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Gastric Cancer in the Zambian Copperbelt: Endoscopic and Histopathological Profile from the First Documented Audit at Ndola Teaching Hospital

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Research Article

Keywords: Gastric cancer, Zambia, Copperbelt, sub-Saharan Africa, endoscopy, histopathology, adenocarcinoma, early-onset gastric cancer

Posted Date: November 4th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11260971/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Gastric cancer surveillance across sub-Saharan Africa remains sparse, and Zambia's Copperbelt Province, the country's second most populous and industrial region, has no previously published gastric cancer data. This study reports the first systematic audit of endoscopically suspected gastric malignancy at Ndola Teaching Hospital (NTH), the regional tertiary referral centre for the Copperbelt.

Methods

We conducted a retrospective audit of all patients with endoscopically suspected gastric malignancy presenting to NTH between March 2023 and December 2025. Data on age, sex, endoscopic findings, site of lesion, and histopathological diagnosis were extracted from gastroscopy records and the DISA electronic health information system. Descriptive statistics were generated using SPSS version 29.0. Reporting followed STROBE guidelines.

Results

Fifty-nine patients were included. Thirty-six (61.0%) were male and 23 (39.0%) were female (M:F ratio 1.57:1). Median age at presentation was 60 years (range 30–78). Fourteen patients (23.7%) were aged 50 years or younger, and five (8.5%) were aged 40 or younger. Histopathological data were retrievable for 48 of 59 patients (81.4%); 11 (18.6%) had no result recorded. Thirty-one patients (52.5%) had confirmed malignancy and 17 (28.8%) showed no evidence of malignancy (gastritis or non-specific inflammation). Adenocarcinoma, including reclassified non-standardised carcinoma descriptors, accounted for 30 of 31 malignancies (96.8%); 25.8% were explicitly graded as poorly differentiated or undifferentiated. The antrum or pylorus and the gastric body were the commonest sites of confirmed tumours (11 of 31 each).

Conclusion

Gastric malignancy identified endoscopically at NTH is male-predominant, affects a clinically significant proportion of patients under 50, and is dominated by adenocarcinoma of frequently aggressive grade. An 18.6% rate of unrecoverable histopathological results indicates a structural deficit in the diagnostic pathway. These findings establish the first baseline for gastric cancer burden in the Zambian Copperbelt.

1.Introduction

Gastric cancer remains a leading cause of cancer-related death worldwide. In 2022, it accounted for approximately 968,000 new cases and nearly 660,000 deaths, ranking fifth in incidence and fourth in cancer-related mortality globally. [1–2] The burden is geographically uneven: incidence is highest in East

Asia and Eastern Europe, and lowest, at least on paper, across sub-Saharan Africa. [1] Whether this apparent sparing reflects genuine biological variation or the profound inadequacy of cancer surveillance infrastructure on the continent remains an open question. The absence of population-based registries across much of Africa means that published incidence estimates rest on extrapolation, incomplete facility data, and assumptions that are difficult to verify. [3]

Zambia illustrates the problem clearly. Gastric cancer currently ranks ninth among all cancers in the country, yet projections indicate that the total burden will more than double by 2040.[3–4] Known risk factors such as Helicobacter pylori infection, biomass smoke exposure, tobacco, and alcohol are prevalent and, in many communities, unabated.[5–6] A retrospective analysis of nearly four decades of endoscopic records at the University Teaching Hospital (UTH) in Lusaka found that gastric cancer rose at a rate of 21% per decade in patients under 60 years of age, a trend that persisted after adjustment for inter-observer variation and changes in equipment.[7] Simultaneously, its frequency declined by 15% per decade in patients over 60, divergent trajectories inconsistent with detection artefact and strongly suggestive of a genuine cohort effect.[7] In a prospective case-control study from the same institution, 21% of gastric adenocarcinoma cases were 45 years or younger, compared with 6.4% in the United States.[5] Early-onset gastric cancer in Zambia is not a statistical curiosity but a recurring, inadequately explained clinical reality that demands localised investigation of its environmental and genetic drivers.

