



**ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF MEDICINE
DEPARTMENT OF SURGERY
ENDOCRINE AND BREAST SURGERY UNIT**

ELECTIVE ENDOCRINE AND BREAST SURGICAL PROCEDURES: HEALTH-RELATED QUALITY OF LIFE OUTCOMES AND PATIENTS' EXPERIENCES: A MIXED METHODS STUDY

BY:

AGEGNEHU BERIE BAYEH (MD, ASSOCIATE PROFESSOR OF SURGERY)

A THESIS SUBMITTED TO DEPARTMENT OF SURGERY, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR SUB-SPECIALITY CERTIFICATE IN ENDOCRINE AND BREAST SURGERY

AUGUST, 2025

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DECLARATION

This is to certify that the thesis titled “ELECTIVE ENDOCRINE AND BREAST SURGICAL PROCEDURES: HEALTH-RELATED QUALITY OF LIFE OUTCOMES AND PATIENTS’ EXPERIENCES: A MIXED METHODS STUDY” is submitted in partial fulfillment of the requirements for the ‘SUB-SPECIALTY CERTIFICATE IN ENDOCRINE AND BREAST SURGERY’ in Department of Surgery, Addis Ababa University. It is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance I received during the course of this proposal development is fully acknowledged.

Dr AGEGNEHU BERIE BAYEH

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Signature

Date

APPROVAL OF THE ADVISORS

I hereby certify that I have supervised, read, and evaluated this thesis titled “ELECTIVE ENDOCRINE AND BREAST SURGICAL PROCEDURES: HEALTH-RELATED QUALITY OF LIFE OUTCOMES AND PATIENTS’ EXPERIENCES: A MIXED METHODS STUDY” by Dr AGE NEHU BERIE BAYEH prepared under my guidance. I approve this proposal to be submitted for IRB for ethical clearance.

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ACCRONYMS and ABBREVIATIONS

AAU: Addis Ababa University

ANOVA: Analysis of Variance

BP: Bodily Pain

CI: Confidence Interval

GH: General Health

Hr-QoL: Health-related Quality of Life

MD: Doctor of Medicine

MH: Mental Health

PF: Physical Functioning

RE: Role-Emotional

RP: Role-Physical

Sd: Standard deviation

SF: Social Functioning

SF-36: 36-Item Short Form Survey Instrument

SPSS: Statistical Package for the Social Sciences

TASH: Tikur Anbesa Specialized Hospital

VT: Vitality

ABSTRACT

Background: Endocrine and breast elective surgeries are among commonly done procedures globally. With excellent outcomes achieved for thyroid diseases and breast cancer, a fundamental shift from the traditional treatment outcome measures, mortality and morbidity, to maintaining improved quality of life has received an increasing attention. However, Hr-QoL after all types of surgeries in general and after elective thyroid and breast surgeries in particular is still an under-researched area. This gap is conspicuously seen and felt in developing countries like Ethiopia.

Objectives: The main objective of this study was to assess the health-related quality of life outcomes and experiences of post-thyroidectomy⁺ and post-mastectomy cases treated in Endocrine and Breast Surgery Unit at TASH, Central Ethiopia in comparison with health institution-based normal individuals.

Methods and Materials: A comparative cross-sectional study was conducted. A self-developed questionnaire and SF-36 tool to measure Hr-QoL outcomes have been used. The collected data were analyzed using SPSS windows version 21. The central tendency measures of the Hr-QoL outcomes were compared among the study groups and major findings of the study have been presented in texts, tables and figures.

Result: Three hundred sixty-six participants for the breast and 318 ones for the thyroid group were included in the final analysis. Post-total thyroidectomy participants had median SF-36 scores ranging from 33.3 for Role-Emotional (RE) to 85.0 for Physical Functioning (PF). The scores for the post-partial thyroidectomy group varied from 42.0 for Bodily Pain (BP) to 85.0 for PF. On the other hand, post-mastectomy cases had median SF-36 scores ranging from 33.3 for RE to 75.0 for Role-Physical (RP). Post-total thyroidectomy participants had statistically significantly lower General Health, Vitality, RE, and Mental Health compared to the controls. All SF-36 scales except PF and RP were significantly lower among post-mastectomy participants than controls.

Conclusion: Quality of life after thyroidectomy and curative-intent mastectomy was found to be lower. The mental health status was more affected than the physical health following thyroid surgery. General Health, Vitality, Role-Emotional and Mental Health were significantly lower as the extent of thyroidectomy increased. Among post-mastectomy participants, scales measuring mental health, both physical and mental health, and bodily pain were significantly lower. Optimal treatment and an organized psychosocial and emotional support by establishing, strengthening and expanding survivorship and support groups can improve such low outcome measures.

CHAPTER ONE: INTRODUCTION

1.1 Background

Studies showed that hundreds of millions of surgical procedures are being done globally each year. The proportion of these operations has a clearly noticeable an uneven global distribution. Most of these procedures are performed in developed countries [1-3]. Even though, compared to the demand a very small fraction of the operations is undertaken in developing countries [3-6], it is a growing area receiving a considerable attention in some of these countries [7,8].

Endocrine and breast elective surgeries are among the commonly done surgical procedures worldwide [9-12]. Part or all of the thyroid gland can be surgically removed for benign and malignant conditions [13-15]. Goiters are common in the general population. The global total goiter prevalence was estimated to be 15.8% with a great variation in their prevalence in different regions of the world [16]. Studies showed that the prevalence of goiter among Ethiopian children was found to be much higher than the global estimate and endemic [17,18].

A worldwide marked increase in the incidence of thyroid tumors has been also witnessed over the last decades largely due to the widespread and increased use of ultrasound of the neck and fine needle aspiration cytology (FNAC) [19-21]. With all this, thyroidectomy has become one of the commonly practiced procedures [9,10]. The other common surgical procedure is mastectomy for the treatment of breast cancer patients [12]. Since the first description of radical mastectomy by Halsted in the late 1800s, there have been striking advances in the management of breast cancer with growing trend toward breast conserving therapy [22-25]. Radical mastectomy is generally an elective procedure of significant morbidity [26].

The other important issues in healthcare services are patients' experiences. Studies showed that high perceptions of health care service quality are significantly associated

with high patient satisfaction and better outcomes [27,28]. Cultivating a positive patient experience is not only good for patients but also for healthcare providers' business success, leading to increased patient retention, higher profit margins, reduced turnover, and lower medical malpractice [29,30].

1.2 Statement of the problem

A considerable proportion of post-surgery patients develop complications that significantly affect life expectancy and quality of life [31,32]. Estimates from previous studies showed that a large proportion of patients develop post-operative complications [33,34]. This hardly-accessible service in low- and middle-income countries is also often accompanied by a high mortality especially in resource limited regions of the world like the Sub-Saharan Africa [34]. Endocrine and breast elective surgeries such as thyroidectomy and mastectomy are often associated with post-operative complications. The most important complications after thyroidectomy include: hypocalcemia, hypoparathyroidism, recurrent laryngeal nerve injury and voice change or loss [35]. These complications have a substantial negative impact on quality of life [36,37]. Post-mastectomy patients may also develop devastating complications like lymphedema and arm and shoulder impairments that hugely lower quality of life of breast cancer survivors. [38,39].

1.3 Justification of the study

With the excellent outcomes and survival rates achieved for thyroid diseases [40] and breast cancer [41], a fundamental change in approach from the traditional treatment outcome measures such as mortality and morbidity to maintaining improved quality of life after surgery has received a sizeable attention in the management of surgical patients [42-44]. Observing its positive impact on their satisfaction and treatment outcomes, a greater emphasis has also been given to healthcare experiences of patients [27-30]. However, health-related quality of life (Hr-QoL) and patients' experiences after all types of surgeries in general and after elective surgeries like thyroidectomy and mastectomy in particular are under-researched areas worldwide. This gap is conspicuously felt and seen especially in developing countries like Ethiopia.

1.4 Significance of the study

Measuring Hr-QoL and patients' experiences is important to estimate the effectiveness of healthcare interventions and programs. Hr-QoL data are also crucially important for pre-operative counseling and understanding among providers and patients about the expectations. Knowing gaps in patients' experiences also helps initiate changes that can lead to increased patient retention, higher profit margins, reduced turnover, and lower medical malpractice [27,42,43].

CHAPTER TWO: LITERATURE REVIEW

2.1 History of Endocrine and Breast Surgery

Endocrine surgery is a rapidly growing field of sub-specialty that focuses predominantly on diseases of the thyroid, parathyroid, adrenal glands and endocrine pancreas [45]. It has a rich and fascinating history that has been passed down from one generation to the other generation of surgeons. While its stories are well-understood and known to surgeons in the globe, countless changes in the details and facts have accumulated over the centuries [45-51].

The origin of thyroid surgery dates back to ancient times. The first recorded partial thyroidectomy was known to be done by Pierre Joseph Desault in 1791 when he removed a thyroid mass measuring 4 cm via a vertical incision. He tied the superior and inferior thyroid arteries and dissected the thyroid gland off the trachea. However, thyroid surgery was in its infancy till the second half of nineteenth century. It has followed and passed through all the ups and downs of evolution to reach the modern era of endoscopic surgery [45-47].

Emil Theodor Kocher (25 August 1841-27 July 1917), a Swiss physician and medical researcher revolutionized the method and techniques of thyroid surgery. The principles that he described became foundations for all refinements and still remain to be valid. For his immense contributions in the physiology, pathology and surgery of the thyroid, he was awarded a Nobel prize in 1909 [46,47,52].

Surgery for breast cancer was first described more than 3,000 years ago. It has evolved from mutilation to medicine. The earliest records of breast cancer are found in the Edwin Smith Egyptian papyrus. William S. Halsted published a landmark paper in 1894. He recommended resection of all suspected tissues including anterior chest muscles, pectoralis major and minor muscles. This procedure became known as Halsted radical mastectomy. After the widespread acceptance of the Halsted's mastectomy, a more aggressive form of mastectomy, supra-radical mastectomy was advocated by some

surgeons. However, results from the then more extensive procedures including from the Halsted's radical mastectomy showed no additional survival benefit leading to modifications resulting in a procedure called modified radical mastectomy [23,53].

2.2 Indications for Thyroidectomy

Thyroid surgery is the most common procedure in endocrine surgery. The extent of thyroidectomy includes: partial thyroidectomy (nodulectomy, lumpectomy), lobectomy (=hemithyroidectomy), sub-total thyroidectomy, near-total thyroidectomy, Dunhill's thyroidectomy and total thyroidectomy. Total Thyroidectomy is the definitive surgical procedure and hemi-thyroidectomy is a procedure of excisional biopsy in cancer cases and therapeutic in some benign thyroid nodules. The remaining named surgeries are not now a days being performed in most regions of world [40,54].

