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Malignancy Trends and Histopathological Patterns in Southeastern Nigeria: A 7-Year Review of 1,680 Surgical Specimens.

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ABSTRACT

Background: Histopathological examination remains the gold standard for definitive diagnosis of tissue lesions and plays a crucial role in cancer detection and management. Understanding patterns of surgical pathology submissions and malignancy rates is essential for resource allocation, quality assurance, and epidemiological surveillance in resource-limited settings.

Objective: This study aimed to analyze the spectrum, distribution, and malignancy patterns of surgical pathology specimens submitted to Federal Medical Centre, Umuahia over a seven-year period (2016-2022), evaluate organ-specific malignancy rates, and determine demographic associations with histopathological diagnoses.

Methods: A retrospective descriptive study was conducted analyzing 1,680 histopathology reports from January 2016 to December 2022. Data extracted included patient demographics (age, sex), specimen type, organ system, and histopathological diagnosis. Specimens were categorized by organ system and diagnoses classified as benign, premalignant/atypical, malignant, inflammatory/infectious, or inadequate. Statistical analysis included descriptive statistics, chi-square tests, independent t-tests, one-way ANOVA, and Pearson correlation for temporal trends. Malignancy rates were calculated using adequate specimens only (excluding the 8 inadequate specimens from the denominator); unclassified/other specimens were retained in the denominator as they represented diagnostically evaluable tissue.

Results: The study analyzed 1,680 surgical pathology specimens with a mean patient age of 39.78 ± 20.47 years (range: 1-98 years). Females constituted 67.9% with a female-to-male ratio

of 2.12:1. The most common organ systems were breast (20.4%), uterus (10.6%), and prostate (9.6%). The overall malignancy rate was 24.8% (415/1,672 adequate specimens). Organ-specific malignancy rates varied significantly: cervix (63.6%), prostate (39.8%), breast (36.7%), gastrointestinal tract (30.7%), and uterus (5.6%). Mean age for malignant diagnoses (53.98 ± 17.62 years) was significantly higher than for benign diagnoses (33.12 ± 19.51 years, $p<0.0001$). Sex was not a significant predictor of malignancy ($p>0.05$). A declining trend in malignancy rates was observed from 31.4% in 2016 to 12.2% in 2022 ($r=-0.622$, $p=0.136$).

Conclusion: This seven-year retrospective study demonstrates a substantial malignancy detection rate of 24.8% in surgical pathology specimens with marked organ-specific variation. The exceptionally high cervical cancer rate (63.6%) underscores the urgent need for enhanced cervical screening programs, particularly through integration of VIA/VILI within the Federal Medical Centre Umuahia General Outpatient Department. The 20-year age gap between benign and malignant diagnoses supports the implementation of age-stratified screening protocols in resource-limited settings. The study provides crucial baseline data for quality assurance and cancer surveillance in southeastern Nigeria.

Keywords: *Histopathology, surgical pathology, malignancy rates, cancer detection, organ-specific patterns, Nigeria, Southeast Nigeria, Abia State*

INTRODUCTION

Histopathological examination of tissue specimens represents the cornerstone of modern diagnostic medicine and the definitive method for establishing tissue diagnoses. Despite advances in imaging modalities and molecular diagnostics, histopathology remains the gold standard for cancer diagnosis, providing crucial information for treatment planning, prognostication, and epidemiological surveillance. In resource-limited settings such as Nigeria, where organized cancer screening programs are largely unavailable, histopathological services often serve as the primary means of cancer detection and documentation.

The pattern of surgical pathology specimens submitted to a laboratory reflects the disease burden, healthcare-seeking behavior, surgical practices, and diagnostic priorities within its catchment population. Analysis of these patterns provides valuable insights into disease epidemiology, helps identify gaps in diagnostic services, guides resource allocation decisions, and establishes baseline data for quality assurance initiatives. Furthermore, organ-specific malignancy rates derived from surgical pathology databases contribute to understanding the cancer burden in specific populations and can inform public health interventions.

Cancer remains a major public health challenge in Nigeria, with GLOBOCAN 2020 estimates indicating approximately 124,815 new cancer cases annually, rising to 269,109 by 2022, with breast and prostate cancers being the most prevalent [13,15]. Cancer registration remains incomplete, and population-based incidence data are limited to a few urban centers [14]. Hospital-based histopathological data, while subject to referral bias, provide important complementary information about cancer patterns and help bridge gaps in cancer surveillance. Studies from various Nigerian centers have reported malignancy rates in surgical pathology specimens ranging from 15% to 35%, with considerable variation across different organ systems and geographic regions [7,8,17].

The distribution of surgical pathology specimens typically reflects the organ systems most commonly affected by disease requiring surgical intervention or biopsy. In many African settings, gynecological specimens (particularly breast and uterine lesions) predominate, followed by gastrointestinal and urological specimens. The relative proportion of different specimen types may vary based on the center's specialty strengths, availability of diagnostic facilities, and population characteristics. Understanding these

patterns is essential for laboratory planning, resource allocation, and quality improvement initiatives.

Malignancy rates in surgical pathology vary considerably by organ system, reflecting differences in cancer incidence, screening practices, and clinical suspicion thresholds for biopsy. Breast tissue, for example, typically shows malignancy rates of 20-40% in most series, while appendiceal specimens rarely harbor malignancy. Prostate biopsy specimens show variable malignancy rates depending on patient selection criteria and PSA screening practices. Cervical biopsy specimens often show high malignancy rates due to targeted biopsy of suspicious lesions. These organ-specific patterns provide important context for interpreting overall malignancy rates and guide clinical practice.

Age and sex distributions of patients undergoing histopathological examination reflect both disease epidemiology and healthcare access patterns. Malignant lesions typically occur at older ages than benign lesions, though the specific age distribution varies by cancer type. Understanding these demographic patterns helps identify high-risk populations, guide screening strategies, and interpret diagnostic findings in clinical context. Sex differences in specimen distribution largely reflect organ-specific pathology but may also reflect healthcare access disparities.

Temporal trends in surgical pathology submissions and malignancy rates can reveal important changes in disease patterns, diagnostic practices, or healthcare utilization. Increasing submission volumes may reflect improved healthcare access, greater diagnostic awareness, or population growth. Changes in malignancy rates over time may indicate shifts in screening practices, referral patterns, or true changes in disease incidence. Analyzing these trends provides insights into healthcare system performance and disease epidemiology.

Federal Medical Centre, Umuahia is a 300-bed tertiary healthcare facility serving as a major referral center for Abia State and neighboring states in southeastern Nigeria. Abia State, with an estimated population of approximately four million people, is predominantly rural with agriculture as the primary economic activity. The state faces significant socioeconomic challenges including high out-of-pocket healthcare expenditure, limited health insurance penetration, and substantial reliance on informal health providers. These factors result in patterns of late disease presentation and selective healthcare-seeking behavior that differ markedly from patterns observed in Nigeria's more urbanized southwestern centers such as Lagos and Ibadan.

Consequently, histopathological data from this region offer a uniquely important window into disease burden and cancer patterns in a predominantly rural, resource-constrained southeastern Nigerian population, complementing the existing literature dominated by southwestern Nigerian centers. The center provides comprehensive surgical services across multiple specialties and maintains an active histopathology laboratory that processes specimens from both internal departments and external referrals. The laboratory follows standard operating procedures for specimen processing, employs qualified histopathology technicians, and reports are issued by experienced pathologists.

Previous studies from Nigeria have documented variable patterns of surgical pathology submissions and malignancy rates across different centers and time periods. However, comprehensive long-term analyses encompassing multiple organ systems remain limited, particularly from southeastern Nigeria. Most published studies have focused on specific organ systems or shorter time periods, limiting their utility for understanding overall disease patterns and temporal trends. Large, multi-year studies that include diverse specimen types provide more robust data for epidemiological inference and quality assurance.

