

Histopathology Services at University of Sierra Leone Teaching Hospitals Complex: A Four-year Retrospective Audit

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ARTICLE INFO

Article History

Received: March 13, 2025

Accepted: June 28, 2025

Published: July 5, 2025

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Technical Information

How to Cite: Onyishi N. T. et.al. Histopathology Services at University of Sierra Leone Teaching Hospitals Complex: A Four-year Retrospective Audit: SLJM 2025;Vol 2(2) pp 1-5.
<https://doi.org/10.69524/sljm.v2i1.203>

Editor-in-Chief: Prof. Kehinde S. Oluwadiya, University of Sierra Leone Teaching Hospitals Complex, Freetown, Sierra Leone.

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Funding: No funding was received for this study.

Ethical Consideration

Conflict of interest: The authors declare they have no conflicts of interest that are directly or indirectly related to the research.

ABSTRACT

Background: Health systems in low- and middle-income countries (LMICs) struggle with gross inadequacy and poor quality of laboratory services as well as other aspects of health care provision. Thus, the sole histopathology laboratory in Sierra Leone has weathered not a few operational challenges with fluctuations in availability of service. In the latest stretch of unbroken operations, specimens have been received from various parts of the country. This report is an analysis of the operations of the laboratory seeking to determine the demographic profile of patients, trends in service uptake and pattern of diagnostic entities.

Methods: The study was conducted at the histopathology laboratory of the Connaught Hospital unit of the University of Sierra Leone Teaching Hospital Complex, Freetown. Data was extracted from archived histopathology reports and the specimen reception register for cases seen from 1st January 2021 to 31st December 2024. Statistical analysis was done using R statistical software.

Results: There was 99% increase in demand for histopathology services between 2021 and 2024. The female to male ratio of laboratory users increased significantly from 1.4:1 in 2021 to 3:1 in 2024. The specimen originated from 47 hospitals in 9 out of the country's 16 districts. Thirty eight percent of all examined cases were malignant, while 62% were benign. Breast cancer represented 41.8% of all malignancies in females, while prostate cancer constituted 42% of cancers in males.

Conclusion: Demand for histopathology services is increasing in Sierra Leone. There is a sex difference in the utilization of histopathology services with twice as many females as males. About 38% of all specimens were histologically malignant. The most common malignancy in females was breast cancer, while prostate cancer was the leading malignancy in males.

Key words: Laboratory Medicine, Histopathology, Biopsies, Cancers, Sierra Leone.

1. INTRODUCTION

Pathology and laboratory medicine are indispensable in modern day medical practice. Rarely does a patient encounter the hospital establishment without being subjected to varying range of laboratory tests because diagnostic information provided by the laboratory are crucial components of patient's engagement with modern health care system. Apart from diagnosis and disease detection, results from the histopathology laboratory contribute to: disease prognosis, management modality and patient specific treatment selection, population cancer screening, support for disease registries, generation of accurate mortality data and medico-legal support¹. Effective use of laboratory tests and interpretation of investigation results within the overall clinical context was determined to significantly improve patients' care and treatment at the primary health care level even as a study attributes 66% of clinical decision in patient management to information generated from laboratory tests^{2,3}. In spite of the pivotal role of the laboratory in health care, health systems in low- and middle-income countries (LMICs) struggle with gross inadequacy and poor quality of laboratory services. In a three-part series of articles focusing on pathology and laboratory medicine in LMICs, lancet medical journal enunciated the prevalent barriers to effective pathology and laboratory medicine practice in low

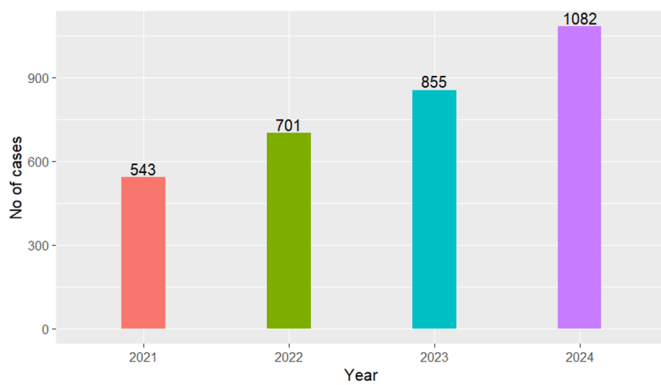


Figure 1: Yearly Trend in Number of Cases Processed at the Histopathology Laboratory Connaught.

and middle income countries, proffering some measures that can mitigate the challenges^{1,4,5}. Identified as perennial challenges to quality laboratory services are inadequate physical infrastructure, inadequate workforce and human resources and issues of standards and accreditation¹. Lean finances and inadequate resource allocation are notable features of laboratory services and indeed, the entire health system in LMICs.