Thyroidectomy can be done for a variety of thyroid gland pathologies that include: toxic multinodular goiter, goiter with compressive symptoms, toxic adenomas, Grave's disease and thyroid cancer. Various factors including the specific indication for the surgery should be taken in account in determining the extent of thyroidectomy. Benign thyroid diseases are the most common indications for thyroidectomy. A thyroid nodule suspicious or confirmed to be thyroid cancer remains as an important reason for a sizeable portion of thyroidectomies done [40,54-58].

During the past more than a century of nodular goiter surgery, the extent of thyroidectomy has been swinging back and forth from limited procedures to a more extensive one. This clearly reflects the difficulties and challenges to strike an ideal and satisfying balance between recurrence of the disease and surgical morbidity [15,59].

2.3 Indications for Mastectomy

Mastectomy is a common surgical procedure that removes the breast with/without nearby structures like axillary lymph nodes. It is most often used to treat breast cancer. Less frequently, it can be performed to help

high risk women in preventing and reducing the likelihood of breast cancer. Such women include those having genes known to have links to breast cancer like BRCA1 and BRCA2 genes. The extent of surgery on the breast includes: wide local excision, simple mastectomy, nipple-sparing mastectomy, skin-sparing mastectomy, modified radical mastectomy, radical mastectomy and supra-radical mastectomy [60,61].

2.4 Post-thyroidectomy Outcomes

During the first half of the nineteenth century, thyroidectomy was a too risky procedure with a mortality rate in excess of 40%. This led to its ban by some academies of the time. With discoveries and improvements in general anesthesia, antisepsis and asepsis in the mid- and second half of the 19th century and great successes achieved in control of hemostasis, a marked reduction in mortality was recorded. Mortality after thyroidectomy by Emil Theodor Kocher showed a decline from 12.8% during his early period to 1% by 1895 [46,48].

Though the surgery of thyroid has come a long way, the best days in terms of patient outcomes are yet to come. It is associated with some important post-operative complications like: hypocalcemia, hypoparathyroidism, recurrent laryngeal nerve injury, vocal cord paralysis and voice change. Hematoma and hemorrhage are also common complications [35,62].

Thyroidectomy lowers quality of life compared to the general population. The quality of life after thyroidectomy is influenced by several factors. One is the extent of surgery. Patients with total thyroidectomy suffer more impairment in physical and social functioning. The nature of underlying thyroid pathology is also an important factor to influence health-related quality of life after thyroidectomy [36,37,63,64].

2.5 Post-mastectomy Outcomes

Since the first description of radical mastectomy by Halsted in the late 1800s, there have been striking advances in the management of breast cancer with growing trend toward breast conserving therapy. Mastectomy is generally an elective procedure of low morbidity and mortality; however, some potential complications need to be recognized and mentioned. These complications include: seroma or hematoma formation, skin flap necrosis, wound infection, shoulder stiffness, and lymphedema. Lymphedema which is one of the devastating complications of treatment of breast cancer negatively affects the quality of life of breast cancer survivors. Up to 40% of women treated for breast cancer face a lifetime risk of developing this unfortunate and dreaded outcome [38,39,65].

2.6 Health Care Related Experiences of Patients

Health care experience of patients is considered as an independent dimension of health care quality. A positive patients' experience leads to satisfied patient and better outcomes. It also increases their loyalty to health organizations. Previous studies showed that high perceptions of health care service quality are significantly associated with high patient satisfaction. Cultivating a positive patient experience is not only good for patients but also for healthcare providers' business success, leading to increased patient retention, higher profit margins, reduced turnover, and lower medical malpractice. Although beliefs that patient experience surveys may predominantly represent subjective feelings exist, previous studies have consistently reported that appropriately measured healthcare experiences of patients reflect the actual quality of the service provided. Thus, they have become effective instruments to estimate healthcare service quality and are increasingly becoming popular to measure patient-centeredness in healthcare systems [27-30,42,43].

CHAPTER THREE: OBJECTIVES

3.1 General objective

- To assess the health-related quality of life outcomes and experiences of post-thyroidectomy⁺ and post-mastectomy cases treated in Endocrine and Breast Surgery Unit at TASH, Central Ethiopia.

3.2 Specific objectives

- 3.2.1 To compare health-related quality of life outcomes of post-thyroidectomy⁺ patients treated from Jan, 2021 to Dec, 2024 with those of health institution-based normal clients in TASH, Central Ethiopia
- 3.2.2 To compare health-related quality of life outcomes of post-mastectomy patients treated from Jan, 2021 to Dec, 2024 with those of health institution-based normal clients in TASH, Central Ethiopia

CHAPTER FOUR: METHODS AND MATERIALS

4.1 Study area and period

This study was carried out from *January, 2024 to December, 2024* in TASH located in Addis Ababa, the capital city of Ethiopia. The hospital was established in 1964 and it is the largest academic and clinical center in the country.

4.2 Study design

A comparative cross-sectional study was conducted to compare and contrast Hr-QoL outcomes among study groups.

4.3 Source population

For the cases, the source population was all operated thyroid and breast cases served from January 01, 2021 to December 31, 2024 in Endocrine and Breast Surgery Unit at TASH. For the control groups the source population was normal clients visiting Churchill Health Center from Jan, 2023 to Dec, 2024 for breast screening services.

4.4 Sample size calculation

For specific objective 3.2.1, there are three groups: post-total thyroidectomy⁺ cases with/without neck dissections (including near total thyroidectomy), post-partial thyroidectomy cases (sub-total thyroidectomy, hemithyroidectomy) and health institution-based normal clients. A total sample size of 318 (106 for each of the three groups) was estimated by a g*power software version 3.1 for comparison of three independent means using one-way analysis of variance (ANOVA) with level of significance of 5%, statistical power of 80% and effect size of Cohn's $f = 0.175$.

To assess specific objective 3.2.2, there are two groups: post-mastectomy cases and health institution-based normal clients. To detect a 10-point difference in the means of the Hr-QoL outcomes between two independent groups, previously published papers [67] recommend sample sizes of 52 and 183 for the Mental Health and Role-Physical

scales of SF-36, respectively. The recommended sample sizes for the remaining six scales are between 52 and 183. The maximum sample size, 183 was taken to each of the two groups in this study (n = 366).

4.5 Inclusion & Exclusion Criteria

Inclusion criteria for specific objectives 3.2.1 and 3.2.2

- ✓ All consenting adult women (≥ 18 years of age) (for all participants)
- ✓ Post-thyroidectomy⁺ (for thyroid cases)
- ✓ Post-mastectomy (for breast cases)
- ✓ Those with at least one year in to their post-operative course (for both post-thyroidectomy and mastectomy cases)
- ✓ With no known or diagnosed disease and/or no surgery is done (for normal controls)

Exclusion criteria for specific objectives 3.2.1 and 3.2.2

- ✓ Women < 18 years of age (for all participants)
- ✓ Men (for all participants)
- ✓ When the type of surgery done was not clearly documented or known (for thyroidectomy and mastectomy cases)
- ✓ Those with less than a year in to their post-operative course (for both post-thyroidectomy and mastectomy cases)
- ✓ Those with known comorbidity or diagnosed disease (for normal controls)
- ✓ Not consenting and/or not responding to two phone calls at two different days

4.6 Study variables

- Socio-demographic: Age, Sex, educational level, marital status, occupation, religion
- Clinical data: type and stage of diagnosis, type of surgery, major complications
- Hr-QoL outcomes as measured by SF-36: Physical Functioning (PF), Role-Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Functioning (SF), Role-Emotional (RE), Mental Health (MH), and Reported Health Transition (RHT)

4.7 Sampling methods, data collection tools and procedures

The electronic and paper-based medical records of all thyroidectomy and mastectomy cases investigated and treated at TASH from Jan 01, 2021 to Dec 31, 2024 were reviewed to ensure for meeting the inclusion criteria. Participants that meet the inclusion criteria were selected consecutively (for thyroidectomy cases) and by lottery method (for mastectomy cases). The controls for the two objectives were selected by systematic sampling method from clients who visited Churchill Health Center for breast screening services from Jan, 2023 to Dec, 2024 taking their order of visit and registration as a sampling frame.

A self-developed questionnaire and SF-36 tool were used in this study. The questionnaire consists of three parts: Cover letter and participants' consent, sociodemographic and clinical data, and SF-36 tool (See Annex I). SF-36 tool was used to assess the Hr-QoL outcomes of the study participants. It is a generic HR-QoL instrument with eight scales: PF, RP, BP, GH, VT, SF, RE, and MH. It also contains a Reported Health Transition (RHT) item. It has been developed to be applicable across a broad range of interventions and populations. Its items and scales are scored in such a way that a higher score shows a better health status. A higher BP score, for example indicates freedom from pain. For interested readers, the development of SF-36 and the details how to standardize and interpret the scores are found published elsewhere [66-68]. The required data were collected by interviewer-administered questionnaire, phone calls and/or review of medical records.

4.8 Statistical analysis

The collected data were entered, cleaned and analyzed using SPSS version 21. For continuous variables, measures of central tendency like mean and median and those of dispersion such as standard deviation (Sd) and interquartile range (IQR) were estimated and reported. Wilson score interval method was used to calculate the 95% confidence intervals of proportions for categorical variables. For the SF-36 scales were found to be not normally distributed, the mean ranks of the standardized scores (on a 0 to 100 scales) of the eight SF-36 scales were estimated and compared between and among

study groups using Mann-Witney U test and Kruskal-Wallis H test with Bonferroni correction at significance level of $p\text{-value} \leq 0.05$. The results of the study have been presented in texts, tables and figures.

4.9 Data quality assurance and dissemination

The data were collected by three surgical fellows. They were given a training on the main purpose of the study and the application of the questionnaire. A widely validated and approved tool (SF-36) was used to measure the Hr-QoL outcomes. Double manual data entry and comparison of the two copies was also applied to enhance data entry quality. The whole process of the research was closely supervised by the principal investigator.

Two manuscripts have been developed from the results of the thesis and submitted to reputable international journals to be considered for publication with the following titles:

- ***Where Do Breast Cancer Patients after Curative-intent Surgery Stand in their Health-related Quality of Life (Hr-QoL) Outcomes Compared with Health Institution-based Normal Clients? A Comparative Cross-sectional Study***
- ***Health-related Quality of Life (Hr-QoL) Outcomes of Women after Thyroid Surgery as Measured by SF-36, an Experience from a Developing Country: A Comparative Cross-Sectional Study***

4.10 Ethical considerations

This research project has been given an ethical approval from Research & Ethics Committee of Department of Surgery, School of Medicine, College of Health Sciences, Addis Ababa University (Protocol number: DOS/REC/101/2024/2016). An informed written consent from participants during the interviewer-administered questionnaire and an oral consent during the phone calls were obtained. Identifying data of the participants have been held confidential and this thesis has been prepared with anonymized data.