The specific objectives of this study were fourfold: first, to determine the frequency, distribution, and organ system spectrum of surgical pathology specimens submitted over the seven-year study period; second, to analyze the demographic characteristics (age and sex) of patients undergoing histopathological examination; third, to determine overall and organ-specific malignancy rates; and fourth, to assess temporal trends in specimen submissions and malignancy detection. The findings will contribute to understanding disease patterns in southeastern Nigeria, establish baseline data for quality assurance activities, and inform strategies for cancer prevention and control.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective descriptive study conducted at the Histopathology Laboratory of Federal Medical Centre, Umuahia, Abia State, Nigeria. The center is a 300-bed tertiary healthcare facility providing comprehensive surgical services including general surgery, gynecology, urology, orthopedics, and otorhinolaryngology to residents of Abia State and neighboring southeastern states.

Study Period

The study covered a seven-year period from January 2016 to December 2022, representing a comprehensive assessment

of surgical pathology practice during this timeframe.

Data Source and Collection

Data were extracted from the histopathology laboratory registers and archived pathology reports. Variables collected included: patient age, sex, specimen type, organ/system, clinical indication, and histopathological diagnosis. All data were anonymized to maintain patient confidentiality. Cases with incomplete or unclear documentation were excluded from specific analyses as appropriate.

Specimen Processing and Examination

All specimens were received in 10% buffered formalin and processed according to standard histopathology protocols. Specimens were grossed by pathologists and their residents, and later processed through graded alcohols and xylene, embedded in paraffin wax, sectioned at 4-5 microns thickness, and stained with hematoxylin and eosin (H&E) by laboratory scientist. Special stains were performed when clinically indicated.

All slides were examined microscopically by qualified pathologists, and diagnoses were reported according to standard classification systems. In cases requiring consultation or second opinion, slides were jointly reviewed by senior pathologists. Quality control measures included regular equipment calibration, reagent quality checks, and participation in external quality assurance programs (United Kingdom National External Quality Assessment Service [UK NEQAS] and the national laboratory quality improvement initiative under the Federal Ministry of Health, Nigeria).

Classification and Categorization

Specimens were categorized by organ system majorly into the following groups: breast, uterus, cervix, ovary, fallopian tube, prostate, gastrointestinal tract (stomach, colon, rectum), appendix, skin and soft tissue, tonsils/adenoids, thyroid, bone, lymph nodes, and then others.

Histopathological diagnoses were then classified into the following six main categories:

1. **Benign**: Lesions with no evidence of malignant features, including benign neoplasms (leiomyoma, lipoma, adenoma, fibroma) and non-neoplastic proliferative conditions.
2. **Premalignant/Atypical**: Lesions showing cellular atypia, dysplasia, or intraepithelial neoplasia with potential for malignant transformation, including high-grade prostatic intraepithelial neoplasia

(HGPIN), cervical intraepithelial neoplasia (CIN), and atypical breast lesions.

3. **Malignant**: Lesions showing features of malignancy including carcinomas (adenocarcinoma, squamous cell carcinoma, transitional cell carcinoma), sarcomas, lymphomas, and other malignant neoplasms.

4. **Inflammatory/Infectious**: Conditions characterized primarily by inflammatory changes without neoplastic features, including appendicitis, follicular hyperplasia, chronic prostatitis, and mastitis.

5. **Other/Unclassified**: Specimens with diagnostic reports that were evaluable but did not fit neatly into the above four categories. This included: (a) normal tissues submitted incidentally (e.g., normal appendix in clinically suspected appendicitis); (b) products of conception and placental tissue; (c) non-specific reactive or descriptive diagnoses without a definitive category; and (d) rare or unusual lesions requiring further workup. Importantly, this category differs from the exclusion criterion for "incomplete or unclear documentation": specimens in the Other/Unclassified group had complete, legible pathology reports but yielded non-categorical diagnoses, whereas excluded cases had missing, illegible, or uninterpretable documentation precluding any meaningful classification.

6. **Inadequate**: Specimens insufficient for histopathological evaluation due to inadequate tissue, poor processing, or artifact.

Statistical Analysis

Data were analyzed using Python programming language (version 3.10) with pandas, numpy, scipy, matplotlib, and seaborn libraries. Descriptive statistics including frequencies, percentages, means, standard deviations, and ranges were calculated for all variables. Student's independent t-test was used to compare mean age between benign and malignant groups; one-way ANOVA was used for age comparison across all diagnostic categories; chi-square test was applied for categorical comparisons including sex versus malignancy; and Pearson correlation coefficient was used to assess temporal trends in malignancy rates over the study period. The overall malignancy rate was calculated as the proportion of malignant diagnoses among adequate specimens (excluding inadequate specimens from the denominator). Unclassified/other specimens were retained in the denominator as they represented diagnostically evaluable tissue. Organ-specific malignancy rates were calculated for each major organ system.

Categorical variables were compared using chi-square test or Fisher's exact test as appropriate. Continuous variables were compared using independent t-test for two groups or one-way ANOVA for multiple groups. Pearson correlation coefficient was used to assess temporal trends. A p-value of less than 0.05 was considered statistically significant. Data visualization was performed using bar charts, histograms, pie charts, and box plots.

Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of Federal Medical Centre, Umuahia. The study utilized retrospective data from existing laboratory records, and all patient information was anonymized to ensure confidentiality. No patient contact or intervention was involved.

RESULTS

A total of 1,680 surgical pathology specimens were analyzed during the seven-year study period (2016-2022). The annual distribution showed considerable variation, with a peak of 351 cases in 2021 (20.9% of total) and the lowest volume of 153 cases in 2017 (9.1%). The years 2016, 2018, and 2022 each contributed between 15-17% of total cases, while 2019 and 2020 each accounted for approximately 10-11% of cases (Table 2, Figure 1).

Patient Demographics

Age data were available for 1,634 of cases. The age of patients ranged from 1 to 98 years with a mean of 39.78 ± 20.47 years and a median of 38.0 years (IQR: 25.0-54.0 years). The age distribution was relatively broad, with the largest proportion of cases occurring in the 21-40 years age group (36.5%), followed by the 41-60 years group (27.3%). Children and adolescents (0-20 years) accounted for 19.0% of cases, while elderly patients (>60 years) comprised 17.2% (Table 1, Figure 4).

Sex data were available for 97.2% of cases. Females predominated, accounting for 67.9% of all specimens, while males represented 32.1%. The female-to-male ratio was 2.12:1. This sex distribution reflects the predominance of gynecological specimens in the dataset (Table 1, Figure 5).

Organ System Distribution

The distribution of specimens by organ system revealed breast tissue as the most common single identifiable organ system, accounting for 20.4% (n=343) of all specimens. Uterine specimens ranked second at 10.6% (n=178), followed by prostate (9.6%, n=161), appendix (8.1%, n=136), tonsils/adenoids (4.6%, n=77), gastrointestinal tract (4.5%, n=75), skin/soft tissue (3.9%, n=66), fallopian tube (3.3%, n=55), cervix (3.3%, n=55), and ovary (3.0%, n=50). Less common specimens

included bone (1.4%, n=24), lymph nodes (1.4%, n=24), and thyroid (0.8%, n=13). A proportion (25.1%, n=423) were classified as 'other' due to diverse specimen types not amenable to a single organ-system label; this group included products of conception/placental tissue, penile and scrotal tissue, salivary gland, nasal polyps, parotid, oral cavity, bladder, and other urological specimens, as well as miscellaneous soft tissue lesions (Table 3, Figure 2).

Overall Histopathological Diagnosis Distribution

Among the 1,680 specimens, benign lesions constituted the largest diagnostic category at 46.7% (n=785), followed by malignant lesions at 24.7% (n=415). Unclassified/other findings accounted for 16.5% (n=278). Inflammatory/infectious conditions comprised 5.4% (n=91), while premalignant/atypical lesions represented 3.1% (n=52). Inadequate specimens were rare at 0.5% (n=8) (Table 4, Figure 3).

Malignancy Analysis

Excluding the 8 inadequate specimens, 1,672 adequate specimens were available for malignancy rate calculation. The overall malignancy rate was 24.8% (415/1,672). When considering only specimens with definitive diagnostic categorization (excluding unclassified/other), the malignancy rate among benign, premalignant, and malignant diagnoses was 32.3% (415/1,283).