Emerging molecular data add a further layer of complexity. A pilot immunohistochemical study from UTH Lusaka identified E-cadherin loss, a marker of diffuse-type gastric carcinogenesis, in 36% of specimens, with higher rates in younger patients. [9–10] These preliminary findings are discussed further below, though molecular characterisation was outside the scope of the present audit.

Yet virtually everything known about gastric cancer in Zambia derives from a single centre: the UTH in Lusaka. The Copperbelt Province, Zambia's second most populous region and industrial heartland, has no published gastric cancer data of any kind, and there is little reason to assume that Lusaka's experience can simply be transposed to it. A century of copper and cobalt mining and smelting has shaped the province's economy, its settlements and, plausibly, its environment: residents of a Zambian copper-mining town carry higher non-occupational burdens of cobalt, copper and lead than residents of a non-mining town.[12] Whether such exposures bear on gastric carcinogenesis is unknown. But alongside the high rates of tobacco and alcohol use, widespread biomass smoke exposure and limited access to specialist gastroenterological services that the province shares with the rest of the country,[6–11] they make the Copperbelt a setting in which the risk profile may differ from the capital's in ways that no one has yet examined. This gap is not merely academic. Without regional data, referral pathways cannot be rationally designed, endoscopic capacity cannot be appropriately resourced, and the case for investment in early detection cannot be made to those who hold institutional and policy authority.

Ndola Teaching Hospital (NTH) is the tertiary referral centre for the Copperbelt, and its endoscopy unit, operating only since 2023, has generated a clinical record that has never been systematically analysed; an audit of that record necessarily captures the early experience of a newly founded service, a point that

bears directly on case ascertainment. This study therefore aims to describe the endoscopic and histopathological profile of gastric cancer at NTH, providing the first documented audit of the disease in the Zambian Copperbelt to inform regional diagnostic and management strategies. It is intentionally an endoscopy-based audit rather than a population-based registry, and cannot capture malignancies that lack the endoscopic features used here. It is offered not as a definitive epidemiological statement but as a necessary foundation: a first account of a disease whose regional burden has, until now, been entirely undocumented.

2.Methods

This was a retrospective audit of all patients with endoscopically suspected gastric cancer presenting to Ndola Teaching Hospital, the regional tertiary referral centre for the Copperbelt Province of Zambia, between March 2023 and December 2025. NTH serves as the principal referral destination for upper gastrointestinal endoscopy across the Northern region and represents the only facility in the public health sector on the Copperbelt with established diagnostic endoscopic capacity.

Data were collected from the gastroscopy records held within the endoscopy unit. Endoscopic suspicion of gastric malignancy was defined as the presence of any of the following features on upper gastrointestinal endoscopy: an ulcerating or fungating gastric mass, irregular or nodular mucosal thickening with loss of normal rugal pattern, or an infiltrating lesion with submucosal involvement, irrespective of anatomical site within the stomach. Gastric polyps and other lesions without these features were not included in this cohort; as some polyps can harbour adenocarcinoma, this endoscopic definition means that this audit should be interpreted as a profile of endoscopically suspected gastric malignancy rather than a comprehensive gastric cancer registry. All endoscopic procedures were performed by a small team of trained surgical endoscopists using standard video gastroscopy equipment; operator-level data were not systematically recorded and are not reported here.

For each patient, the following variables were extracted: age at endoscopy, sex, endoscopic findings, site of lesion, and histopathological diagnosis as recorded on the DISA electronic health information system. Variables with recognised prognostic or mechanistic relevance, including tumour size, presenting symptoms or indication for endoscopy, and comorbidities including HIV serostatus and tobacco use, were not consistently recorded in the source records and could not be reliably extracted; this constrains the analytical depth of the audit and is discussed further in the Limitations. Where histopathological results were not retrievable from DISA, this was recorded as a missing result and the patient retained in the cohort for demographic analysis.