The study protocol was carried out in accordance with the declaration of Helsinki.

CHAPTER FIVE: RESULTS AND DISCUSSION

The RESULTS and DISCUSSION sections of the thesis have been organized in to two parts: PART I and PART II.

Part I consists of the RESULTS and DISCUSSION of the findings for the study on post-thyroidectomy⁺ participants, specific objective:

- To compare health-related quality of life outcomes of post-thyroidectomy⁺ patients treated from Jan, 2021 to Dec, 2024 with those of health institution-based normal clients in TASH, Central Ethiopia

Part II consists of the RESULTS and DISCUSSION of the findings for the study on post-mastectomy participants, specific objective:

- To compare health-related quality of life outcomes of post-mastectomy patients treated from Jan, 2021 to Dec, 2024 with those of health institution-based normal clients in TASH, Central Ethiopia

PART I: POST-THYROIDECTOMY PARTICIPANTS

5.1 RESULTS

5.1.1 Sociodemographic and clinical data

A total of three hundred and eighteen women (N = 318), hundred and six (n = 106) in each of the three study groups were recruited and included in the final analysis. The post-total thyroidectomy, post-partial thyroidectomy and control groups had median ages in years of 41.0 (IQR: 20), 42.5 (IQR: 17) and 38.0 (IQR: 16), respectively. Fifty-nine (55.7%; 95% CI: 46.2-64.8%) of the participants in the post-total thyroidectomy group had an educational level of at least up to a Secondary School. These estimates for the post-partial thyroidectomy and control groups were 67 (63.2%; 95% CI: 53.7-71.8%) and 77 (72.6%; 95% CI: 63.5-80.2%), respectively. Two thirds of the participants in the control, 72 (67.9%; 95% CI: 58.5-76.0%) were married. The respective estimates for the post-total thyroidectomy and post-partial thyroidectomy groups had been found to be 69 (65.1%; 95% CI: 55.6-73.5%) and 63 (59.4%; 95% CI: 49.9-68.3%). In all of the three study groups, the majority of the participants were Christians.

In both post-thyroidectomy groups of the study, benign thyroid pathologies had been the common causes for the surgical procedures. Sixty-four (60.4%; 95% CI: 50.9-69.2%) of the participants in the post-total thyroidectomy and 89 (84.0%; 95% CI: 75.8-89.7%) of those in the post-partial thyroidectomy group had non-cancerous thyroid diseases. None of the thyroid cancer patients in both groups had received radio-active iodine therapy. Toxic goiters were important indications in both groups with 43 (40.6%; 95% CI: 31.7-50.1%) and 53 (50.0%; 95% CI: 40.6-59.4%) cases in the post-total thyroidectomy and post-partial thyroidectomy groups, respectively. Five (4.7%) women among the total thyroidectomy group and 3 (2.8%) of those among the hemithyroidectomy group had a unilateral recurrent laryngeal nerve injury. None of the participants in the hemithyroidectomy group and 7 (6.6%) of those in the total thyroidectomy group developed permanent hypo-parathyroidism. **Table 5.1.1** summarizes the sociodemographic and clinical data.

Table 5.1.1: Sociodemographic and Clinical Data of Women by their Study Groups, Central Ethiopia, January 2021 to December 2024 (N = 318)

Study Variables	Post-total thyroidectomy	Post-partial thyroidectomy	Controls
	N (%; 95% CI)	N (%; 95% CI)	N (%; 95% CI)
Marital status			
Single	10 (09.4; 05.2-16.5)	23 (21.7; 14.9-30.5)	07 (06.6; 03.2-13.0)
Married	69 (65.1; 55.6-73.5)	63 (59.4; 49.9-68.3)	72 (67.9; 58.5-76.0)
Divorced	11 (10.4; 05.9-17.6)	12 (11.3; 06.6-18.8)	18 (17.0; 11.0-25.3)
Widowed	16 (15.1; 09.5-23.1)	08 (07.5; 03.9-14.2)	09 (08.5; 04.5-15.4)
Educational status			
No formal education	27 (25.5; 18.1-34.5)	18 (17.0; 11.0-25.3)	10 (09.4; 05.2-16.5)
Primary school	20 (18.9; 12.6-27.4)	21 (19.8; 13.3-28.4)	19 (17.9; 11.8-26.3)
Secondary school	37 (34.9; 26.5-44.4)	41 (38.7; 30.0-48.2)	31 (29.2; 21.4-38.5)
College and above	22 (20.8; 14.1-29.4)	26 (24.5; 17.3-33.5)	46 (43.4; 34.4-52.9)
Occupation			
Government	46 (43.4; 34.4-52.9)	42 (39.6; 30.8-49.1)	57 (53.8; 44.3-63.0)
Private	24 (22.6; 15.7-31.5)	19 (17.9; 11.8-26.3)	18 (17.0; 11.0-25.3)
Self-employed	17 (16.0; 10.3-24.2)	28 (26.4; 19.0-35.5)	23 (21.7; 14.9-30.5)
Unemployed	19 (17.9; 11.8-26.3)	17 (16.0; 10.3-24.2)	08 (07.5; 03.9-14.2)
Religion			
Orthodox	62 (58.5; 49.0-67.4)	56 (52.8; 43.4-62.1)	60 (56.6; 47.1-65.6)
Muslim	24 (22.6; 15.7-31.5)	25 (23.6; 16.5-32.5)	32 (30.2; 22.3-39.5)
Protestant	14 (13.2; 08.0-21.0)	16 (15.1; 09.5-23.1)	12 (11.3; 06.6-18.8)
Catholic	06 (05.7; 02.6-11.8)	09 (08.5; 04.5-15.4)	02 (01.9; 0.50-06.6)
Diagnosis			
Thyroid cancer	42 (39.6; 30.8-49.1)	17 (16.0; 10.3-24.2)	It is not applicable
Grave's diseases	09 (08.5; 04.5-15.4)	0 (0.00; 0.00-0.00)	It is not applicable
Toxic MNG	28 (26.4; 19.0-35.5)	49 (46.2; 37.0-55.7)	It is not applicable
Toxic adenoma	06 (05.7; 02.6-11.8)	04 (03.8; 01.5-09.3)	It is not applicable
Others	21 (19.8; 13.3-28.4)	36 (34.0; 25.6-43.4)	It is not applicable

CI, confidence interval

5.1.2 Summary of the eight SF-36 scales

The mean (Sd) and median (IQR) of the eight scales on a scale of 0 to 100 for each of the study groups were calculated and reported. The scores for the PF, RP and BP were analyzed to measure the different aspects of physical health. General Health and Vitality have been reported to measure both physical and mental health. On the other hand, SF, RE and MH measure the different facets of mental health. A normality test using Shapiro-Wilk test showed that only Vitality in the post-partial thyroidectomy group was found to be normally distributed ($p = 0.119$). For this reason, Kruskal-Wallis H test was used as an omnibus test to compare the eight SF-36 scales among the three study groups if any groups have scores that rank differently (**Table 5.1.2**).

Table 5.1.2: Health-related Quality of Life Outcomes of Participants by their Study Groups as Measured by SF-36, Central Ethiopia, January 2021 to December 2024

SF-36 scale	Post-total thyroidectomy		Post-partial thyroidectomy		Controls		P-value
	Mean (Sd)	Median (IQR)	Mean (Sd)	Median (IQR)	Mean (Sd)	Median (IQR)	
PF	80.3 (11.1)	85.0 (20.0)	82.5 (8.7)	85.0 (15.0)	83.7 (10.0)	87.5 (15.0)	0.069
RP	54.5 (25.8)	75.0 (50.0)	59.4 (23.0)	75.0 (31.3)	63.0 (26.8)	75.0 (25.0)	0.071
BP	38.2 (21.1)	41.0 (34.0)	43.1 (23.5)	42.0 (42.0)	43.7 (17.5)	44.0 (30.0)	0.118
GH	38.9 (24.0)	35.0 (45.0)	49.7 (26.1)	45.0 (40.5)	51.1 (22.9)	47.0 (40.0)	< 0.001
VT	43.3 (21.8)	40.0 (40.0)	50.6 (19.0)	50.0 (30.0)	62.8 (18.6)	60.0 (26.3)	< 0.001
SF	57.5 (23.1)	62.5 (37.5)	57.1 (18.3)	62.5 (37.5)	62.3 (19.3)	62.5 (25.0)	0.079
RE	50.0 (17.4)	33.3 (33.4)	61.3 (20.7)	66.7 (33.4)	72.3 (23.7)	66.7 (33.3)	< 0.001
MH	42.6 (16.4)	40.0 (28.0)	49.6 (14.7)	48.0 (28.0)	62.5 (19.0)	60.0 (32.0)	< 0.001

Sd, standard deviation; IQR, interquartile range; PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health

5.1.3 SF-36 scales measuring physical health

The post-total thyroidectomy group had the minimum SF and RP scores. All the three groups had a mean value greater than eighty in all of the three scales that measure physical health (PF, RP and BP). The post-total thyroidectomy, post-partial thyroidectomy and controls had a mean PF of 80.3 (95% CI: 78.2-82.5), 82.5 (95% CI: 80.8-84.1) and 83.7 (95% CI: 81.4-85.6), respectively. The values for RP in order were 54.5 (95% CI: 49.5-59.4), 59.4 (95% CI: 55.0-63.9) and 63.0 (95% CI: 57.8-68.1). The respective estimates for the BP scale had been found to be 38.2 (95% CI: 34.2-42.3), 43.1 (95% CI: 38.6-47.6) and 43.7 (95% CI: 40.4-47.1) (**Figure 5.1.1**).