Organ-Specific Malignancy Rates

Malignancy rates varied markedly across different organ systems. Among major organ systems with adequate sample sizes, cervical specimens showed the highest malignancy rate at 63.6% (35/55), indicating that most cervical biopsies were performed for clinically suspicious lesions subsequently confirmed as malignant.

Prostate tissue showed a malignancy rate of 39.8% (64/161), reflecting targeted biopsy of patients with elevated PSA or abnormal digital rectal examination. Breast specimens demonstrated a malignancy rate of 36.7% (126/343), consistent with clinical selection of suspicious breast masses for biopsy or excision. Gastrointestinal specimens showed a 30.7% (23/75) malignancy rate, while thyroid lesions demonstrated 15.4% (2/13) malignancy. Ovarian specimens showed 10.0% (5/50) malignancy, and skin/soft tissue lesions 10.6% (7/66). Uterine specimens had a relatively low malignancy rate of 5.6% (10/178), as most uterine specimens were myomectomy or hysterectomy specimens for benign indications. Benign inflammatory conditions dominated in tonsil/adenoid specimens (malignancy rate 1.3%, 1/77) and appendiceal specimens

(malignancy rate 0.7%, 1/136) (Table 5, Figure 6).

Age Distribution by Diagnostic Category

Analysis of age distribution across diagnostic categories revealed highly significant differences (ANOVA F=123.21, p<0.0001). Patients with malignant diagnoses were substantially older (mean age 53.98 ± 17.62 years, median 55 years) compared to those with benign diagnoses (mean age 33.12 ± 19.51 years, median 32 years). This 20-year age difference was statistically highly significant (independent t-test: t=17.77, p<0.0001). Patients with premalignant/atypical lesions showed intermediate ages (mean 54.00 ± 18.95 years), similar to the malignant group. Those with inflammatory/infectious conditions were younger (mean 30.35 ± 17.62 years), comparable to the benign group (Table 6, Figure 8).

Sex and Malignancy

Sex was not significantly associated with malignancy risk. Among cases with documented sex, females had a 22.7% malignancy rate while males had 22.2% (χ^2=0.06, p=0.810), indicating similar cancer detection rates between sexes in this surgical pathology series.

Temporal Trends

Annual malignancy rates showed variation over the seven-year study period. The malignancy rate was highest in 2016 at 31.4% and showed a general declining pattern through 2022 (12.2%). Intermediate years showed rates of: 2017 (21.2%), 2018 (23.0%), 2019 (21.7%), 2020 (26.2%), and 2021 (24.8%) (Table 7, Figure 7).

Pearson correlation analysis demonstrated a negative correlation between year and malignancy rate (r=-0.622, p=0.136), suggesting a declining trend in malignancy detection over the study period, though this did not reach conventional statistical significance. This pattern may reflect increasing routine submission of surgical specimens, improved early detection, or changing referral patterns (Figure 7).

Quality Indicators

The study demonstrated excellent quality indicators for surgical pathology services. The inadequate specimen rate of 0.5% was well below the acceptable benchmark of <5%, reflecting high-quality specimen collection, fixation, and processing. The high proportion of definitive diagnoses (83.5% excluding unclassified/other) demonstrates diagnostic precision. These quality metrics compare favorably with international standards and suggest robust laboratory practices.

DISCUSSION

This comprehensive seven-year analysis of 1,680 surgical pathology specimens from Federal Medical Centre, Umuahia

provides important insights into disease patterns, malignancy rates, and demographic characteristics of patients undergoing histopathological examination in southeastern Nigeria. The findings contribute to understanding the burden of surgically managed disease in this region and have important implications for resource allocation, quality assurance, and public health planning.

Volume and Distribution of Specimens

The annual submission volume of approximately 240 specimens per year reflects the surgical pathology workload at a tertiary center serving a population of several million people in southeastern Nigeria. The variation in annual volumes (range: 153-351 cases) may reflect changes in surgical activity, diagnostic awareness, healthcare-seeking behavior, or resource availability. The peak in 2021 may represent post-pandemic recovery of delayed procedures. Compared to larger tertiary centers in Nigeria, our submission volume is moderate, reflecting both catchment population size and the extent of surgical services available.

Demographic Patterns

The mean age of 39.8 years in our study is consistent with findings from other Nigerian studies and reflects Nigeria's young demographic structure. The substantial representation of children and adolescents (19.0%) underscores the importance of pediatric pathology services. The female predominance (67.9%) is expected given the high proportion of gynecological specimens and is comparable to other African surgical pathology studies.

Organ System Distribution

The predominance of breast specimens (20.4%) is consistent with most African surgical pathology studies, reflecting both high breast disease incidence and clinical practice patterns. The substantial proportion of uterine specimens (10.6%) largely comprises myomectomy specimens for fibroids, reflecting the high prevalence of uterine leiomyomas in African women. Prostate specimens (9.6%) reflect increasing awareness and PSA testing. The organ system distribution provides valuable insights for laboratory resource planning and quality improvement initiatives.

Overall Malignancy Rate

The overall malignancy rate of 24.8% in our study is within the range reported in Nigerian surgical pathology studies (15-35%) but higher than Western centers (10-15%). This reflects selective submission of suspicious lesions, late patient presentation, limited screening programs, and potentially higher background cancer incidence. The rate is consistent with other African studies and emphasizes the substantial cancer

burden requiring adequate diagnostic and treatment capacity.

Organ-Specific Malignancy Rates

The exceptionally high malignancy rate in cervical specimens (63.6%) is the most striking finding of this study and represents a major public health concern. This indicates that most cervical biopsies at our center are performed for clinically advanced disease rather than screening-detected early lesions. Studies from other Nigerian centers have reported similarly high cervical biopsy malignancy rates ranging from 40% to 75% [3,18,19], consistently indicating late presentation. This underscores the critical and urgent need for enhanced cervical cancer screening programs using VIA/VILI, Pap smear, or HPV testing to detect pre-invasive lesions before progression to invasive cancer [25].

The prostate malignancy rate of 39.8% and breast malignancy rate of 36.7% are also substantial and consistent with Nigerian studies. The gastrointestinal malignancy rate of 30.7% reflects significant burden of GI cancers. In contrast, the low uterine malignancy rate (5.6%) is expected given that most uterine specimens are for benign indications.

Age and Malignancy

The highly significant 20-year age difference between malignant and benign diagnoses ($p<0.0001$) is consistent with cancer biology, as cancer incidence increases with age due to accumulation of mutations and declining immune surveillance. The mean age for malignant diagnoses (54 years) is somewhat younger than Western populations. This cannot be attributed solely to Nigeria's young demographic structure; biological factors also appear to play a significant role. Women of African descent are known to present with more biologically aggressive breast cancer subtypes, including triple-negative breast cancer (TNBC), at younger ages compared to their Western counterparts, with TNBC prevalence in West Africa estimated at up to 45.7% compared to 15% in European women [23,24]. Furthermore, late presentation — a well-documented phenomenon in sub-Saharan Africa driven by financial barriers, poor health literacy, and limited access to diagnostic facilities [22] — effectively compresses the "clinical window," meaning patients present with symptomatic, advanced-stage disease earlier in the natural history of their malignancy. Together, these biological and healthcare access factors likely explain the younger mean malignancy age and underscore the need for both earlier clinical intervention and targeted cancer awareness programmes. This finding emphasizes the importance of

maintaining diagnostic vigilance even in relatively young patients.

Temporal Trends

The declining trend in malignancy rates over the study period (from 31.4% in 2016 to 12.2% in 2022; r=-0.622, p=0.136) is interesting, though it did not reach conventional statistical significance. This pattern may reflect several factors: improved early detection leading to increased biopsy of less suspicious lesions, increasing routine submission of surgical specimens regardless of clinical suspicion, changing referral patterns with more community-based biopsies, or genuine improvements in cancer awareness and earlier presentation. Critically, the COVID-19 pandemic (2020-2021) must be acknowledged as a potential confounder in this temporal analysis. Global disruptions to elective surgical services during this period likely affected specimen submission volumes and case mix at our centre, with studies from Nigeria reporting up to 95.8% of surgeons experiencing a decline in elective operations [20], and a pan-African review documenting widespread cancellations and delays in cancer diagnostic services [21]. Notably, our data show that 2020 and 2021 together contributed approximately 32% of all cases (n=541), with the 2021 peak of 351 cases possibly reflecting a post-pandemic rebound of deferred procedures. If elective biopsies of less suspicious lesions were disproportionately deferred during the pandemic while urgent cancer biopsies continued, this could have artificially elevated the malignancy rate in 2020 (26.2%), creating a spurious dip followed by apparent recovery. The non-significant trend (p=0.136) therefore warrants cautious interpretation, and prospective post-pandemic data will be essential to determine whether the declining malignancy trend is genuine.

