the wide age range (20-80 years), and the QOL information direct from the patient and not a

proxy. There are, however, multiple limitations worth noting. The sample comes from one

oncology clinic in Cameroon, and women with longer times from first diagnosis to interview

may over- represent those who survived for follow-up or reoccurrence. Most of the women

were of a single religion or ethnic group. Thus, generalizability of our findings could be reduced.

Other potentially important variables were not incorporated in this analysis, e.g. time from last

treatment to interview. While this time window likely is associated with some quality of life

subscales it may be unrelated to age, income, living status and other variables we found

significant in our analyses, therefore not a major source of unmeasured confounding. Also, we

did not explore effect modifications by factors under study such as income. Further analyses of

effect modifications might shed additional light.

Our study adds to a growing body of literature pointing to the need to consider quality of life in

cancer patients. In particular, findings may differ across high income and low-income countries.

Only by studying African women with breast cancer can we learn the specifics of what

influences their quality of life, who needs the most support, and the types of support most

needed. Our results suggest that clinicians should pay particular attention to the quality of life

of African breast cancer cases who are older (greater 45 years), live alone, not involved in any

type of occupation, have lower household income levels and are diagnosed with advanced

stage disease. This study is a one-time snapshot in the lives of breast cancer patients in Yaunde,

Cameroon. Future quality of life studies of breast cancer patients could gain additional insights

by assessing changes in quality of life longitudinally in relation to disease stage, treatments and

living circumstances.

APPENDIX

TABLES

Table 1. Characteristics of Analytic Sample (N=297)

Characteristics	No. of case	%	Mean	SD	Range
Days from diagnosis to interview (292) 5 missing			360.55	696.19	0-7672 days
Current age (296) 1 missing			47.37	11.77	20.0-80.0 yrs
Current age (in years) (N=296)					
Less than 45 years	132	44.59			
Greater than or equal to 45 years	164	55.41			
Frequency missing =1					

Table 1 (cont'd)

Relationship or living status (N=293)

Living alone	31	10.58
Living with husband or boyfriend	159	54.27
Not married and living with family	103	35.15

Frequency Missing = 4

Highest level of education (N=292)

None/Primary	97	33.22
Secondary or vocational/technical	152	52.05
Some university/ bachelor's/ postgraduate degree	43	14.73

Frequency Missing =5

Occupation (N=289)

None/ housewife	97	33.56
Trader/ farmer/ Artisan/ professional/ technician/clerical/Other	192	66.44

Frequency Missing = 8

Table 1 (cont'd)

Religion (N=295)

Christianity	273	92.54
Islam/Other	22	7.46

Frequency Missing = 2

Region (N=295)

Central region	170	57.63
Outside central region	125	42.37

Frequency missing = 2

Ethnic group (N=292)

Bantous/ Semi-Bantous	274	93.84
Sudanese/ Semites/OTHER	18	6.16

Frequency Missing = 5

Table 1 (cont'd)

Income level (N=297)

	106	35.69
less than or equal to 50000 CFA		
	160	53.87
greater than 50000 CFA		
	31	10.44
missing		

Medical Characteristics

Surgery (N=291)

No	16	5.50
Yes	202	69.42
Missing	73	25.09

Missing entire medical records =6

Table 1 (cont'd)

Type of Surgery (N=291)

Bilateral Mastectomy	2	0.69
Lumpectomy	73	25.09
Unilateral Mastectomy	126	43.30
Missing	90	30.93

Missing entire medical records =6

TNM Classification of Clinical stage (N=291)

Stage_0/I	23	7.90
Stage_II	122	41.92
Stage_III	84	28.87
Stage_IV	31	10.65
Missing	31	10.65

Missing entire medical records =6

Table 1 (cont'd)

Chemotherapy (N= 291)

	1	0.34
No		
	251	86.25
Yes		
	39	13.40
Missing		

Missing entire medical records =6

Missing medical records =6
RadioTherapy (N= 291)

No	22	7.56
Yes	36	12.37
Missing	233	80.07

Missing entire medical records =6

Table 1 (cont'd)

HormonalTherapy (N= 291)

No	28	9.62
Yes	12	4.12
Missing	251	86.25

Missing entire medical records =6

Time from diagnosis to interview

Less than 180 days	177	59.60
>= 180 but less than 365 days	46	15.49
>= 365 but < 730 days	36	12.12
>= 730 days	38	12.79