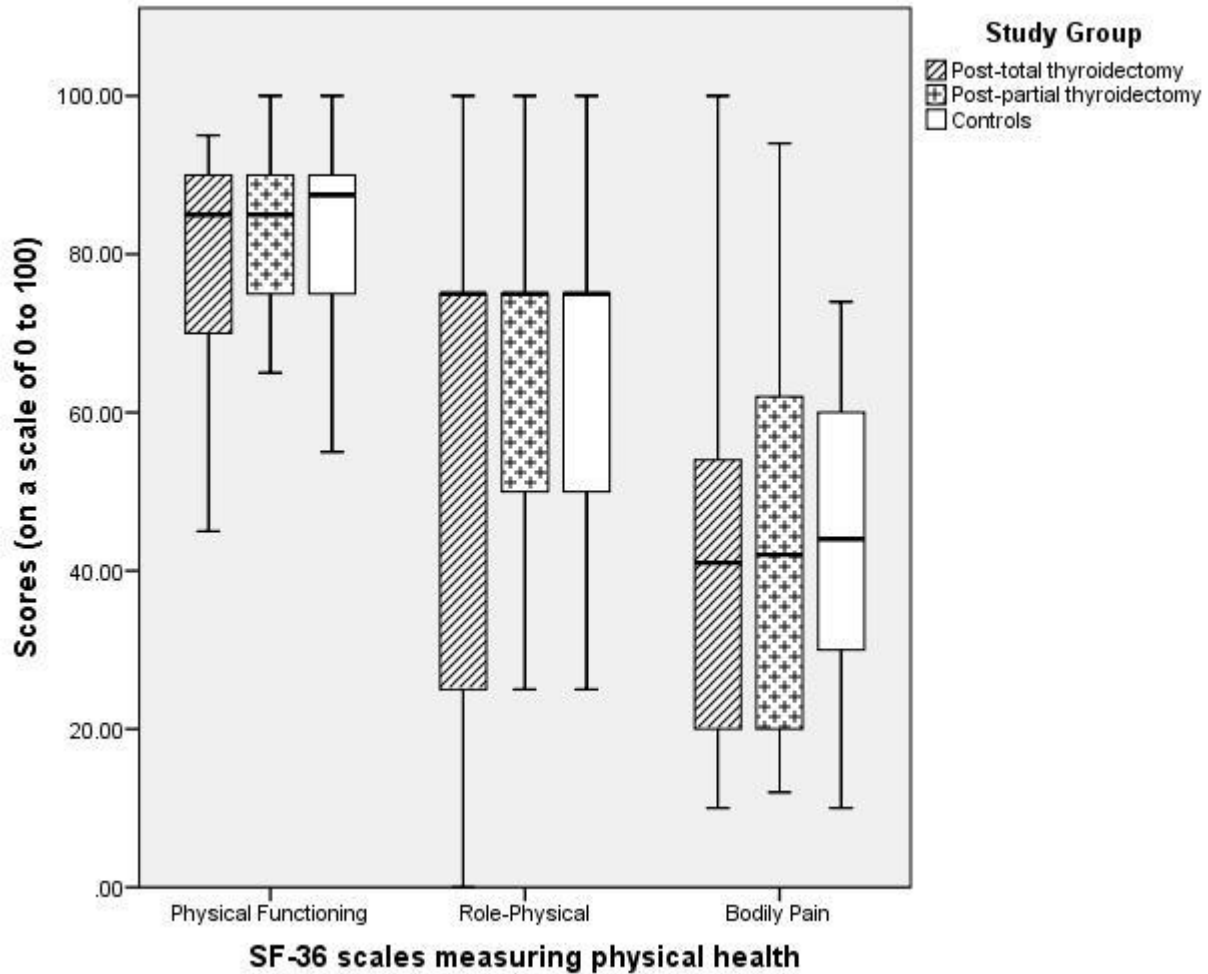


Figure 5.1.1: Boxplots of SF-36 scales measuring physical health. Post-total thyroidectomy, post-partial thyroidectomy and control groups evaluated their physical health similarly and positively.

5.1.4 SF-36 scales measuring both physical and mental health

The post-total thyroidectomy had the lowest Vitality score, 5.0. The minimum GH was scored by the two post-thyroidectomy groups and it was 10.0. On the other hand, the maximum GH score, 100.0 was found among the post-total thyroidectomy and controls. The mean GH among the post-total thyroidectomy, post-partial thyroidectomy and controls was 38.9 (95% CI: 34.3-43.5), 49.7 (95% CI: 44.6-54.7) and 51.1 (95% CI: 46.7-55.5), respectively. The respective values of VT had been 43.3 (95% CI: 39.1-47.6), 50.6 (95% CI: 47.0-54.3) and 62.8 (95% CI: 59.2-66.4) (**Figure 5.1.2**).

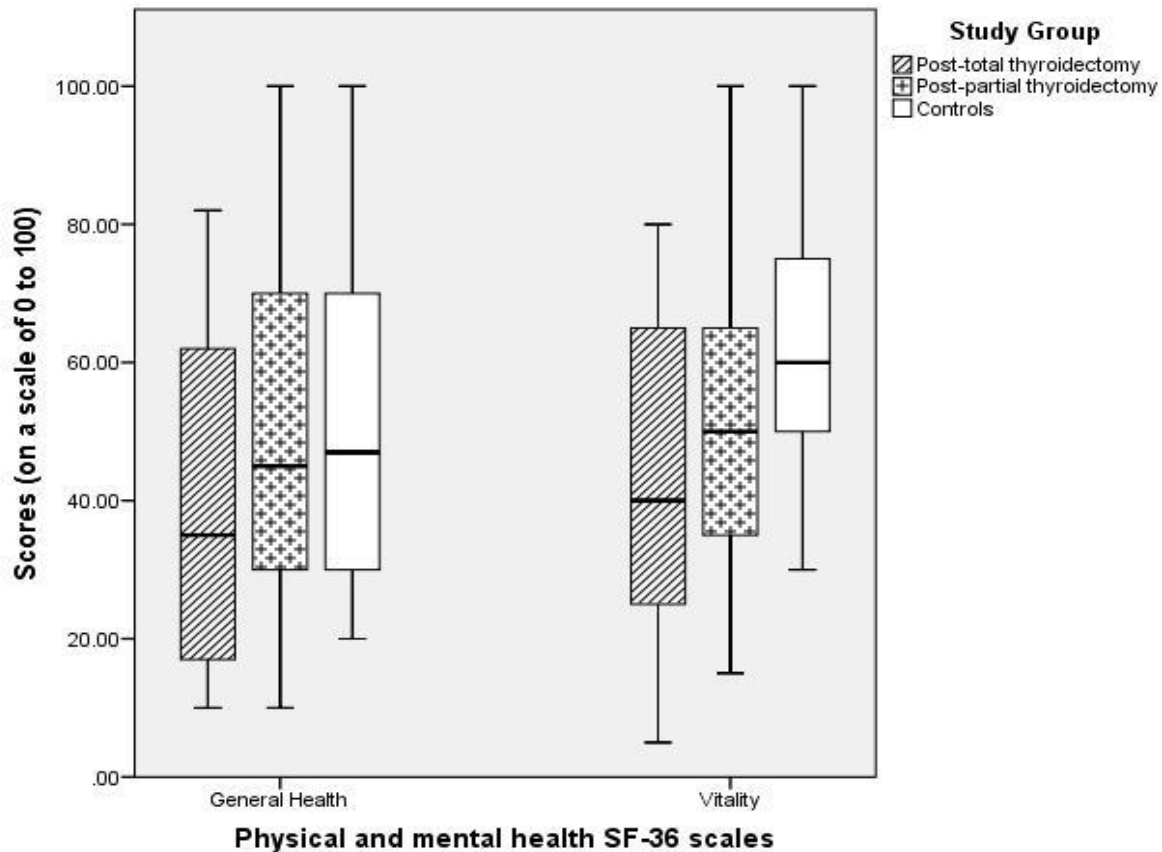


Figure 5.1.2: Boxplots of General Health and Vitality of participants. Post-thyroidectomy patients generally had unfavorable evaluation of their health compared with health institution-based controls.

5.1.5 SF-36 scales measuring mental health

The post-partial thyroidectomy group had the minimum score of SF. On the other hand, the post-total thyroidectomy group scored the minimum MH. The maximum possible score for MH was achieved among the controls only. The post-total thyroidectomy, post-partial thyroidectomy and controls had a mean SF of 57.5 (95% CI: 53.1-62.0), 57.1 (95% CI: 53.5-60.6) and 63.2 (95% CI: 59.5-66.9), respectively. Such values for RE in order were 50.0 (95% CI: 46.6-53.3), 61.3 (95% CI: 57.4-65.3) and 72.3 (95% CI: 67.8-76.9). On the other hand, the respective estimates for the MH scale had been found to be 42.6 (95% CI: 39.4-45.8), 49.6 (95% CI: 46.8-52.5) and 62.5 (95% CI: 58.9-66.2) (**Figure 5.1.3**).

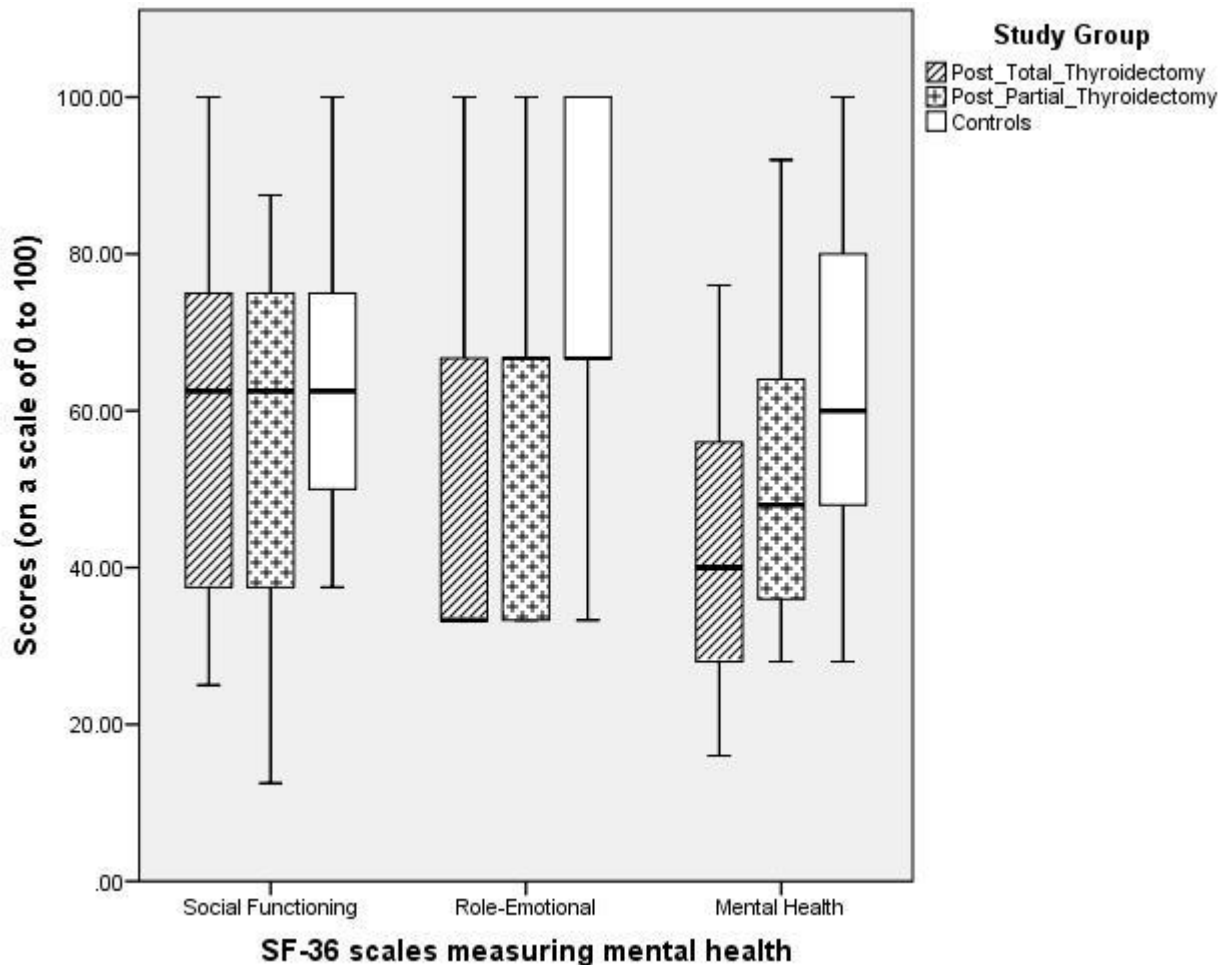


Figure 5.1.3: Boxplots of SF-36 scales measuring mental health. Post-total thyroidectomy and post-partial thyroidectomy participants had unfavorable evaluation of their Role-Physical and Mental health, but a similar and positive assessment of their Social Functioning compared with controls.