Clinical and Public Health Implications

Several critical implications emerge from this study. First, the exceptionally high cervical cancer rate (63.6%) represents a public health emergency requiring urgent scaling up of cervical screening programs. Most cervical cancers are preventable with appropriate screening, yet our data show most biopsies are for advanced disease. Second, the high overall malignancy rate (24.8%) indicates substantial cancer burden requiring adequate pathology services, oncology capacity, and palliative care resources. Third, the high rates in breast (36.7%) and prostate (39.8%) justify continued emphasis on cancer awareness and early detection programs.

Fourth, the significant age difference between malignant and benign lesions suggests that age-appropriate diagnostic

algorithms could enhance efficiency. Fifth, the declining temporal trend, if sustained, may indicate improving cancer control efforts. Finally, robust data management systems are essential for ongoing quality assurance and epidemiological surveillance.

Quality Assurance Considerations

The very low inadequate specimen rate (0.5%) is excellent and reflects good specimen collection, fixation, and processing practices. This rate is well below acceptable benchmarks (<5%) and demonstrates high technical quality. The high proportion of definitive diagnoses (83.5%) is a positive finding as well. Implementing standardized diagnostic templates and synoptic reporting could further enhance diagnostic precision and data utility for cancer surveillance.

Study Limitations

This study has few limitations that should be acknowledged. First, as a single-center retrospective study, findings may not be fully generalized to other settings with different patient populations, referral patterns, or diagnostic practices. The hospital-based nature introduces referral bias, with specimens representing surgically managed disease rather than community disease burden.

Second, detailed clinical follow-up data were not available, precluding assessment of diagnostic accuracy, treatment outcomes, or survival.

Third, the study lacks information on important clinical variables such as indication for biopsy, stage at diagnosis, screening history, HIV status, and socioeconomic factors. A particularly important socioeconomic limitation deserves specific emphasis: histopathological services at FMC Umuahia operate largely on an out-of-pocket payment basis, as health insurance coverage in Abia State remains limited. This creates a significant selection bias — patients who undergo biopsy are disproportionately those who are either severely symptomatic (advanced disease) or sufficiently affluent to afford the investigation. Consequently, the reported overall malignancy rate of 24.8% may be artificially elevated relative to the true community prevalence, as many patients with early or asymptomatic lesions who cannot afford histological workup are systematically excluded from the dataset. This financial barrier to diagnostic access is a crucial limitation when extrapolating our findings to population-level cancer burden estimates. Finally, the non-significant temporal trend (p=0.136) should be interpreted cautiously and requires validation with prospective data collection. Despite these limitations, this study provides valuable baseline data on

histopathological patterns in southeastern Nigeria from a substantial dataset spanning seven years.

CONCLUSION

This comprehensive seven-year retrospective analysis of 1,680 surgical pathology specimens from Federal Medical Centre, Umuahia demonstrates a substantial overall malignancy detection rate of 24.8% with marked organ-specific variation. The exceptionally high cervical cancer rate (63.6%) indicating predominantly late-stage presentations represents a major public health concern requiring urgent intervention. Significant malignancy rates in prostate (39.8%) and breast (36.7%) specimens, combined with a statistically significant 20-year age difference between malignant and benign diagnoses ($p<0.0001$), have important implications for screening and diagnostic strategies.

The female predominance (67.9%) reflects gynecological specimen burden, while the young mean age (39.8 years) reflects Nigeria's demographic structure. The excellent specimen adequacy rate (99.5%) demonstrates high technical quality of laboratory services. A declining trend in malignancy rates over time suggests possible improvements in early detection or changing referral patterns, though further validation is needed.

These findings establish baseline data for quality assurance, highlight the critical need for enhanced cervical cancer screening programs, and emphasize age-appropriate diagnostic strategies. The study contributes valuable epidemiological data from southeastern Nigeria and underscores histopathology's continued importance as the definitive diagnostic modality and cancer surveillance tool in resource-limited settings. Future efforts should focus on implementing comprehensive cancer screening programs, strengthening pathology services, establishing robust cancer registration systems, and conducting prospective studies with clinical correlation.

RECOMMENDATIONS

For Clinical Practice:

1. Enhanced Cervical Screening: Integrate VIA/VILI (Visual Inspection with Acetic Acid/Lugol's Iodine) screening within the FMC Umuahia General Outpatient Department to capture asymptomatic women presenting for other conditions. This low-cost, no-laboratory point-of-care approach is particularly suited to Umuahia's resource-constrained setting and would enable detection of pre-invasive cervical lesions before progression to the invasive cancers that currently account for 63.6% of cervical biopsies at this centre.

Pap smear and HPV-based testing should be introduced progressively as laboratory capacity permits.

2. Breast Cancer Awareness: Strengthen breast cancer awareness campaigns and establish screening clinics for early detection.

3. Prostate Cancer Detection: Develop appropriate PSA testing guidelines for high-risk populations.

4. Age-Appropriate Protocols: Implement age-stratified diagnostic protocols recognizing the strong association between age and malignancy.

For Laboratory Services:

5. Quality Assurance: Maintain rigorous quality control measures and participation in external quality assurance programs.

6. Standardized Reporting: Implement synoptic reporting templates for common cancer types.

7. Data Management: Establish electronic laboratory information systems for complete data capture.

8. Capacity Building: Provide continuing professional development for laboratory personnel.

For Public Health:

9. Cancer Registration: Establish comprehensive hospital-based cancer registries.

10. Resource Allocation: Use organ-specific data to guide oncology service planning.

11. Primary Prevention: Implement HPV vaccination and lifestyle modification programs.

For Research:

12. Prospective Studies: Conduct studies with clinical follow-up to validate diagnostic accuracy.

13. Molecular Diagnostics: Explore integration of advanced diagnostic techniques and regional based immunohistochemistry services

14. Multi-Center Studies: Collaborate for broader epidemiological data.

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CONFLICTS OF INTEREST

The author declares no conflicts of interest related to this study.

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Table 1: Study Characteristics and Patient Demographics

Characteristic	Value
Total cases	1680
Study period	2016-2022
Study duration	7 years
Age (years)	
Mean ± SD	39.78 ± 20.47
Median (IQR)	38.0 (25.0-54.0)
Range	1-98
Sex, n (%)	
Female	1140 (67.9)
Male	540 (32.1)
F:M Ratio	2.12:1

Table 2: Annual Case Distribution (2016-2022)

Year	Number of Cases	Percentage (%)
2016	291	17.3
2017	153	9.1
2018	271	16.1
2019	161	9.6
2020	190	11.3
2021	351	20.9
2022	263	15.7
Total	**1680**	**100.0**

Table 3: Distribution of Specimens by Organ System

Organ System	Number of Cases	Percentage (%)
Breast	343	20.4
Uterus	178	10.6
Prostate	161	9.6
Appendix	136	8.1
Tonsils/Adenoids	77	4.6
Gastrointestinal	75	4.5
Skin/Soft Tissue	66	3.9
Fallopian Tube	55	3.3
Cervix	55	3.3
Ovary	50	3.0
Bone	24	1.4
Lymph Node	24	1.4
Thyroid	13	0.8
Other	423	25.1

Table 4: Overall Histopathological Diagnosis Distribution

Diagnostic Category	Number of Cases	Percentage (%)
Benign	785	46.7
Malignant	415	24.7
Other/Unclassified	278	16.5
Inflammatory/Infectious	91	5.4
Premalignant/Atypical	52	3.1
Inadequate	8	0.5
Total	**1680**	**100.0**