Table 2. Distribution of responses for Quality of Life (QOL) variables

	Present study			Avis et al., 2005			Other studies		
Scale	No. of patients	Mean	STD	No. of patients	Mean	SD	No. of patients.	Mean.	STD
PWB	295	18.82	5.75	201	23.84	4.68	161	21.42	5.46‡
SWB	295	21.05	5.51	201	21.05	5.44	161	22.76	4.95§
EWB	291	15.27	3.71	201	17.63	4.03	161	17.90	4.19
FWB	294	18.25	6.23	200	21.23	5.62	161	20.16	5.58
BCS	293	18.53	3.04	201	23.43	6.07	161	22.50	6.22
FACTB total	290	92.06	17.01	199	111.0	19.11	161	111.72	20.81
FACTB TOI	293	55.61	11.64						
FACTG	291	73.49	15.62						

Table 3. Bivariate analysis of sociodemographic characteristics

Sociodemographic	N	PWB Mean (SD)	P	SWB Mean (SD)	P	EWB Mean (SD)	P	FWB Mean (SD)	P	BCS Mean (SD)	P	FACT-G Mean (SD)	P	FACT-B total Mean (SD)	P	FACT-B TOI Mean (SD)	P
Current age																	
less than 45 years	132	18.97 (5.85)	0.71	22.35 (5.25)	**<0.01**	17.42 (4.94)	0.36	19.25 (6.01)	**0.01**	19.35 (2.89)	**<0.01**	78.16 (16.68)	**0.01**	97.31 (18.11)	**<0.01**	57.50 (12.00)	**0.01**
>= 45 years	164	18.73 (5.69)		19.99 (5.53)		16.87 (5.25)		17.45 (6.33)		17.85 (3.01)		73.28 (16.48)		91.19 (17.70)		54.08 (11.47)	
Education																	
None/Primary **(REF)**	97	17.67 (6.03)	**REF**	19.89 (5.80)	**REF**	16.82 (5.56)	REF	17.84 (6.28)	REF	17.88 (2.96)	**REF**	72.31 (17.23)	**REF**	90.29 (18.37)	**REF**	53.49 (11.56)	**REF**
Secondary or vocational/technical	152	19.34 (5.48)	**0.03*** 0.98**	21.54 (5.14)	**0.02*** 0.28**	17.19 (4.83)	0.59* 0.61**	18.40 (6.07)	0.49* 0.65**	18.62 (2.98)	0.06* **0.01***	76.69 (16.24)	**0.05*** 0.40**	95.35 (17.62)	**0.03*** 0.32**	56.30 (11.50)	0.07* 0.32**
Some univ-ersity/bachelor's/ postgrad	43	19.36 (5.94)	0.11*	22.54 (5.16)	**0.01***	17.65 (5.16)	0.39*	18.90 (6.81)	0.36*	20.02 (2.80)	**<0.01***	79.18 (16.74)	**0.03***	98.48 (18.28)	**0.01***	58.28 (12.08)	**0.03***

Table 3 (cont'd)

Occupation

	N	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
None/ housewife	97	18.17 (6.13)	0.21	19.88 (5.66)	**0.01**	16.22 (5.27)	**0.04**	16.74 (6.26)	**<0.01**	17.68 (2.78)	**<0.01**	71.39 (16.22)	**<0.01**	89.10 (18.37)	**<0.01**	52.60 (11.96)	**<0.01**
Trader/farmer/technician Artisan/prof clerical/other	192	19.08 (5.58)		21.64 (5.36)		17.57 (4.99)		19.01 (6.12)		18.98 (3.10)		77.47 (16.21)		96.39 (17.69)		57.08 (11.35)	

Religion

	N	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
Christianity	273	18.72 (5.78)	0.27	21.06 (5.56)	0.95	17.11 (5.10)	0.93	18.38 (6.25)	0.18	18.54 (3.07)	0.61	75.43 (17.00)	0.92	94.04 (18.45)	0.76	55.66 (11.84)	0.76
Islam/other	22	20.13 (5.42)		20.98 (5.33)		17.00 (5.34)		16.53 (6.16)		18.20 (2.74)		75.82 (13.07)		92.77 (13.9)		54.86 (9.56)	

Region

	N	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
Central	170	18.50 (6.12)	0.25	20.78 (5.50)	0.37	16.73 (4.84)	0.14	17.67 (6.32)	0.06	18.53 (2.96)	0.89	73.96 (16.60)	0.08	92.46 (17.75)	0.11	54.71 (11.80)	0.13
Outside Central	125	19.28 (5.22)		21.37 (5.55)		17.64 (5.44)		19.03 (6.08)		18.49 (3.17)		77.46 (16.77)		95.94 (18.52)		56.81 (11.44)	