5.1.6 Reported health transition item

The study participants rated their current health status in comparison to how it was a year ago. They chose one of the five options for this item of the SF-36 tool that include: “Much better”, “Somewhat better”, “About the same”, “Somewhat worse”, and “Much worse”. In all of the three groups of the study, only small proportion of the participants reported that their current health status was “much worse” than it had been a year ago. The reported health transition findings for the three study groups based on the five options have been summarized in **Table 5.1.3**.

Table 5.1.3: Reported Health Transition of Participants by Study Groups, Central Ethiopia, January 2021 to December 2024

Reported Health Transition	Post-total thyroidectomy N (%; 95% CI)	Post-partial thyroidectomy N (%; 95% CI)	Controls N (%; 95% CI)
Much better	23 (21.7; 14.9-30.5)	17 (16.0; 10.3-24.2)	13 (12.3; 07.3-19.9)
Somewhat better	16 (15.1; 09.5-23.1)	34 (32.1; 24.0-41.5)	25 (23.6; 16.5-32.5)
About the same	26 (24.5; 17.3-33.5)	37 (34.9; 26.5-44.4)	45 (42.5; 33.5-52.0)
Somewhat worse	32 (30.2; 22.3-39.5)	16 (15.1; 09.5-23.2)	18 (17.0; 11.0-25.3)
Much worse	09 (08.5; 04.5-15.4)	02 (01.9; 0.50-06.6)	05 (04.7; 02.0-10.6)

CI, confidence interval

5.1.7 Comparison of HR-QoL outcomes among the three study groups

The three study groups had no statistically significant differences in their PF ($P = 0.069$), RP (0.071), BP ($p = 0.118$) and SF ($P = 0.079$). The two post-thyroidectomy groups had a median PF and BP lower than that of the controls; however, the Kruskal-Wallis H test showed that the differences did not amount to a statistical significance. On the other hand, the three groups had significant differences in their GH ($p < 0.001$), VT ($p < 0.001$), RE ($p < 0.001$) and MH ($p < 0.001$).

Pairwise comparisons revealed that the post-total thyroidectomy had lower GH than the post-partial thyroidectomy group ($p = 0.005$) and the controls ($p = 0.001$). The post-partial thyroidectomy group had a GH similar to the controls ($p = 1.000$). Each of the two post-thyroidectomy groups had a VT less than the controls ($p < 0.001$ in both pairs); and the extent of the thyroidectomy did show a significant difference in the VT scale ($p = 0.028$). The comparisons also showed that the post-thyroidectomy groups had significantly lower scores in RE: post-total thyroidectomy versus post-partial thyroidectomy ($p = 0.001$); post-total thyroidectomy versus controls ($p < 0.001$); and post-partial thyroidectomy versus controls ($p = 0.003$). The post-thyroidectomy groups had MH scores significantly lower than the controls: post-total thyroidectomy versus post-partial thyroidectomy ($p = 0.019$); post-total thyroidectomy versus controls ($p < 0.001$); and post-partial thyroidectomy versus controls ($p < 0.001$).

5.2 DISCUSSION

The three study groups had generally comparable sociodemographic data. They had a similar median age that was estimated and found to be about 40 years ($p = 0.066$). The overlapping 95% confidence intervals showed that the participants were largely similar in their marital status, occupation and religion. The educational level of the three groups had also been largely similar, but the proportion of those with 'college and above' was relatively higher among the controls.

The post-total thyroidectomy and post-partial thyroidectomy groups consisted of women after thyroid surgery for a mix of thyroid gland pathologies. In both groups, the vast majority of the participants were operated for benign diseases of the gland. Six-tenths of the participants in the post-total thyroidectomy and the vast majority (nine-tenths) of those in the post-partial thyroidectomy group had non-cancerous thyroid diseases. Toxic goiters were among the important benign diseases that were indications for a sizable proportion of participants in both post-thyroidectomy groups. Other pathologies like multinodular goiter with pressure symptoms had also been found to be important reasons for significant portions of the surgical procedures in the current study. Previous studies from Ethiopia [62,69,70], Kenya [71] and Greece [72] reported similar findings that thyroidectomies were performed for non-malignant diseases of the thyroid in the vast majority of patients.

The post-thyroidectomy women in our study had physical Functioning, Role-Physical and Bodily Pain similar to the normal health institution-based women. The extent of thyroidectomy did not also affect these three SF-36 scales that measure the different aspects of physical health. Li J *et al.* [73] reported that differentiated thyroid cancer patients evaluated a year after their near-total thyroidectomy did have no difference in their PF, but a significantly lower RP and BP compared with hospital-based controls. A study from South Korea by Yu HW *et al.* [64] using a different tool, the modified version of Korean Short Form 12 questionnaire (SF-12) reported that post-thyroidectomy cases had no different Physical Functioning and Bodily Pain compared with population-based matched controls. They, however had a significantly lower status in terms of their Role-

Physical. Another study from Saud Arabia by Alyousef MY *et al.* [36] using the validated Arabic version of the European Organization for Research and Treatment of Cancer head and neck cancer specific quality of life questionnaire (EROTC-QLQ)-H&N43 questionnaire concluded that patients after thyroid surgery had a very good long-term quality of life.

Contrary to the findings in our study, some previous studies showed that more extensive thyroid surgeries had led to unfavorable physical health outcomes [37,63]. Nickel B *et al.* [63] reported that differentiated thyroid cancer cases after total thyroidectomy with/without neck dissection had several and significant concerns and limitations in their physical health than post-hemithyroidectomy patients. The fact that the participants in this study were relatively older and all with a diagnosis of thyroid cancer together with the use of a different tool to measure Hr-QoL and a different study setting could contribute to the differences noted in the findings. A systematic review study had also showed that studies that assessed quality of life after thyroid surgery had so diverse sociodemographic and clinical characteristics of participants and used many and different instruments. This in turn made head-to-head comparisons and contrasts of the different domains and aspects of Hr-QoL to draw strong conclusions difficult [37]. Generally, our study showed that physical health problems like restrictions in work and usual activities and limitations in discharging different roles as a result of physical disease after thyroidectomy were not found to be different from the normal controls.

The current study showed that total thyroidectomy significantly lowers General Health and Vitality compared with controls. The extent of thyroidectomy also affected these two scales that assess both physical and mental health of individuals. The post-total thyroidectomy group had scores in the two SF-36 scales lower than the scores of the controls. This indicated that post-surgery patients after a more extensive form of thyroidectomy generally gave a negative assessment to their health. As GH and VT are among the three bipolar scales of SF-36 (GH, VT and MH) [66], the achievement of mid-range scores among the post-partial thyroidectomy and controls, however showed that these two groups generally had no unfavorable evaluations of their health. In line

with the findings of our study, previous studies revealed that post-surgery thyroid cases after a more extensive thyroidectomy had lower GH and VT [37,73]. Contrary to the findings in the current study, Yu HW *et al.* [64] reported that post-thyroidectomy patients had GH and VT scores similar to controls recruited from the general population as measured by the SF-12 tool used in the study. Given the findings that the participants in our study generally evaluated their physical health positively, the unfavorable findings in GH and VT could be largely due to the negative assessment they gave for their mental health.

As measured by the two-item SF-36 scale, Social Functioning, post-thyroidectomy participants did not report a significant difference in the quality or quantity of their social activities that they thought to be as the result of their own physical or mental health problems. Previous studies reported conflicting findings [37]. Some found that such patients had no problems in their social functioning. The study from South Korea that compared quality of life of post-thyroidectomy patients with that of controls recruited from routine screening visits showed that the scores of both groups to a question “How much of the time has your physical health or emotional problems interfered with your social activities?” were found to be comparable [64]. On the other hand, a study from China by Li J *et al.* [73] showed that differentiated thyroid cancer patients after near total thyroidectomy had significant problems in their social functioning compared to recruited volunteers with no subjective health problems. Several studies that assessed the social-related Hr-QoL of total thyroidectomy patients in comparison with the general population found that post-total thyroidectomy cases had significant impairments in their different social activities and less extent thyroid surgery had less impairments [37]. Differences in the participants’ sociodemographic data and clinical features as well as the instruments used to measure Hr-QoL outcomes could be important sources for the conflicting results.

Role-Emotional and MH were among the four SF-36 scales found to be significantly different among the three study groups. The extent of surgery also affected these aspects of mental health significantly. Post-total thyroidectomy participants had a lower

RE and MH than both post-partial thyroidectomy cases and controls. In consistent with the findings in our study, Li J *et al.* [73] found that post-thyroidectomy cases did have lower average RE and MH compared with normal controls. Yu HW *et al.* [64] also reported similar findings in some of the items used to measure these two scales. A systematic review study reported that total thyroidectomy led to a significant reduction in psychological-related Hr-QoL as found by several of the included studies. Generally, evidences show that mental health status is more likely to be impaired after total thyroidectomy compared with controls from the general population. Several mental health domains and items have been reported to have shown a significant decrease which included anxiety, depression, distress, mental fatigue, mental health component, somatization and reduced motivation [37]. Life-long medications, diagnosis of thyroid cancer, repeated appointments, the absence of optimal diagnostic and therapeutic services like for example the absence of radioactive iodine scan and therapy and lower educational level could be important contributing factors to the finding that the participants in our study evaluated their mental health unfavorably.

In conclusion, thyroidectomy reduces quality of life. It affects the mental health status more significantly than the physical health. Two of the three mental health scales (RE and MH) and all of the scales that measure both mental and physical health (GH and VT) were statistically significantly lower among participants for whom total thyroidectomy with/without neck dissections was done. Post-partial thyroidectomy cases had significantly lower scores in VT, RE, and MH than controls. All of the three scales assessing physical health (PF, RP, and BP) were similar among the three study groups. A holistic care by integrating mental health services with routine surgical treatment may improve quality of life of post-thyroid surgery clients.