Table 5: Organ-Specific Malignancy Rates

Organ System	Total Cases	Malignant Cases	Malignancy Rate (%)
Cervix	55	35	63.6
Prostate	161	64	39.8
Breast	343	126	36.7
Gastrointestinal	75	23	30.7
Thyroid	13	2	15.4
Skin/Soft Tissue	66	7	10.6
Ovary	50	5	10.0
Uterus	178	10	5.6
Tonsils/Adenoids	77	1	1.3
Appendix	136	1	0.7

Table 6: Age Distribution by Diagnostic Category

Diagnosis	N	Mean ± SD	Median (IQR)	Range
Benign	785	33.12 ± 19.51	32.0 (20.0-45.0)	1-95
Malignant	415	53.98 ± 17.62	55.0 (42.0-67.0)	8-98
Premalignant/Atypical	52	54.00 ± 18.95	57.0 (45.0-66.0)	15-85
Inflammatory/Infectious	91	30.35 ± 17.62	28.0 (18.0-40.0)	2-78
Other/Unclassified	278	38.25 ± 20.15	36.0 (22.0-52.0)	1-92

Table 7: Annual Malignancy Rates (2016-2022)

Year	Total Cases	Adequate Specimens	Malignant Cases	Malignancy Rate (%)
2016	291	290	91	31.4
2017	153	153	32	21.2
2018	271	271	62	23.0
2019	161	161	35	21.7
2020	190	190	50	26.2
2021	351	351	87	24.8
2022	263	263	32	12.2
Total	**1680**	**1672**	**415**	**24.8**

Note: Temporal correlation: r=-0.622, p=0.136.

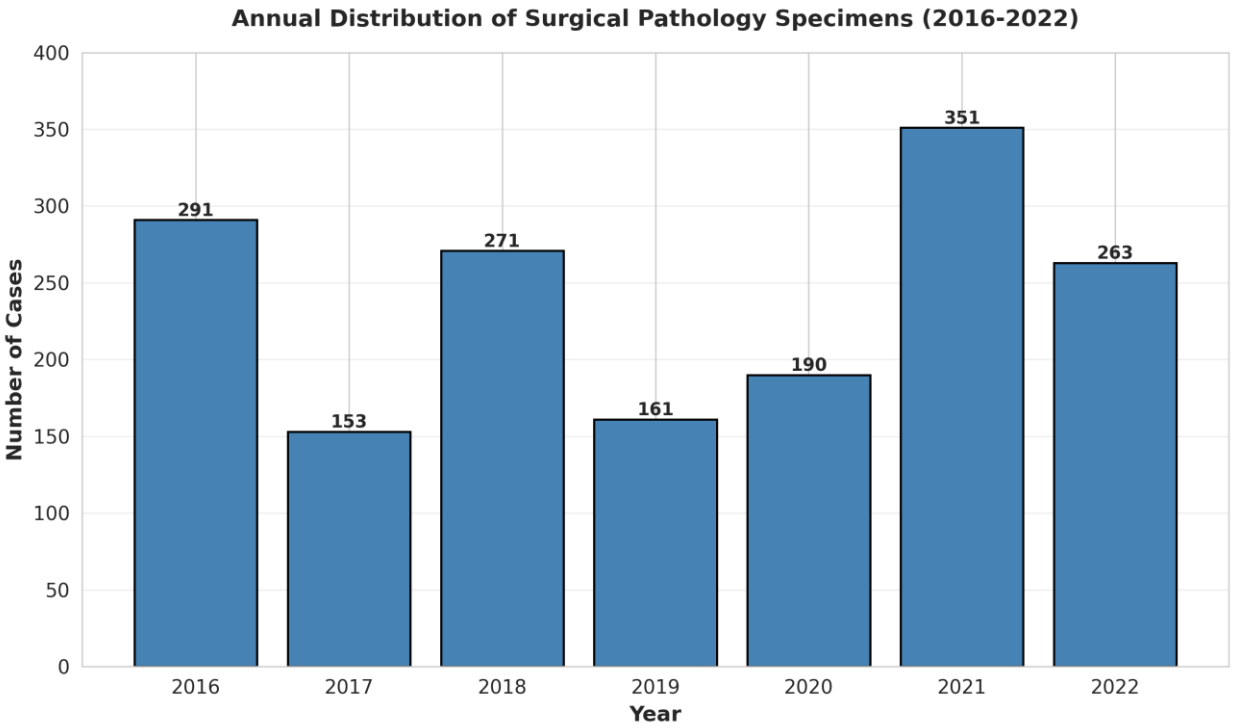

Figure 1: Annual distribution of surgical pathology specimens (2016-2022) showing peak in 2021 (n=351) and variation in case volumes over the seven-year period.

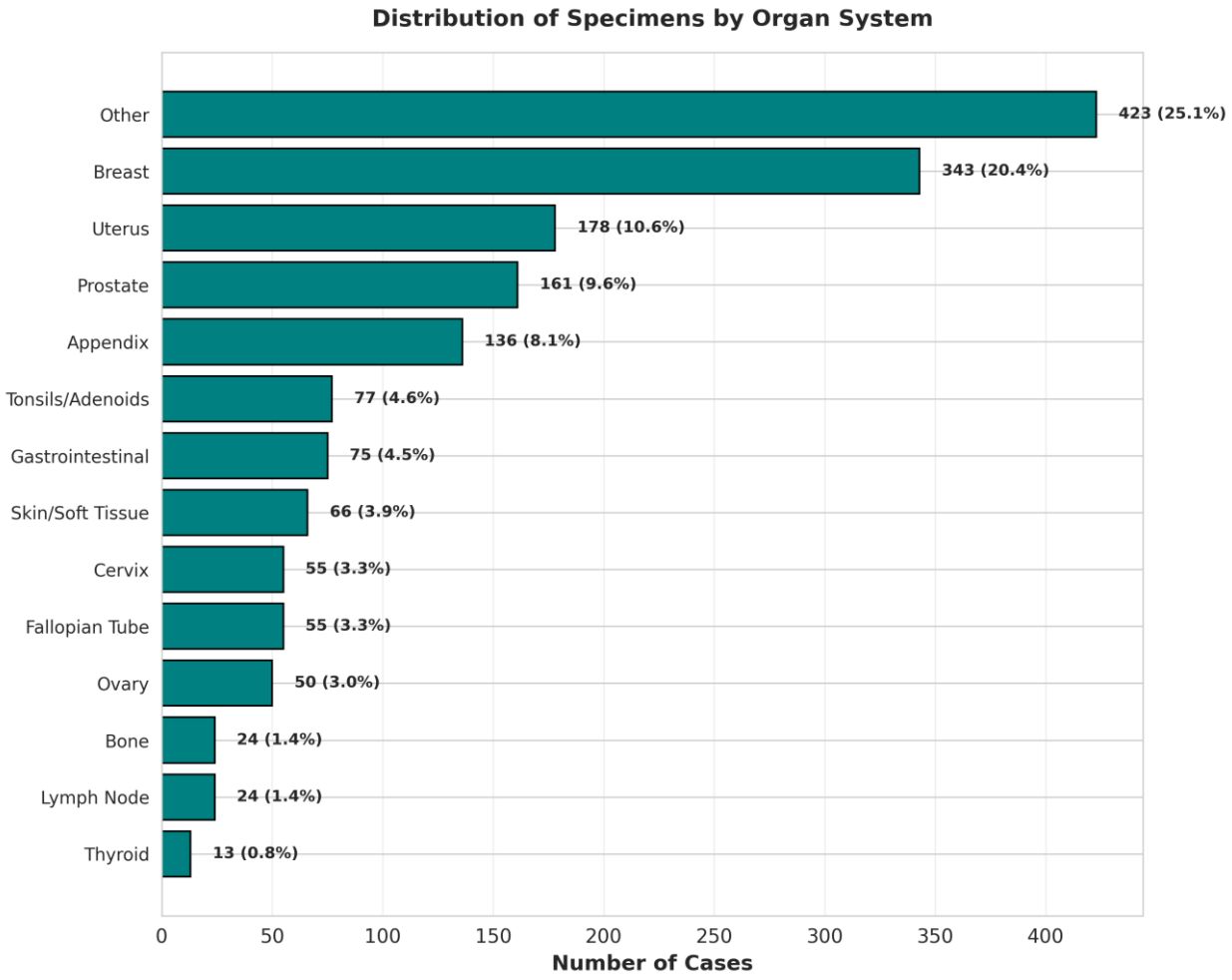

Figure 2: Distribution of specimens by organ system showing breast as most common (20.4%), followed by uterus (10.6%) and prostate (9.6%).