The multifarious challenges to quality laboratory services in global LMICs, as extensively evaluated by Wilson ML et al¹, is exemplified by the course and state of histopathology services in Sierra Leone, a low income country by world bank criteria⁶. Histopathology capacity is only present in one centre nationally and operations is bedevilled with facility, personnel and supply issues. Overwhelmed by these challenges, the laboratory experienced a period of hiatus between 2018 and 2020. Following the resuscitation of the laboratory by the University of Sierra Leone Teaching Hospital administration, operations has been on for four consecutive years. The present article is an analysis of cases accessioned within this period aiming to determine the demographic profile of patients, trends in service uptake and profile of diagnostic entities prevalent in the laboratory. While population based surveys remain the gold standard in establishing the incidence and prevalence of health conditions, analysis of histopathological data pool has been rec-

Table 2. Comparing the Mean(SD) Ages of Females and Males

Age in years	Female	Male	P value
All Cases	39.2 (16.2)	49.8 (21.8)	<0.001
Benign Diagnoses	34.8 (14.6)	47.7 (22.8)	<0.001
Malignant Diagnoses	46.3 (16.1)	54.3 (18.9)	<0.001

ognized to highlight trends in prevalence of diseases within a population⁷. The data obtained in the histopathology laboratory can be fairly extrapolated to reflect the prevalence of those disease conditions which require tissue diagnoses for confirmation.

2. MATERIALS AND METHODS

The study was conducted at the Histopathology laboratory of University of Sierra Leone Teaching Hospital, Connaught. Connaught hospital is a 350-bed referral hospital, which is pivotal to Sierra Leone's health care system. It is situated at the heart of Freetown and has expertise in diverse surgical sub-specialties. It is the site of the country's only histopathology laboratory. Data was extracted from archived histopathology reports and specimen reception register for all cases accessioned from 1st January 2021 to 31st December 2024. Data collected include patients' age and sex, organ of biopsy, requesting hospital and histopathological diagnosis. Diagnoses had been made by routine Haematoxylin and Eosin stain with no ancillary immunohistochemistry. Some cases of granulomatous inflammation were further assessed with Ziehl-Neelsen and Periodic acid (PAS) stain. Extracted data were entered into an Excel spread sheet and subsequently cleaned and imported into R statistical software. Continuous variables were presented as mean (SD) while categorical variables were presented as table of frequencies and bar charts. For statistical tests, p value .05 or less was accepted as significant.

Data Availability:

The dataset that supports the findings of this study is openly available at Mendeley Data repository at <https://data.mendeley.com/datasets/dddvp9hzd/1>.

3. RESULT

Three thousand, one hundred and eighty-one (3181) cases were

Table 1: Age, Sex of Clients and Nature of Diagnosis over a Four-Year Period (2021 to 2024)