PART II: POST-MASTECTOMY PARTICIPANTS

5.3 RESULTS

5.3.1 Sociodemographic and clinical data

One hundred and eighty-three women in each of the two study groups were included in the analysis. The median age in years for the post-mastectomy and control groups were 45 (IQR: 15) and 36 (IQR: 15) ($p < 0.001$), respectively. Eighty percent of the post-mastectomy group and more than 40% of the control had an educational level of college or above, respectively. More than half of breast cancer patients had stage III disease. Because the study was carried out on breast cancer cases for whom a curative-intent surgery was done, the number of stage IV patients in the study was zero. The sociodemographic and clinical data of the participants is summarized in **Table 5.3.1**.

Table 5.3.1: Sociodemographic and clinical data of women by study group, Central Ethiopia, Jan 2021 – Dec 2024 (N = 366)

Variables	Post-mastectomy N (%; 95% CI)	Control N (%; 95% CI)
Educational status		
No formal education	53 (29.0; 22.9-35.9)	24 (13.1; 09.0-18.8)
Primary school	40 (21.9; 16.5-28.4)	43 (23.5; 17.4-29.6)
Secondary school	56 (30.6; 24.4-37.6)	40 (21.9; 16.5-28.4)
College and above	34 (18.6; 13.6-24.8)	76 (41.5; 34.6-48.8)
Marital status		
Single	29 (15.8; 11.3-21.8)	20 (10.9; 07.2-16.3)
Married	120 (65.6; 58.4-72.1)	128 (69.9; 62.9-76.1)
Divorced	21 (11.5; 07.6-16.9)	26 (14.2; 09.2-19.3)
Widowed	13 (07.1; 04.2-11.8)	09 (04.9; 02.6-09.1)
Occupation		
Government	38 (20.8; 15.5-27.2)	87 (47.5; 40.4-54.8)
Private	30 (16.4; 11.7-22.4)	36 (19.7; 14.6-26.0)
Self-employed	64 (35.0; 28.4-42.1)	49 (26.8; 20.9-33.6)
Unemployed	51 (27.9; 21.4-34.4)	11 (06.0; 03.4-10.4)
Religion		
Orthodox	78 (42.6; 35.7-49.9)	124 (67.8; 60.7-74.1)
Muslim	56 (30.6; 24.4-37.6)	32 (17.5; 12.7-23.6)
Protestant	38 (20.8; 15.5-27.2)	19 (10.4; 06.8-15.6)
Catholic	11 (06.0; 03.4-10.4)	08 (04.4; 02.2-08.4)
Stage of breast cancer		
Stage 0	07 (03.8; 01.9-07.7)	Not applicable
Stage I	23 (12.6; 08.5-18.2)	Not applicable
Stage II	50 (27.3; 21.4-34.2)	Not applicable
Stage III	103 (56.3; 49.0-63.3)	Not applicable
Stage IV	0 (0.00; 0.00-0.00)	Not applicable

Note: CI, confidence interval

5.3.2 Health-related Quality of Life Outcomes

For each of the eight SF-36 scales (on a 0 to 100 scale), measures of central tendency like mean and median and measures of dispersion such as Sd and IQR have been estimated and reported. The 25th percentile (1st quartile, Q1) and the 75th percentile (3rd quartile, Q3) were also determined. With a belief that it facilitates the smooth and easy flow and report of the results. we introduced at this early stage of the results section the table that consists of the different estimates of the eight SF-36 scales for the two study groups and the p-values from the Mann-Witney U test used for the scales were not normally distributed (**Table 5.3.2**).

Table 5.3.2: Health-related Quality of Life outcomes of participants by study groups, Central Ethiopia, Jan 2021 – Dec 2024 (N = 366)

Scale	Post-mastectomy				Control				P-value
	Mean (Sd)	Mean Rank	Q1, Q3	Median (IQR)	Mean (Sd)	Mean Rank	Q1, Q3	Median (IQR)	
PF	69.2 (12.7)	173.4	65.0, 80.0	70.0 (15.0)	72.4 (11.1)	193.6	65.0, 80.0	75.0 (15.0)	0.064
RP	67.1 (17.3)	174.4	50.0, 75.0	75.0 (25.0)	72.3 (20.3)	192.6	50.0, 100	75 (50.0)	0.073
BP	46.0 (25.0)	162.7	21.0, 64.0	44.0 (43.0)	55.7 (24.6)	204.3	40.0, 74.0	54.0 (34.0)	< 0.001
GH	37.8 (22.8)	148.8	17.0, 57.0	35.0 (40.0)	53.9 (23.8)	218.2	30.0, 75.0	50.0 (45.0)	< 0.001
VT	44.0 (21.6)	147.7	25.0, 60.0	40.0 (35.0)	59.3 (18.3)	219.3	45.0, 70.0	55.0 (25.0)	< 0.001
SF	53.6 (21.0)	165.4	37.5, 75.0	50.0 (37.5)	60.7 (18.1)	201.6	50.0, 75.0	62.5 (25.0)	0.001
RE	49.7 (17.5)	143.3	33.3, 66.7	33.3 (33.4)	69.6 (23.8)	223.7	66.7, 100	66.7 (33.3)	< 0.001
MH	46.4 (13.4)	119.7	36.0, 56.0	44.0 (20.0)	64.0 (8.0)	247.3	56.0, 72.0	64.0 (16.0)	< 0.001

Note: Sd, standard deviation; Q1, first quartile; Q3, third quartile; IQR, interquartile range; PF, physical functioning; RP, role-physical; BP, bodily pain; GH, general health; VT, vitality; SF, social functioning; RE, role-emotional; MH, mental health

5.3.3 Physical Functioning, Role Physical and Bodily Pain

These three scales measure the different aspects of physical health. The post-mastectomy group had a median Physical Functioning of 70.0 (IQR: 15.0); Role-Physical of 75.0 (IQR: 25.0); and Bodily Pain of 44.0 (IQR: 43.0). The respective values for the control group were 75.0 (IQR: 15.0); 75.0 (IQR: 50.0); and 54.0 (IQR: 34.0). The minimum scores for the PF, RP and BP in the post-mastectomy group were 35.0, 25.0 and 10.0, respectively. The respective minimum values for the control group were 45.0, 50.0 and 10.0. On the other hand, the maximum scores for the PF, RP and BP in the

post-mastectomy group were 90.0, 100.0 and 100.0, respectively. The respective maximum values for the control group were 95.0, 100.0 and 100.0. In the post-mastectomy group, Bodily Pain was the widely dispersed SF-scale followed by the Role-Physical. In the control group, however the most widely dispersed one among the three SF-36 scales was the Role-Physical followed by the Bodily Pain. The Physical Functioning, however was relatively compacted about the median in both groups (Figure 5.3.1).

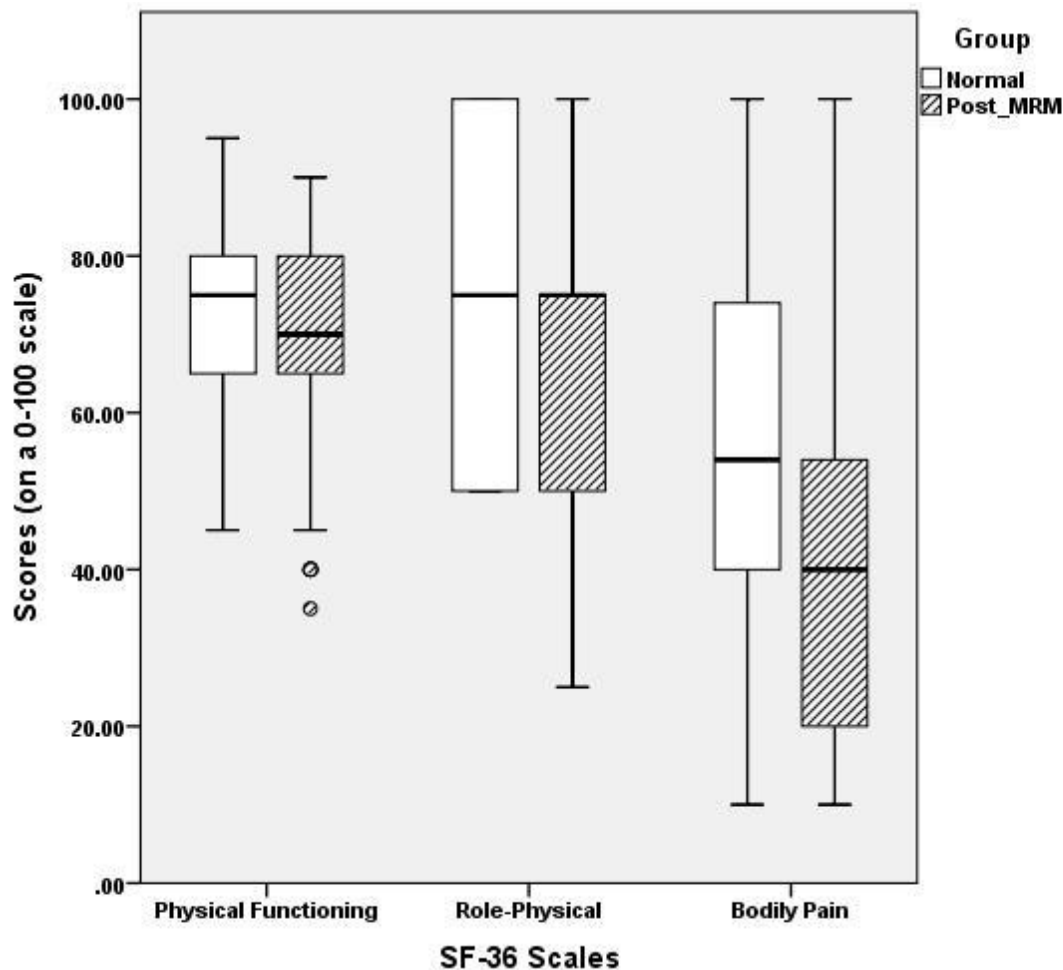


Figure 5.3.1: Boxplots of Physical Functioning, Role-Physical and Bodily Pain of study participants. Both groups had similar scores of Physical Functioning and Role-Physical. Bodily Pain, however was found to be statistically significantly lower in the post-modified radical mastectomy (post-MRM) group showing that they have a lower physical health status in terms of this scale.