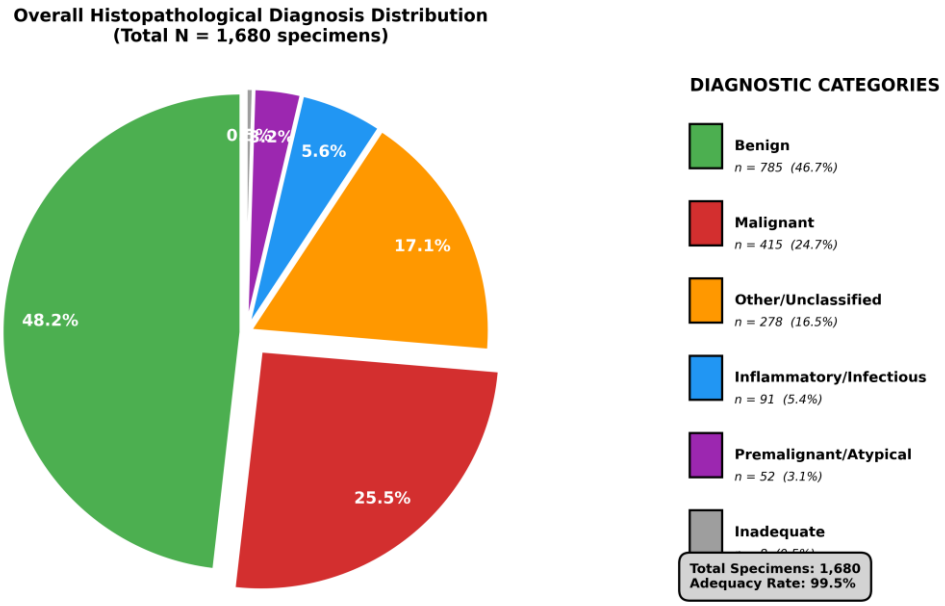

Figure 3: Distribution of histopathological diagnoses showing benign lesions as most common (46.7%), followed by malignant (24.7%) and unclassified/other (16.5%).

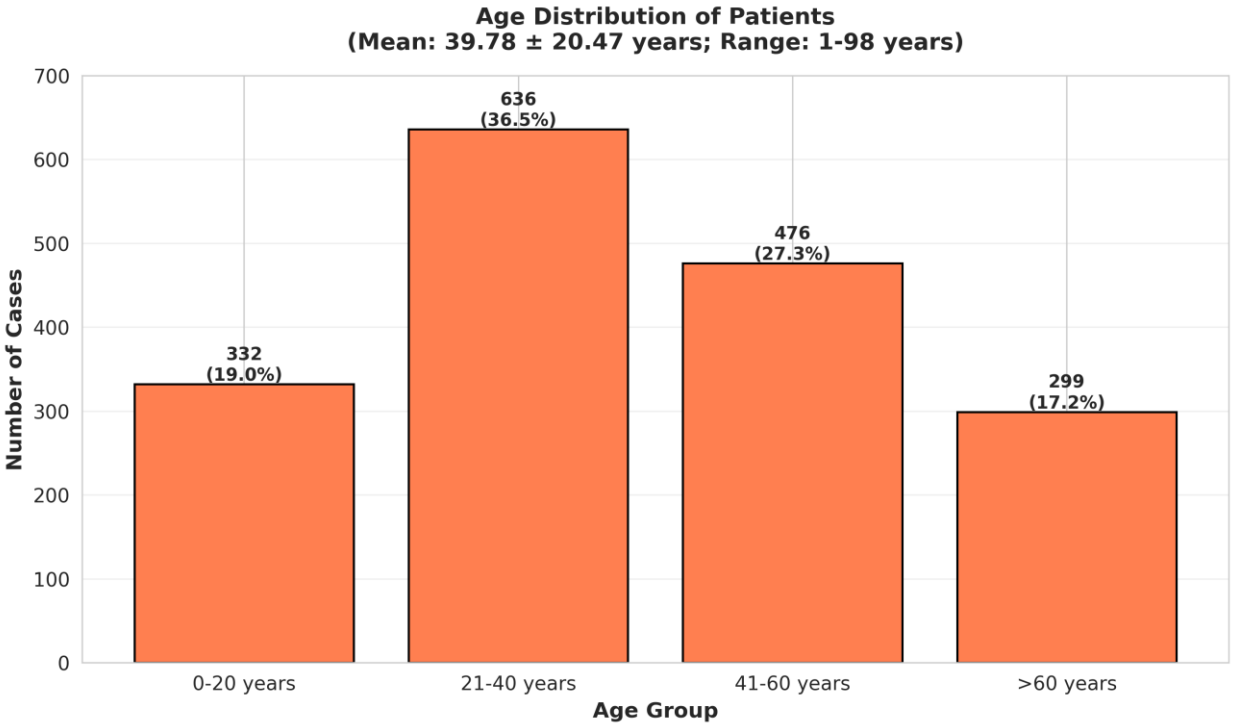

Figure 4: Age distribution histogram showing broad age range (1-98 years) with peak in 21-40 years age group (36.5%) and mean age of 39.8 years.