Table 3 (cont'd)

	N		p		p		p		p		p		p		p		p
Ethnic group Bantous/Semi-Bantous	274	18.79 (5.81)	0.90	21.12 (5.35)	0.33	17.13 (5.05)	0.88	18.34 (6.22)	0.74	18.51 (3.08)	0.85	7.49 (16.68)	0.77	94.06 (18.14)	0.80	55.64 (11.83)	0.94
Sudanese/Semites/other	18	18.96 (4.88)		19.83 (6.89)		16.94 (6.45)		17.83 (6.53)		18.65 (2.12)		74.25 (18.75)		92.88 (18.85)		55.44 (9.58)	
Income level less than or equal to 50000 CFA (REF)	106	17.88 (5.77)	REF	19.86 (55.52)	REF	16.51 (5.36)	REF	16.79 (6.39)	REF	17.82 (2.79)	REF	71.04 (16.75	REF	88.96 (18.05)	REF	52.58 (11.47)	REF
Greater than 50000 CFA	160	19.58 (5.68)	**0.02*** 0.21**	21.88 (5.14)	**<0.01*** 0.34**	17.78 (4.74)	**0.05*** **0.05****	19.46 (5.75)	**<0.01*** **0.04****	19.06 (3.02)	**<0.01*** 0.14**	78.78 (15.53)	**<0.01*** **0.11****	97.8 (16.70)	**<.01*** 0.05**	58.05 (10.87)	**<0.01*** **0.04****
Missing	31	18.16 (5.61)	0.81*	20.86 (6.64)	0.37*	15.81 (5.67)	0.51*	17.00 (6.91)	0.87*	18.20 (3.52)	0.53*	73.44 (19.10)	0.49*	90.87 (20.91)	0.61*	53.36 (13.40)	0.74*

Table 3 (cont'd)

Living status	N																
Living alone (**REF**)	3198	16.98 (5.41)	REF	16.05 (7.45)	REF	15.68 (4.82)	REF	14.81 (6.82)	REF	17.61 (3.33)	REF	63.95 (17.78)	REF	81.14 (18.42)	REF	49.40 (10.70)	REF
Living with husband or boyfriend	159	19.63 (5.56)	**0.02*** / 0.06**	22.57 (4.91)	**<0.01*** / **<0.01****	17.12 (5.18)	0.16* / 0.64**	19.06 (5.98)	**<0.01*** / 0.19**	19.01 (2.93)	**0.02*** / **0.01****	78.52 (16.35)	**<0.01*** / **<0.01****	97.63 (17.74)	**<0.01*** / **0.01****	57.79 (11.28)	**<0.01*** / **0.02****
Not married and living with family	103	18.29 (5.80)	0.26*	20.26 (4.75)	**<0.01***	17.43 (5.04)	0.10*	18.04 (6.09)	**0.01***	18.06 (3.00)	0.47*	73.99 (15.52)	**<0.03***	92.04 (16.73)	**<0.01***	54.30 (11.41)	**0.04***

P-values with * compares each category to the referent.

P-values without * are the global p values.

P-values with ** compares the other two non-referent categories

$\propto$ indicate 2nd vs 3rd category

$\propto\propto$ indicate 2nd vs 4th category

$\propto\propto\propto$ indicate 3rd vs 4th category

Table 4. Bivariate Analysis of Medical characteristics

Medical characteristic	N	PWB Mean (SD)	P	SWB Mean (SD)	P	EWB Mean (SD)	P	FWB Mean (SD)	P	BCS Mean (SD)	P	FACT-G Mean (SD)	P	FACT-B total Mean (SD)	P	FACT-B TOI Mean (SD)	P
Surgery	466	18.20 (5.90)	0.30	20.69 (5.96)	0.53	17.77 (5.14)	**<0.01**	18.12 (6.46)	0.51	18.52 (3.06)	0.34	75.10 (17.75)	0.23	93.63 (19.09)	0.21	54.87 (12.05)	0.93
Yes																	
no	24	19.50 (6.52)		19.9 (5.28)		13.69 (5.36)		17.22 (7.33)		17.91 (3.46)		70.46 (19.19)		88.32 (20.87)		54.00 (54.63)	
Chemo																	
yes	450	18.11 (5.93)	**0.05**	20.62 (6.02)	0.75	17.81 (5.11)	**<0.01**	17.99 (6.48)	0.34	18.52 (3.08)	0.44	74.86 (17.91)	0.92	93.39 (19.27)	0.98	54.65 (12.11)	0.21
no	40	20.00 (5.67)		20.94 (4.84)		15.02 (5.85)		19.03 (6.67)		18.13 (3.06)		75.16 (17.08)		93.33 (18.50)		57.15 (13.02)	