Inclusion criteria were broad by design: all patients undergoing upper gastrointestinal endoscopy during the study period in whom gastric malignancy was endoscopically suspected were eligible. No exclusion criteria were applied on the basis of age, sex, or histological subtype. Patients without a retrievable histopathological result were not excluded, as the documentation of diagnostic incompleteness was itself considered a study outcome of interest. Histopathology was considered retrievable when a

finalised report for the index endoscopy could be found on DISA; tissue blocks and slides were not accessed. Patients without a report were classed as having no result recorded, and the records did not allow us to establish why (biopsy not taken, specimen not received, report not issued, or report not captured on DISA).

All data were anonymised prior to analysis. Descriptive statistics were generated using SPSS version 29.0 (IBM Corp., Armonk, NY). Categorical variables are reported as frequencies and percentages; continuous variables are reported as median with range, consistent with the non-normal distribution of the data. No inferential statistical testing was performed; in keeping with the descriptive and hypothesis-generating aims of this audit. This study is reported in accordance with the STROBE guidelines for observational research. [13] Staging data were not systematically captured during the study period and are not reported; this is acknowledged as a significant limitation.

This study utilised anonymised, routinely collected hospital data and involved no direct patient contact, no intervention, and no collection of identifiable information. The Ndola Teaching Hospital Research Ethics Committee (NTH-REC), Ndola, Zambia, reviewed the study and granted a waiver of full ethics review, including a waiver of individual informed consent, on the basis that it is a retrospective audit of de-identified, routinely collected clinical data. Permission to access and report on the departmental data was also granted by Ndola Teaching Hospital management.

3.Results

3.1 Patient Demographics

3.1.1 Sex Distribution

Fifty-nine patients were included in the endoscopic cohort over the study period. Thirty-six (61.0%) were male and 23 (39.0%) were female, yielding a male-to-female ratio of 1.57:1 (Table 1). This male predominance is consistent with patterns described across sub-Saharan African series, though less pronounced than the ratios of 2:1 or greater reported in some East African and West African cohorts, [14–15] and it aligns closely with the 1.5:1 ratio observed in the UTH Lusaka case-control study. [5]

Table 1
Sex distribution of patients in the Gastric Cancer Endoscopic Cohort (n = 59).

Sex	**n**	**%**
Male	36	61.0%
Female	23	39.0%
Total	**59**	**100.0%**

3.1.2 Age Profile

The median age at presentation was 60 years (mean 58.5 years; range 30–78 years). Over half of all presentations (54.2%) fell between 51 and 70 years (Table 2). Fourteen patients (23.7%) were aged 50 years or younger at diagnosis. This proportion, almost one in four patients, is striking and warrants careful contextualisation. At UTH Lusaka, 21% of gastric adenocarcinoma cases were 45 years or younger; [5] comparable early-onset burden has been documented in Tanzania, where 29% of gastric cancer cases were under 50. [15] The Copperbelt data are consistent with this pattern and suggest that it is not a Lusaka-specific observation but a regional phenomenon.

Five patients (8.5%) were aged 40 years or younger, a subgroup in whom hereditary diffuse gastric cancer driven by germline CDH1 mutation warrants consideration. Genetic testing capacity to evaluate this hypothesis is not currently available at this centre, and this gap carries direct clinical consequences for family counselling and surveillance. [10]

Table 2
Age band distribution of patients in the Gastric Cancer Endoscopic Cohort (n = 59).

Age Band (years)	n	%
≤ 40	5	8.5%
41–50	9	15.3%
51–60	16	27.1%
61–70	16	27.1%
71–78	13	22.0%
Total	**59**	**100.0%**

3.2 Histopathological Findings

A finalised histopathology report was retrievable on DISA for 48 of 59 patients (81.4%). Eleven patients (18.6%) had no histopathology result recorded on the DISA electronic health information system, a gap that is itself a significant finding, discussed in detail below. Of the 48 patients with retrievable results, 31 (52.5% of the full cohort) had confirmed malignancy and 17 (28.8% of the full cohort) showed no histological evidence of malignancy, comprising 3 patients (5.1%) with acute or chronic gastritis and 14 patients (23.7%) with non-specific mucosal inflammation or other benign findings. A patient flow diagram summarising these denominators is presented in Fig. 1.