5.3.4 General Health and Vitality

General Health and Vitality are used to measure both physical and mental health. The post-mastectomy group had a median GH of 35.0 (IQR: 40.0) and VT of 40.0 (IQR: 35.0). The values for the control group were 50.0 (IQR: 45.0) and 55.0 (IQR: 25.0), respectively. The minimum and maximum GH scores were 10.0 and 82.0 in the post-mastectomy and 20.0 and 100.0 in the control group, respectively. The maximum VT score was 100.0 in both groups; but its minimum score was 5.0 and 30.0 in the post-mastectomy and control groups, respectively (**Figure 5.3.2**).

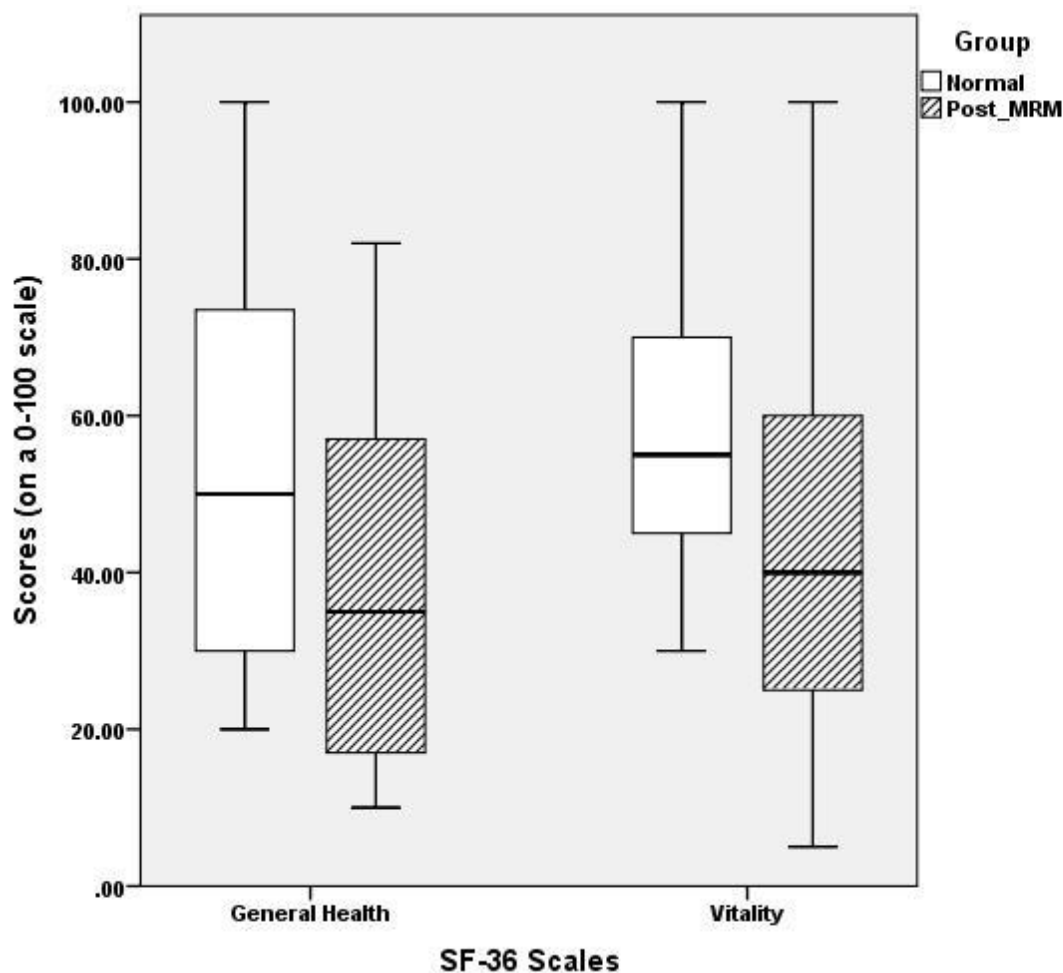


Figure 5.3.2: Boxplots of General Health and Vitality of study participants. The post-modified radical mastectomy (post-MRM) group had statistically significantly lower standardized scores in these two SF-36 scales than the controls.

5.3.5 Social Functioning, Role-Emotional and Mental Health

The post-mastectomy group had a median SF of 50.0 (IQR: 37.5); RE of 33.3 (IQR: 33.4); and MH of 44.0 (IQR: 20.0). The respective values for the control group were 62.5 (IQR: 25.0); 66.7 (IQR: 33.3); and 64.0 (IQR: 16.0). The minimum scores for the SF, RE and MH in the post-mastectomy group were 25.0, 0.0 and 28.0, respectively. The minimum respective values for the control group were 37.5, 33.3 and 52.0. On the other hand, the maximum scores for the SF, RE and MH in the post-mastectomy group were 87.5, 100.0 and 72.0, respectively. Such respective maximum values for the control group were 100.0, 100.0 and 76.0 (**Figure 5.3.3**).

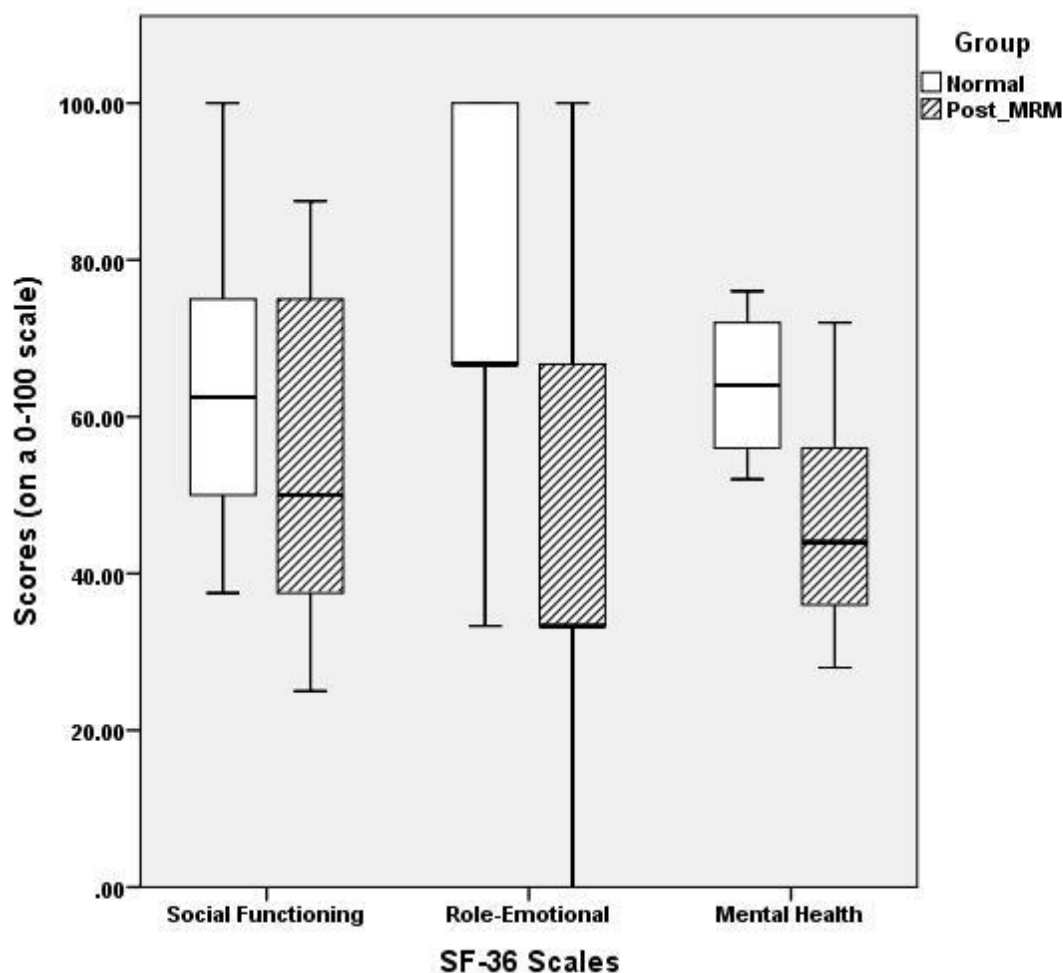


Figure 5.3.3: Boxplots of Social Functioning, Role-Emotional, and Mental Health of study participants. The post-modified radical mastectomy (post-MRM) group had statistically significantly lower standardized scores in these three SF-36 scales than the controls.

5.3.6 Reported Health Transition

Participants were asked to generally rate their health compared with how it was a year ago. Forty percent of participants with breast cancer ($n = 73$; 39.9%) reported that their health is somewhat worse than it was a year ago. Almost a quarter ($n = 43$; 23.5%) of them said it is about the same. A health status much worse than now than a year ago was reported by 32 (17.5%) of the post-mastectomy group. Those who reported 'much better' and 'somewhat better' current health status were 13 (7.1%) and 22 (12.0%), respectively. In the control group, nearly half ($n = 86$; 47.0%) of the participants reported that their current health status is about the same. Sixty-six (36.1%) of them reported a health status somewhat better than how it was one year ago. Thirty-one (16.9%) of the control had a somewhat worse health.

5.3.7 Comparison of SF-36 scales between the study groups

As it has been shown in **Table 5.3.2**, the mean rank of the Physical Functioning of the post-mastectomy group was lower than that of the control. However, the difference had not been statistically significant, $p = 0.064$. No statistically significant difference in the mean ranks of the RP was found between the two groups, $p = 0.073$. The Bodily Pain had been statistically significantly higher in the post-mastectomy group, $p < 0.001$. The mean ranks of the GH and VT scales were statistically significantly lower in the post-mastectomy group, $p < 0.001$ and $p < 0.001$, respectively. The mean ranks of SF, RE and MH were statistically significantly lower in the post-mastectomy group, $p = 0.001$, $p < 0.001$ and $p < 0.001$, respectively.

5.4 Discussion

One hundred and eighty-three women participants to each of the two study groups, post-mastectomy (post-modified radical mastectomy = post-MRM) and controls were included in the final analysis of the current study. The cases were relatively older than the controls. In both groups, about two thirds of the participants were married. Thirty-four (18.6%) of women in the post-mastectomy group and 76 (41.5%) of those in the control group had an educational status of college and above. This significant difference in their level of education may be due to the fact that the controls came mainly from the capital city of the country where the facility giving breast cancer screening is found whereas the post-mastectomy group came from both the capital as well as referred from the rest part of the country for better management of their diagnoses, breast cancer.

The majority of breast cancer cases included in the current study had a loco-regionally advanced disease, stage III. Advanced disease at presentation is a common problem reported by studies from developing countries. Most breast cancer patients in the Sub-Saharan Africa present with stages III and IV of the disease [74-76]. A systematic review and meta-analysis study carried out to determine the proportion of early-stage breast cancer at the time of diagnosis in Ethiopian hospitals reported a pooled proportion of 36% (31%-41%), an estimate significantly lower than the target set by the Global Breast Cancer Initiative of the World Health Organization [75].