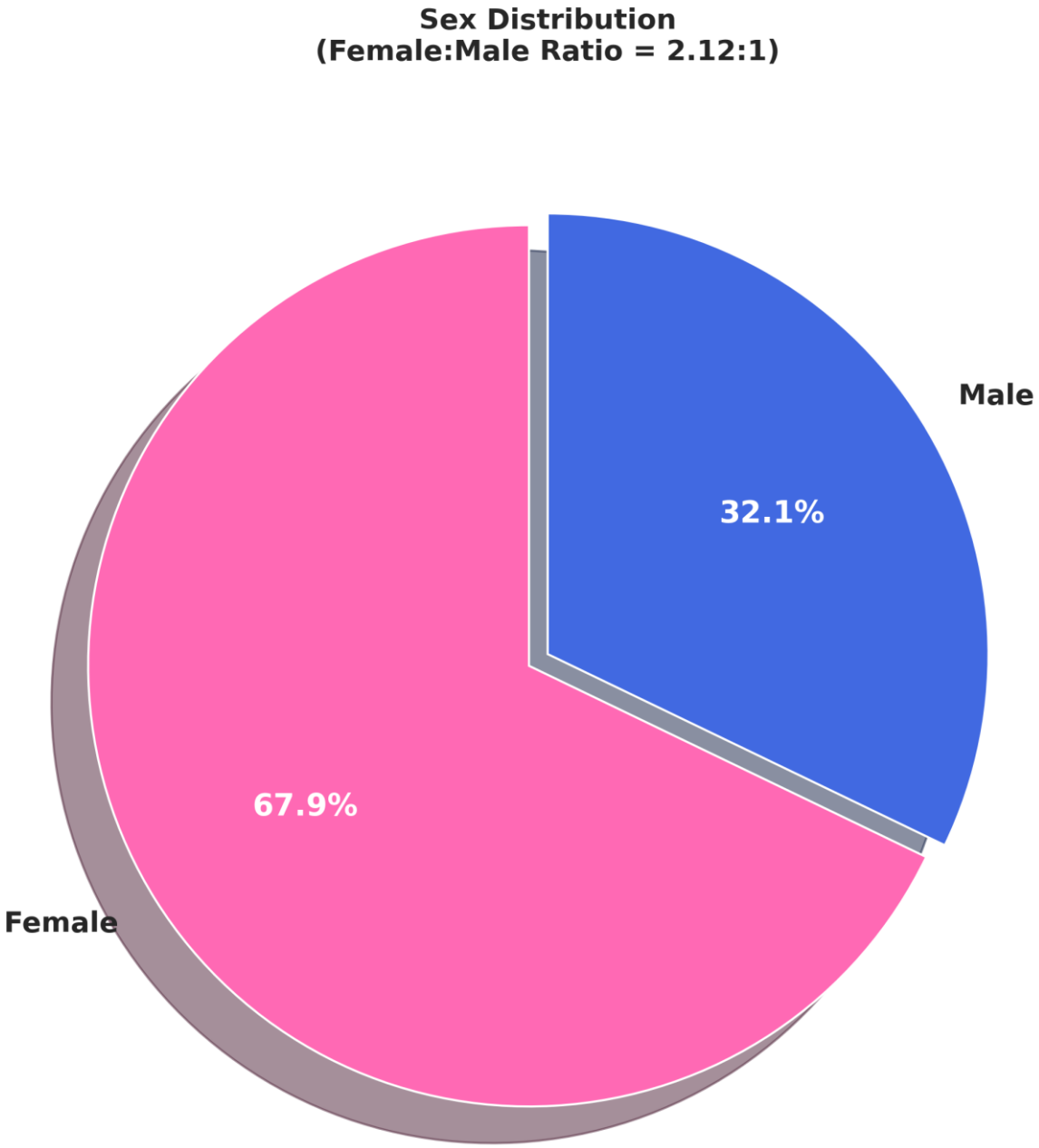

Figure 5: Sex distribution showing female predominance (67.9%) reflecting high proportion of gynecological specimens. F:M ratio 2.12:1.

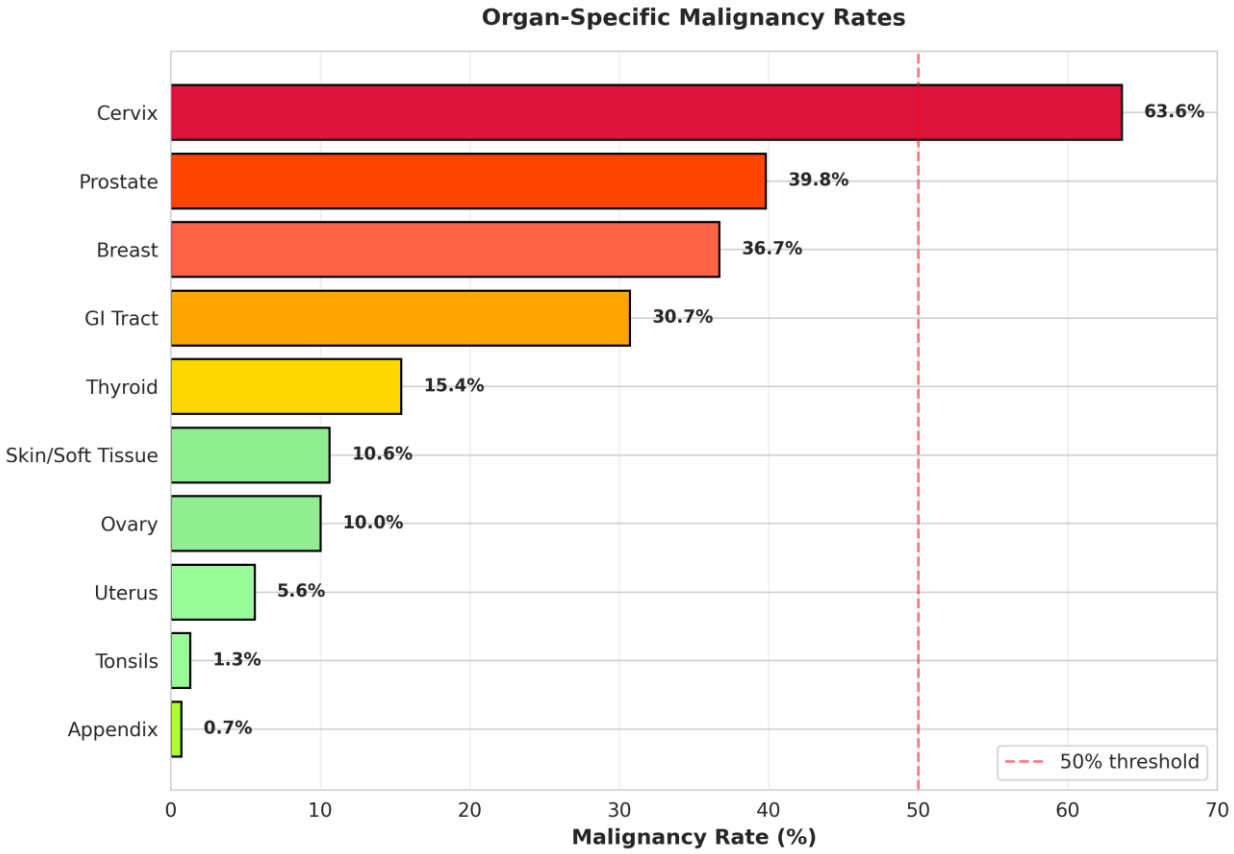

Figure 6: Organ-specific malignancy rates showing cervix with highest rate (63.6%), followed by prostate (39.8%) and breast (36.7%).

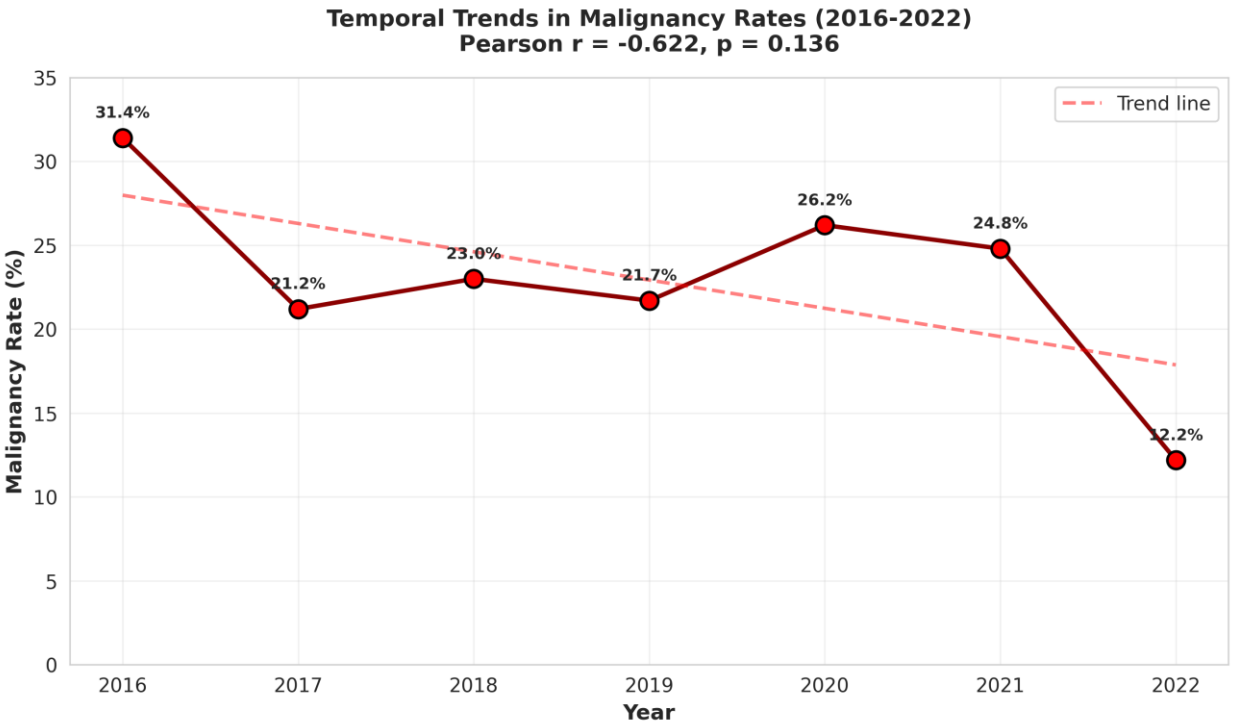

Figure 7: Temporal trends in annual malignancy rates (2016-2022) showing declining pattern from 31.4% (2016) to 12.2% (2022). Pearson correlation r=-0.622, p=0.136.