	2021 (N=543)	2022 (N=701)	2023 (N=855)	2024 (N=1,082)
Age (Years)				
Mean (SD)	42.7 (19.5)	42.9 (19.1)	42.7 (19.2)	42.8 (18.4)
Median (IQR)	42.0 (31.0)	42.0 (30.0)	42.0 (30.0)	42.0 (28.0)
Range	0.7 - 90.0	0.1 - 89.0	0.1 - 104.0	0.1 - 93.0
Missing	15 (2.8%)	9 (1.3%)	2 (0.2%)	7 (0.6%)
Age Group (Years)				
≤15	37 (6.8%)	34 (4.9%)	64 (7.5%)	73 (6.7%)
16 to 25	79 (14.5%)	108 (15.4%)	114 (13.3%)	132 (12.2%)
26 to 35	95 (17.5%)	137 (19.5%)	131 (15.3%)	200 (18.5%)
36 to 45	93 (17.1%)	121 (17.3%)	171 (20.0%)	205 (18.9%)
46 to 55	74 (13.6%)	92 (13.1%)	136 (15.9%)	173 (16.0%)
56 to 65	67 (12.3%)	100 (14.3%)	121 (14.2%)	173 (16.0%)
>65	83 (15.3%)	100 (14.3%)	116 (13.6%)	119 (11.0%)
Missing	15 (2.8%)	9 (1.3%)	2 (0.2%)	7 (0.6%)
Sex of Patients				
Female	320 (58.9%)	428 (61.1%)	566 (66.2%)	780 (72.1%)
Male	223 (41.1%)	273 (38.9%)	289 (33.8%)	302 (27.9%)
Diagnosis				
Benign	340 (62.6%)	438 (62.5%)	483 (56.5%)	583 (53.9%)
Malignant	180 (33.1%)	246 (35.1%)	326 (38.1%)	415 (38.4%)
Missing	23 (4.2%)	17 (2.4%)	46 (5.4%)	84 (7.8%)

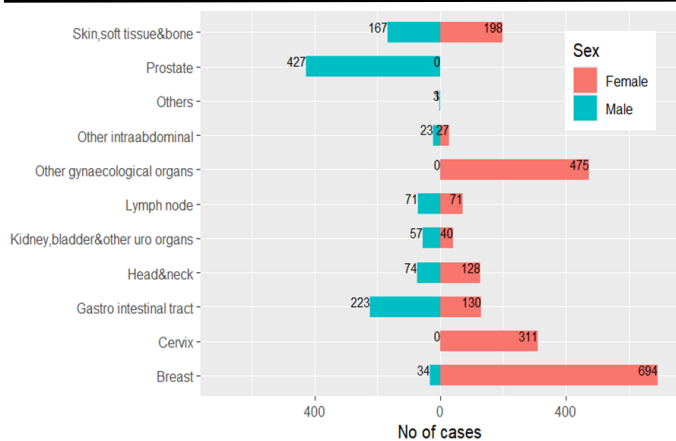


Figure 3: Organ Distribution of Biopsies in Both Sexes.

processed and reported over four years, Table 1. These cases originated from forty-seven different hospitals across the country. The average and the median ages of clients remained constant over the four-year period. Majority of the patients were within the age range of 26 to 45 years. Comparing the mean ages of both sexes, female clients were found to be far younger than males, (Table 2).

Figure 1 is a bar chart showing trends in utilization of the services of the laboratory. There has been an upward trend with an increase from 543 clients in 2021 to 1082 in 2024, translating to 99.3% increase in activity and utilization of histopathology services.

On the sex distribution of the clients, more females than males were served in each of the years under consideration, Table 1. Figure 2 compares the male to female ratio of user population of the laboratory over four years. It varied from M:F ratio of 1:1.4 in 2021 to ratio of 1:3 in 2024.

Figure 3 shows the organ distribution of biopsies in both male and female patients. In the females, biopsies are more frequently from the breast and gynaecological tract while the most frequent biopsies in males are prostate and gastrointestinal tract.

Majority (62) of the cases were diagnosed as benign. In aggregate, prevalence of malignancy was 38%, Figure 4.

Figure 5 displays the ranking of organ/sites of malignancy in males and females. The most common malignancy in females is cancer of the breast followed by that of the uterine cervix while prostate cancer predominates in males followed by skin and soft tissue tumours mostly Kaposi sarcoma.

Specimens were received from 47 hospitals in 9 out of the country's 16 districts, Table 3. The vast majority (85%) of the specimen

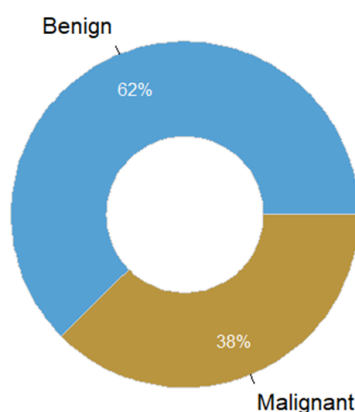


Figure 4: A Pie Chart Showing the Biological Nature of the Cases.