Of the three SF-36 scales developed to measure the different aspects of physical health, bodily pain was found to be statistically significantly lower in the post-mastectomy group of this study. Prior studies showed that women with breast cancer commonly suffer from pain with far reaching consequences including a reduction in quality of life [79]. Chronic pain after mastectomy is a frequently encountered experience [77]. It has several contributing components including the extent of the surgical procedure, radiotherapy and psychosocial factors. Compared to breast conserving surgery, mastectomy is associated with a higher incidence and magnitude of pain. A more extensive dissection of the axilla is also a strong predictor of post-surgery pain among such patients [80]. Our study participants had several of the factors strongly

contributing to the development and magnitude of pain in breast cancer. Their type of surgery was a more extensive one with no reconstruction attempts, modified radical mastectomy. The psychosocial burden and its contribution to the pain of losing their breasts are also expected to be higher as evidenced with their lower scores in the SF-36 scales measuring the different aspects of mental health. The PF was lower in the post-mastectomy group; however, the difference was not significant. The score for RP was equal between the two groups. The fact that nearly half of them had early-stage breast cancer; their relatively younger age and the lower rate of comorbidities among them can contribute to these findings.

In the current study, the standardized scores of the three SF-36 scales that measure the different aspects of mental health (SF, RE and MH) were found to be significantly lower among post-mastectomy cases than controls. The RE of cases was half of that of the controls. Similarly, prior studies showed that women face huge mental health challenges and burden accompanying the diagnosis of breast cancer. The emotional journey after receiving the diagnosis of breast cancer has thorny ups and downs. These all can occur before, during and after treatment [81,82]. Mental disorders were more common in breast cancer patients than controls [80-83]. A systematic review by Carreira, *et al.* [78] which included sixty studies concluded that breast cancer survivors had increased risk of depression, anxiety, suicide, and sexual and neurocognitive dysfunctions.

Many different factors have been reported by several studies to influence mental health after breast cancer diagnosis. Endocrine therapies like tamoxifen were found to be associated with increased rate of mental disorders [81]. Most studies found that lesser extent of breast surgery and oncoplastic breast surgeries improve psychological outcomes [84,85]. The behavioral and emotional changes that breast cancer patients experience reduce quality of life [82]. Scars and other lasting body changes following treatment of breast cancer make women feel less attractive and have less self-acceptance [86,87]. The post-mastectomy group of our study had several factors that can contribute to the lower RE and MH. The more extensive breast surgery even when

they had an early breast cancer that could be treated with breast-conserving surgery due to scarce availability and less affordability of radiotherapy; no practice of breast reconstruction after mastectomy; sense of being not optimally treated due to scarcity of several treatment options and the long waiting list to obtain the available services; the bare availability of breast cancer survivorship and support groups; and losing the breasts at a relatively younger age are among the factors worth mentioning.

The social functioning of cases in our study was lower than that of the controls. Sperlich S, et al. [88] reported that breast cancer patients after primary surgery had lower social participation compared to the general population. It also showed that breast cancer patients after a mastectomy had a higher likelihood to have a lower degree of social participation compared to those who had breast conserving surgery. A narrow social network among breast cancer cases negatively impacts their long-term outcomes like morbidity, mortality and quality of life [89]. It is also positively correlated with psychological distress [90,91]. The more extensive surgery they had; the diversified socio-cultural characteristics; their relatively lower educational level and other factors might contribute to the lower social functioning of the post-mastectomy group in our study. Negative body image and the subsequent psychological burden that they experience as a result of loss of their breasts can also be mentioned as an important contributing factor. Yoo JJ, et al. [92] showed that the extent of surgery, educational level and other socio-demographic and cultural characteristics of cancer patients influence the perception of their body appearance; and mastectomy cases reported a more negative body image than those for whom breast-conserving surgery was done.

In conclusion, quality of life of breast cancer patients after a curative-intent surgery was found to be lower. The post-mastectomy group scored significantly lower values in all of the scales measuring mental health and those measuring both physical and mental health. Of the three scales measuring physical health, bodily pain was found to be significantly lower. The study provides a barely available data on measures of health-related quality of life outcomes on post-operative breast cancer individuals compared with health institution-based clients from a resource-limited setting. The findings

contribute to improvements in pre- and post-operative counseling and understanding among providers and breast cancer cases about the expectations; and it also helps in assessing the effectiveness and quality of healthcare interventions and programs. Optimal treatment and an organized psychosocial and emotional support by establishing, strengthening and expanding cancer survivorship and support groups can improve such low outcome measures.

LIMITATIONS AND STRENGTHS OF THE STUDY

The study has important limitations worth reporting. One, for logistical constraints, women among the control group were recruited from health institution-based clients. These participants might not be a representative of the larger, wider and diversified Ethiopian context. Two, we used SF-36 to measure the health-related quality of life of the participants. The tool has been developed and widely validated across different regions of the globe to be applicable in a variety of populations and clinical settings [66-68]; however, it is yet to be validated in the Ethiopian context. The third important limitation of the study is that post-thyroidectomy groups included a different mix of thyroid pathologies; but, the vast majority of the cases were of benign diagnoses. Four, we did not assess the effect of long-term major surgical complications on quality of life due to inadequate sample size for those with the complications to constitute a separate comparison group.

The use of a widely validated standard tool and controls to assess and compare Hr-QoL outcomes is an important strength of the study. The other major strength of the study is that, as the first study in Ethiopia to assess the Hr-QoL of patients after thyroidectomy and mastectomy, the findings can be used in provider-patient communication about the expectations and as important ingredients to future studies that should focus on assessing quality of life of thyroid and breast cases segregated in to different pathologies and treatment options using a population-based norm for comparisons. Readers are encouraged to take in to account the limitations when interpreting and generalizing the study findings.

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ANNEX I: DATA COLLECTION TOOL

PART I: COVER LETTER AND CONSENT OF PARTICIPANTS

Date _____

Dear participant:

My name is **Dr Agegnehu Berie Bayeh** and I am an Endocrine and Breast Surgery fellow at **Addis Ababa University**. For my final project, I am assessing the health-related quality of life and health care experiences of clients treated in **TASH**. You are kindly invited to participate in my research project by completing the attached surveys. The main purpose of the research is to assess the health-related quality of life outcomes and health care experiences of clients treated in **Endocrine and Breast Surgery Unit at TASH**.

Your participation is **entirely voluntary and you have a full right to withdraw** from participation at any time you feel to do it. If you decide to participate, you will be asked to complete a paper-based survey. The survey should take no more than 30 minutes and I hope to recruit hundreds of participants. The survey will not collect any identifiable information and no one will be able to connect your response to you. Your anonymity is further protected by not asking you to sign and return a consent form. Your voluntary completion of the survey will serve as your consent.

If you have any questions about this study, you may call **me** at **+251923486085** or my advisor, **Dr Endale Anberber** at **+251911424659**. This project has been reviewed and approved by the Research & Ethics Committee (**REC**) of Department of Surgery, School of Medicine, College of Health Sciences, Addis Ababa University. If you have any questions about your rights as a research participant, you may call the **REC** at **+251115152753**.

Thank you for taking the time to assist me in my educational endeavors.

Sincerely,

Agegnehu Berie Bayeh (MD)

Mobile: +251923486085

Email: agegnehuberie@gmail.com

Participant's signature: _____

Participants Code/MRN: _____

PART II: SOCIODEMOGRAPHIC AND CLINICAL DATA (TO REVIEW CLINICAL RECORDS AS NEEDED)

MRN/ Code	Age	Sex	Educational level	Marital status	Occupation	Religion	Study group	Final diagnosis	Procedure done/date	Post-op Complications

PART III: For HR-QoL Outcomes; This survey asks for views about your health. This information will help keep track of how you feel how well you are able to do your usual activities.

Answer every question by marking the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is: (Circle only one)

1. Excellent 2. Very good 3. Good 4. Fair 5. Poor

2. Compared to one year ago, how would you rate your health in general now?

1. Much better now than one year ago
2. Somewhat better now than one year ago
3. About the same as one year ago
4. Somewhat worse than one year ago
5. Much worse now than one year ago

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? (Circle one number on each line)

Questions	Activities	Yes, Limited A Lot	Yes, Limited A Little	No, Not Limited at All
3a	Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
3b	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
3c	Lifting or carrying groceries	1	2	3
3d	Climbing several flights of stairs	1	2	3
3e	Climbing one flight of stairs	1	2	3
3f	Bending, kneeling, or stooping	1	2	3
3g	Walking more than a mile	1	2	3
3h	Walking several blocks	1	2	3
3i	Walking one block	1	2	3
3j	Bathing or dressing yourself	1	2	3

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? (Circle one number on each line)

Questions		Yes	No
4a	Cut down on the amount of time you spent on work or other activities	1	2
4b	Accomplished less than you would like	1	2
4c	Were limited in the kind of work or other activities	1	2
4d	Had difficulty performing the work or other activities (for example, it took extra effort)	1	2

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)? (Circle one number on each line)

Questions		Yes	No
5a	Cut down on the amount of time you spent on work or other activities	1	2
5b	Accomplished less than you would like	1	2
5c	Didn't do work or other activities as carefully as usual	1	2

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups? (Circle one)
 1. Not at all 2. Slightly 3. Moderately 4. Quite a bit 5. Extremely
7. How much bodily pain have you had during the past 4 weeks?
 1. None 2. Very mild 3. Mild 4. Moderate 5. Severe 6. Very severe
8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (Circle one)
 1. Not at all 2. A little bit 3. Moderately 4. Quite a bit 5. Extremely
9. These questions are how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks- (Circle one number on each line)

Questions		All of the Time	Most of the Time	A Good Bit of the Time	Some of the Time	A Little of the Time	None of the Time
9a	Did you feel full of pep?	1	2	3	4	5	6
9b	Have you been a very nervous person?	1	2	3	4	5	6
9c	Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
9d	Have you felt calm and peaceful?	1	2	3	4	5	6
9e	Did you have a lot of energy?	1	2	3	4	5	6
9f	Have you felt downhearted and blue?	1	2	3	4	5	6
9g	Did you feel worn out?	1	2	3	4	5	6
9h	Have you been a happy person?	1	2	3	4	5	6
9i	Did you feel tired?	1	2	3	4	5	6

10. During the past 4 weeks, how much of the has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?
 1. All of the time 2. Most of the time 3. Some of the time 4. A little of the time 5. None of the time
11. How True or False is each of the following statements for you? (Circle one number on each line)

Questions		Definitely True	Mostly True	Don't know	Mostly False	Definitely False
11a	I seem to get sick a little easier than other people	1	2	3	4	5
11b	I am as healthy as anybody I know	1	2	3	4	5
11c	I expect my health to get worse	1	2	3	4	5
11d	My health is excellent	1	2	3	4	5