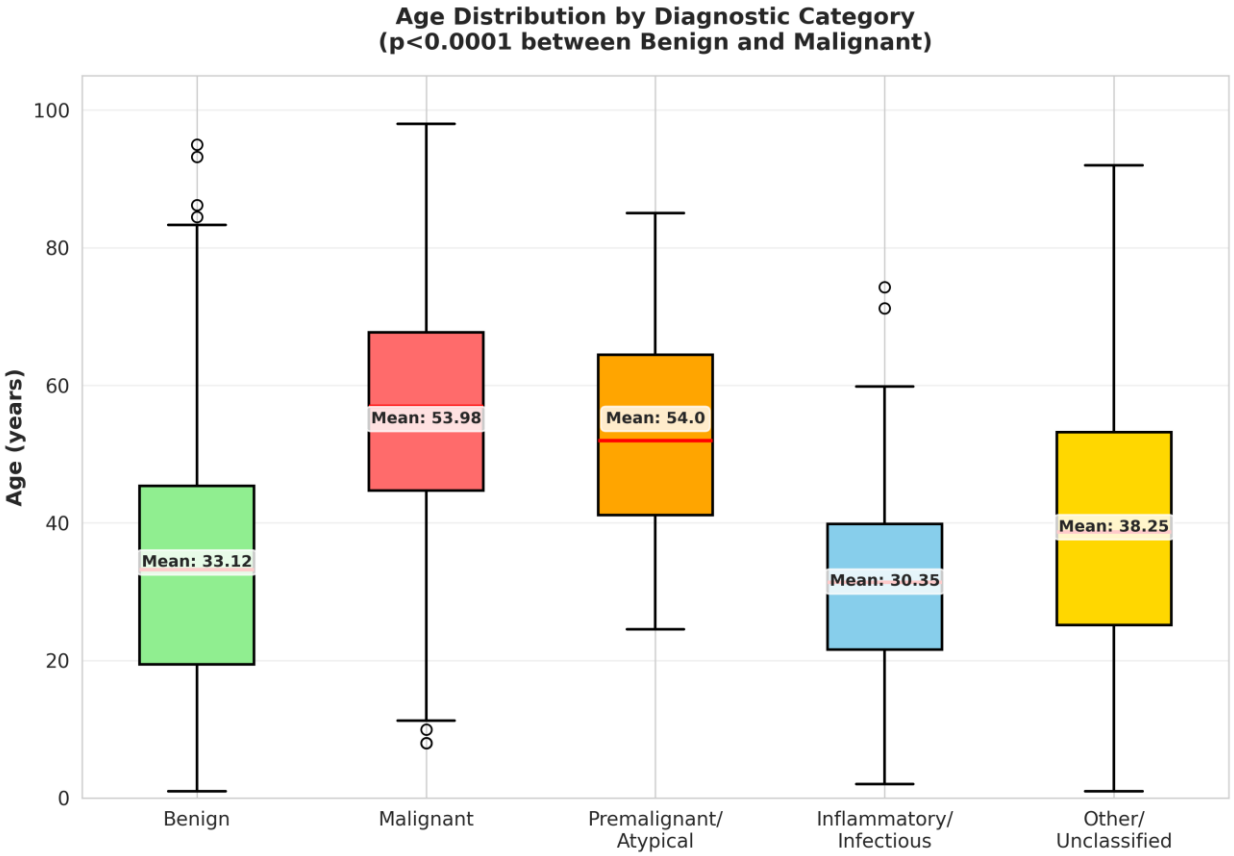

Figure 8: Box plot comparing age distribution across diagnostic categories showing significantly older age for malignant diagnoses (mean 53.98 years) versus benign diagnoses (mean 33.12 years), p<0.0001.

REFERENCES

1. Ferlay J, Colombet M, Soerjomataram I, et al. Cancer statistics for the year 2020: An overview. Int J Cancer. 2021;149(4):778-789.
2. Jedy-Agba E, McCormack V, Adebamowo C, et al. Stage at diagnosis of breast cancer in sub-Saharan Africa: a systematic review and meta-analysis. Lancet Glob Health. 2016;4(12):e923-e935.
3. Anorlu RI. Cervical cancer: the sub-Saharan African perspective. Reprod Health Matters. 2008;16(32):41-49.
4. Adesunkanmi ARK, Lawal OO, Adelusola KA, Durosimi MA. The severity, outcome and challenges of breast cancer in Nigeria. Breast. 2006;15(3):399-409.
5. Ogunbiyi JO, Shittu OB. Increased incidence of prostate cancer in Nigerians. J Natl Med Assoc. 1999;91(3):159-164.
6. Abdulkareem FB. Epidemiology and incidence of common cancers in Nigeria. Cancer Registry, University College Hospital, Ibadan. 2009.
7. Mandong BM, Ngbea JA, Tanko MN, Echejoh GO. Pattern of histopathological diagnosis in a Nigerian tertiary hospital. Niger J Med. 2011;20(2):204-209.
8. Atanda AT, Atanda OA. Surgical pathology specimens in a Nigerian teaching hospital: an audit. Ann Ib Postgrad Med. 2012;10(2):24-29.
9. Ohene-Yeboah M, Adjei E. Breast cancer in Kumasi, Ghana. Ghana Med J. 2012;46(1):8-13.
10. Irabor DO, Oludara MA. Pattern of malignant tumours seen at the Lagos University Teaching Hospital (1992-2007). J Clin Pract. 2012;15(1):373-380.
11. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. CA Cancer J Clin. 2015;65(2):87-108.
12. Somdatta P, Baridalyne N. Awareness of breast cancer in women of an urban resettlement colony. Indian J Cancer. 2008;45(4):149-153.
13. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249.
14. Jedy-Agba E, Curado MP, Ogunbiyi O, et al. Cancer incidence in Nigeria: a report from population-based cancer registries. Cancer Epidemiol. 2012;36(5):e271-e278.

15. Omosun A, Abayomi A, Ogboye O, et al. Distribution of cancer and cancer screening and treatment services in Lagos: a 10-year review of hospital records. JCO Glob Oncol. 2022;8:e2200107.
16. Usman S, Musa BI, Musa BM, et al. Emerging cancer disease burden in a rural sub-Saharan African population: northeast Nigeria in focus. Front Oncol. 2024;14:1380615.
17. Ezeome ER, Anarado AN. Cancer incidence in Nigeria: a tertiary hospital experience. Asian Pac J Cancer Care. 2020;5(1):335-340.
18. Nnadi DC, Singh S, Ahmed Y, et al. Histo-pathological features of genital tract malignancies as seen in a tertiary health centre in north-western Nigeria: a 10-year review. Ann Med Health Sci Res. 2014;4(2):213-217.
19. Adejumo PO, Aniagwu T, Oladimeji O, et al. Pattern of gynaecological malignancies at a university teaching hospital in southwest Nigeria: a 5-year review. Int J Gynaecol Obstet. 2022;159(1):230-237.
20. Tolani MA, Fidelis L, Oyelowo N, et al. Impact of the COVID-19 pandemic on surgical practice, training, and research in Nigeria. Pan Afr Med J. 2021;39:59.
21. Nnaji CA, Moodley J. Impact of the COVID-19 pandemic on cancer diagnosis, treatment and research in African health systems: a review of current evidence and contextual perspectives. Ecancermedicalscience. 2021;15:1170.
22. Pace LE, Shulman LN. Breast cancer in sub-Saharan Africa: challenges and opportunities to reduce mortality. Oncologist. 2016;21(6):739-744.
23. Foulkes WD, Stefansson IM, Chappuis PO, et al. Triple-negative breast cancer in African-American women: disparities versus biology. Nat Rev Cancer. 2017;17(1):21-38.
24. Lott A, Bhatt M, Okpechi SC, et al. Triple-negative breast cancer prevalence in Africa: a systematic review and meta-analysis. BMJ Open. 2022;12(6):e057435.
25. Mbulawa ZZA, Temmerman M, Broeck DV, et al. Performance of alternative strategies for primary cervical cancer screening in sub-Saharan Africa: systematic review and meta-analysis of diagnostic test accuracy studies. BMJ. 2015;351:h3936.