Table 4 (cont'd)

TNM Class																	
Stage 0/I (REF)	19	19.24 (7.01)	REF	22.75 (4.76)	REF	18.68 (5.38)	REF	20.65 (6.29)	REF	18.38 (2.96)	REF	81.32 (18.37)	REF	99.70 (20.10)	REF	58.27 (13.43)	REF
Stage II	116	18.49 (5.52)	0.56*	20.39 (5.62)	0.06*	17.37 (5.26)	0.26*	18.36 (6.26)	0.10*	18.64 (3.17)	0.70*	74.98 (17.22)	0.10*	93.67 (18.91)	0.13*	55.48 (12.07)	0.29*
Stage III	58	19.29 (5.19)	0.98* 0.33∝	20.28 (6.15)	0.06* 0.89∝	16.70 (5.34)	0.10* 0.36∝	17.84 (6.31)	**0.05*** 0.55∝	18.34 (2.91)	0.97* 0.50∝	74.39 (17.11)	0.08* 0.81∝	92.37 (17.91)	0.14* 0.62∝	55.47 (11.16)	0.30* 0.99∝
Stage IV	24	17.74 (5.19)	0.34* 0.52∝ 0.20∝∝	22.08 (4.45)	0.66* 0.12∝ 0.12∝∝	15.82 (4.42)	0.04* 0.13∝ 0.42∝∝	15.35 (5.29)	**<.01*** **0.02∝** 0.06∝∝	17.44 (2.56)	0.26* **0.05∝** 0.16∝∝	70.99 (13.38)	**0.02*** 0.24∝ 0.34∝∝	88.81 (13.64)	0.09* 0.19∝ 0.35∝∝	50.77 (8.61)	**0.02*** **0.05∝∝** 0.06∝∝∝
Missing	74	18.81 4.83)	0.78*	22.71 (3.79)	0.98*	17.26 (4.35)	0.32*	19.90 (6.07)	<0.66* **<0.01**4	19.65 (3.09)	0.58* **<0.01**4	78.68 (14.50)	0.56*	98.33 (16.49)	0.78*	58.36 (11.66)	0.98*

Table 4 (cont'd)

Medical characteristics	N	PWB Mean (SD)	P	SWB Mean (SD)	P	EWB Mean (SD)	P	FWB Mean (SD)	P	BCS Mean (SD)	P	FACTG Mean (SD)	P	FACTB total Mean (SD)	P	FACTB TOI Mean (SD)	P
Time from diagnosis to interview Less than 6 months	177	19.46 (5.38)	REF	20.79 (5.60)	REF	16.97 (5.11)	REF	18.30 (6.25)	REF	18.69 (3.03)	REF	75.75 (16.38)	REF	94.28 (17.69)	REF	56.39 (11.24)	REF
≥6 mnths but < one year	46	17.64 (5.86)	0.06*	21.84 (5.00)	0.25*	16.67 (4.80)	0.72*	17.41 (6.50)	0.39*	17.86 (3.20)	0.10*	74.17 (14.94)	0.57*	92.11 (16.72)	0.48*	.92 (11.51)	0.07*
≥one year but < two years,	36	18.07 (5.98)	0.19* 0.74∝	21.23 (5.79)	0.66* 0.62∝	17.31 (5.71)	0.73* 0.58∝	19.01 (6.33)	0.53* 0.25∝	18.71 (2.85)	0.97* 0.21∝	75.65 (18.98)	0.88* 0.52∝	94.78 (20.20)	0.94* 0.58∝	56.11 (12.10)	0.90* 0.22∝
Greater than or equal to two years.	38	18.00 (6.80)	0.16* 0.78∝∝ 0.95∝∝∝	21.17 (5.53)	0.70* 0.58∝∝ 0.97∝∝∝	18.26 (4.86)	0.17* 0.16∝∝ 0.43∝∝∝	18.32 (5.79)	0.98* 0.51∝∝ 0.63∝∝∝	18.47 (3.11)	0.70* 0.36∝ 0.75∝∝	75.75 (18.39)	0.99* 0.60∝ 0.90∝∝	94.23 (19.96)	0.88* 0.69∝ 0.86∝∝	54.80 (13.06)	0.45* 0.46∝ 0.63∝∝