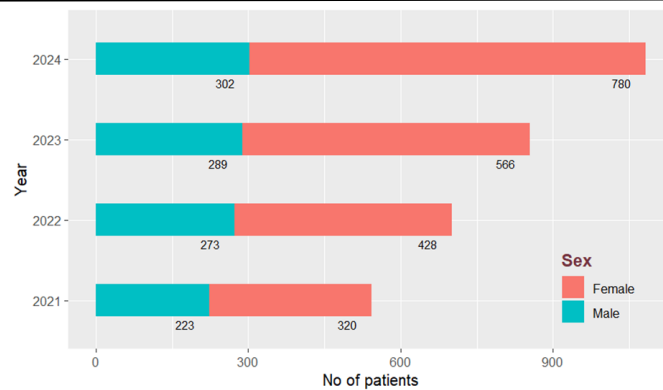


Figure 2: Comparing the Male to Female Ratios of Clients.

originated from 33 different hospital within Freetown. Kono district follows with 135(9%) surgical biopsies submitted from 2 hospitals.

4. DISCUSSION

In this work, effort has been made to analyse the specimens handled at the histopathology laboratory of University of Sierra Leone Teaching Hospitals Complex in order to document pattern of utilization of histopathology services by the population. There were three thousand, one hundred and eight one (3181) specimens in four years and there was a steady upward trend in yearly submissions. In fact, the volume of tissues received in 2024 represented about ninety-nine percentage increase compared with 2021 receptions. Scaling up of health service or intervention in a population is often accomplished by implementing carefully planned activities and strategies^{8,9}. However, the rapid expansion in services witnessed within the period of resuscitation occurred without any special promotion, a testament to the established and entrenched position of histopathology services as an integral component of modern health care service delivery.

As expected, the age and sex parameters as well as nature of disease process remained similar across the four-year period. This is expected, as the yearly samples had emanated from the same population of people over a relatively short time frame.

Disaggregating the sample by sex revealed some definite trends. First, the mean age of females was significantly lower than that of male clients in all the years and this age disparity was present irrespective of disease process. Thus, females with benign diagnoses as well as those with malignancy were much younger than their male counterparts. This suggests that those disease conditions that require histopathological assessment develop at younger age in females. Consistent with this, our data showed that the

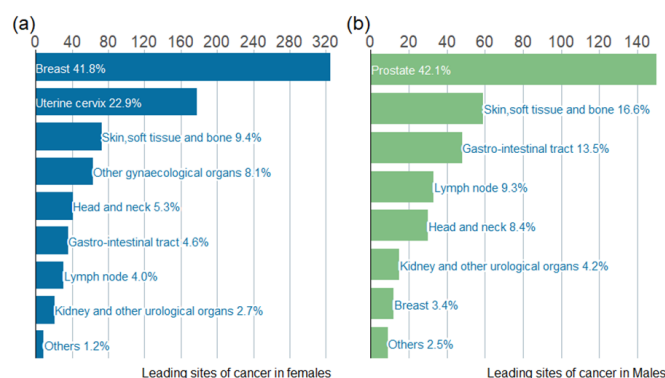


Figure 5: Ranking of sites of malignancy in (a) Females and (b) Males.

Table 3: Table Showing the Geographic Location of Hospitals that Submitted Specimens and the Percentage of Cases Contributed (n=1478)

District	Number of Hospitals Submitting Specimen	Number of Specimens Submitted (n=1478)	Percent
Western Area Urban	33	1,262	85.39%
Kono	2	135	9.13%
Tonkolili	2	30	2.03%
Kenema	1	18	1.22%
Western Area Rural	3	14	0.95%
Bo	1	7	0.47%
Bombali	3	6	0.41%
Karene	1	3	0.20%
Port Loko	1	3	0.20%