Table 4 (cont'd)

P-values with * compares each category to the referent.
$\propto$ P value of category 2 vs. 3
$\propto\propto$ P value of category 2 vs. 4
$\propto\propto\propto$ P value of category 3 vs. 4

Table 5. Multivariable Analysis of Sociodemographic and Medical Characteristics

Sociodemographic Characteristics	N	PWB β (SE)	SWB β (SE)	EWB	FWB β (SE)	BCS β (SE)	FACT-G β (SE)	FACT-B total β (SE)	TOI β (SE)
<u>Current age</u>							REF		
Less than 45 years	132	REF	REF		REF	REF		REF	REF
Greater than 45 years	164	-2.25 (0.54****)	-2.36 (0.54****)		-1.67 (0.56**)	-1.36 (0.30***)	-3.83 (1.72*)	-4.97 (1.85**)	-2.65 (1.16*)
<u>Education</u>							REF		
None/Primary (REF)	97	REF	REF		REF	REF		REF	REF
Secondary or vocational/technical	152	1.52 (0.60*)	0.70 (0.59)			-0.20 (0.33)	1.39 (1.90)	1.20 (2.02)	0.42 (1.28)
Some university/ bachelor's/ postgraduate degree	52	0.74 (0.85)	0.83 (0.89)			0.07 (0.50)	-1.26 (2.88)	-1.79 (3.07)	-2.41 (1.93)
<u>Occupation</u> None/housewife (REF)	97	REF			REF	REF	REF	REF	REF
Trader/farmer/Artisan/ professional/ technician/ clerical/other	192	1.19 (0.55*)	1.45 (0.54**)	1.41 (0.51**)	1.79 (0.61**)	0.60 (0.30*)	5.76 (1.76**)	6.96 (1.88***)	3.96 (1.19***)

Table 5 (cont'd)

Sociodemographic characteristics		PWB β (SE)	SWB β (SE)	EWB β (SE)	FWB β (SE)	BCS β (SE)	FACT-G β (SE)	FACT-B total β (SE)	FACT-B TOI β (SE)
<u>Income level</u>									
Less than or equal to 50000 CFA (REF)	106	REF	REF	REF	REF	REF	REF	REF	REF
Greater than 50000 CFA	160	1.85 (0.59**)	1.86 (0.56**)	1.20 (0.52*)	3.04 (0.61****)	1.26 (0.32***)	8.85 (1.84****)	9.43 (1.95****)	6.65 (1.24****)
Missing	31	1.51 (0.99)	0.80 (0.93)	-1.18 (0.87)	0.34 (1.03)	0.68 (0.52)	2.12 (3.03)	2.66 (3.21)	3.31 (2.01)
<u>Living status</u>									
Living alone (REF)	31	REF	REF		REF	REF	REF	REF	REF
Living with husband/boyfriend	159	2.13 (0.97*)	6.97 (0.89****)		3.35 (1.00***)	0.34 (0.50)	13.41 (2.93****)	14.38 (3.04****)	6.09 (1.96**)
Not married and living with family	103	1.44 (0.99)	5.09 (0.91****)		3.14 (1.02**)	-0.14 (0.51)	11.59 (2.99***)	11.20 (3.12***)	4.53 (2.00*)

Table 5 (cont'd)

Medical characteristics		PWB β (SE)	SWB β (SE)	EWB β (SE)	FWB β (SE)	BCS β (SE)	FACT-G β (SE)	FACT-B total β(SE)	FACT-B TOI β (SE)
TNM Classification									
Stage 0/I (REF)	23	REF	REF	REF	REF	REF	REF	REF	REF
Stage II	122				-0.99 (1.09)	-0.32 (0.53)	-6.09 (3.08*)		-2.26 (2.08)
Stage III	84				-3.72 (1.14**)	-0.14 (0.55)	-10.28 (3.19**)		-4.47 (2.16*)
Stage IV	31				-4.51 (1.40**)	-0.09 (0.69)	-8.02 (3.93*)		-5.70 (2.69*)
Missing	31				-1.70 (1.37)	-0.12 (0.67)	-5.77 (3.83)		-1.55 (2.60)
Chemotherapy									
No	40								
yes	450	-1.98 (0.95*)		1.08 (1.22)					
Surgery									
no	24								
yes	466			3.29 (1.57*)					

* indicates that the p-value is <0.05
** indicates that the p-value is <0.01
*** indicates that the p-value is <0.001
**** indicates that the p-value is <0.0001
SE without any * indicates no significant difference

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