most common malignancies in females (breast and cervix) occurred at much younger age compared with the topmost cancer in males (prostate). Second, there were twice as much female users of histopathology services than males. Male to female ratio of service users changed from 1:1.4 in 2021 to 1:3 in 2024, establishing a clear predominance of females as users of our histopathology laboratory. This trend of female predominance in use of health care services has previously been reported with respect to other countries¹⁰. A study which investigated women's use of health care concluded that excluding pregnancy-related visits, women were 33 percent more likely than men to visit a doctor and that the rate of doctor visits for annual examinations and preventive services was 100 percent higher for women than for men¹¹. Women's consistently higher levels of healthcare use was ascribed to a combination of factors, including lower treatment-seeking threshold and health disadvantage¹². Furthermore, it has been proposed that people's health-seeking behaviour is influenced by the degree to which the disease is perceived by the person as threatening, the degree to which the intended health behaviour is believed to be effective and cost in terms of money, time and effort, of receiving the care¹³. In our context, gynaecological conditions produced most submitted specimen. It might be that symptomatology of gynaecological diseases, which very often include the alarming and discomforting feature like bleeding, encourages care-seeking. It is also possible that social responsibilities and societal expectations make majority of male folks to prioritize their economic and social responsibilities over budding health challenges, seeking health interventions only in graver situations.

The prevalence of malignancy in our practice is 38% of all registered cases. At about 41.8% of all malignancies in females, breast cancer ranks as the most common malignancy in females while prostate cancer takes the lead in males (42.1% of all cancers in males). This epidemiological pattern mirrors the regional and global picture¹⁴⁻¹⁶. The position of cervical cancer as the second most frequent cancer in our series also agrees with the situation as reported in other LMICs^{17,18}. Cervical cancer being amenable to early detection and prevention has been curtailed out of the top ten cancer types in developed countries by deployment of population screening¹⁶. Its high prevalence in our population signposts weak or inadequate programme of screening and prevention.

The vast majority (85%) of our specimens originated from hospitals within Freetown with the remaining 15% originating from hospitals in eight other districts. This pattern suggests a skew in availability of surgical expertise, personnel and resources with over concen-

tration in Freetown. Another explanation might be that hospitals in provinces face logistical challenge transporting surgically resected tissue to Freetown, the site of the Histopathology laboratory. Kono contributing 9% and Tonkolili (Masanga) 2% may be considered in any plan for additional histopathology laboratories in the country. This will effectively capture the burden of diseases in Sierra Leone and assist in health care planning and budgeting. Furthermore, there is a high chance of early detection of premalignant cum early stages of malignant diseases, institution of early treatment and perhaps prevention of disease progression, ultimately leading to increased quality of life in the population.

The challenges of our practice in Sierra Leone have also been noted in Nigeria, a country similarly situated in the West African sub-region. A multi-centre study of 16 health institutions in Nigeria highlighted addressable gaps in pathology services and indicated deficiencies in standardization, quality control, and immunohistochemistry validation that could affect the reliability of pathology results¹⁹. A more recent nationwide survey of state of pathology services in Nigeria found Anatomic Pathology services and basic surgical and cytopathology capabilities to be available at many locations, offering only basic anatomic pathology diagnosis with no advanced or ancillary diagnostic techniques such as immuno-histochemistry, Fluorescent in situ hybridization and frozen section²⁰.

4.1 Conclusion

Histopathology is an integral part of modern medical practice and a prerequisite for tumour and disease diagnosis pre- and post-surgical resections. Demand for histopathology services is increasing in Sierra Leone. There is sex difference in utilization of histopathology services with twice as many females than men using histopathology services over a cumulative four year period. About thirty eight percent of all specimens are histologically malignant. The most common malignancy in females is breast cancer, while prostate cancer is the leading malignancy in males.

Acknowledgement:

We wish to thank the histotechnologists, Mr Abubakarr Kamara, Mr Mohammed Bangura and all the other staff of Histopathology laboratory for their contributions to the operations of the laboratory and their involvement in specimen processing.

Contributor Roles Taxonomy (CRediT) Statement

Onyishi NT: Conceptualization, Project administration, supervision, Validation, Methodology, Formal analysis, Visualization, Original draft, Review and Editing.

Duduyemi B M: Supervision, Validation, Data curation, Review, Editing.

Kalawa A: Data curation, Review and editing.

Conflict of Interest:

All authors declare that we do not have any financial or personal relationship which may have inappropriately influenced us in writing this article.

Funding:

No funding was received for this study.

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