On revision, the histopathological classification used in the original audit was simplified in response to peer review. The original pathology records used several overlapping, non-standardised descriptors for carcinoma not further subtyped, including ‘poorly differentiated carcinoma’, ‘infiltrating carcinoma’,

‘invasive carcinoma’, and ‘undifferentiated carcinoma’. As gastric carcinomas without a specified alternative lineage are overwhelmingly of adenocarcinoma origin, and original pathology slides were not available for centralised re-review, these descriptors were reclassified as adenocarcinoma, grouped by the closest corresponding grade or growth-pattern descriptor (poorly differentiated/undifferentiated, or invasive/infiltrating). The single case reported as ‘diffuse-type gastric carcinoma’ using Lauren classification terminology was retained as a separate, indeterminate category, since this designation cannot be confidently equated with adenocarcinoma without slide re-review. Adenocarcinoma (all patterns, aggregated) therefore comprises adenocarcinoma not otherwise specified (NOS), poorly differentiated/undifferentiated adenocarcinoma, invasive/infiltrating adenocarcinoma, mucinous adenocarcinoma, and adenocarcinoma with a diffuse growth pattern on conventional histology, a designation distinct from Lauren diffuse-type carcinoma. The full histopathological distribution across all 59 patients is presented in Table 3; subtype detail for confirmed malignancies is given in Table 4.

Table 3
Histopathological findings across all patients in the Gastric Cancer Endoscopic Cohort (n = 59), following reclassification of non-adenocarcinoma carcinoma descriptors (see Methods). Adenocarcinoma subtypes are detailed in Table 4.

Histopathological Category	**n**	**%**
Adenocarcinoma (all patterns, aggregated)	30	50.8%
Diffuse Type Gastric Carcinoma (Lauren classification)□	1	1.7%
Gastritis (Acute/Chronic)	3	5.1%
Non-specific Mucosal Inflammation / Other Benign Findings	14	23.7%
No Result Recorded (DISA)	11	18.6%
Total	59	100.0%

□ *Lauren-classification term used by the reporting pathologist; retained separately because it could not be confidently equated with adenocarcinoma without slide re-review (see Methods).*

Among the 31 patients with confirmed malignancy (18 male, 58.1%; 13 female, 41.9%), adenocarcinoma (all patterns, aggregated) accounted for 30 cases (96.8%); the single remaining case was reported as diffuse-type gastric carcinoma (Lauren classification) and was retained as a separate, indeterminate category (Table 4). The commonest designation was adenocarcinoma, NOS (12 of 31; 38.7%), followed by poorly differentiated or undifferentiated tumours (eight; 25.8%) and those with an invasive or infiltrating pattern (eight; 25.8%), with one mucinous and one diffuse-growth-pattern tumour. These groupings follow the descriptors in the original reports and were not re-graded. The high proportion of poorly differentiated or undifferentiated tumours carries direct prognostic implications in any setting, but particularly in one where most patients are likely already presenting with locally advanced or metastatic disease. [14–16] No lymphomas, gastrointestinal stromal tumours, or other non-epithelial malignancies were identified in this endoscopically ascertained cohort.

Table 4
Histopathological subtype distribution among patients with confirmed malignancy in the Gastric Cancer Endoscopic Cohort (n = 31), following reclassification of non-adenocarcinoma carcinoma descriptors (see Methods).

Malignant Diagnosis	n	%
Adenocarcinoma, NOS	12	38.7%
Adenocarcinoma, poorly differentiated/undifferentiated	8	25.8%
Adenocarcinoma, invasive/infiltrating pattern	8	25.8%
Adenocarcinoma, mucinous	1	3.2%
Adenocarcinoma, diffuse growth pattern	1	3.2%
Subtotal: Adenocarcinoma (all patterns)	30	96.8%
Diffuse Type Gastric Carcinoma (Lauren classification)□	1	3.2%
Total	31	100.0%

□ *Lauren-classification term used by the reporting pathologist; retained separately because it could not be confidently equated with adenocarcinoma without slide re-review (see Methods).*

3.3 Site of Lesion

The anatomical site of the lesion was recorded for all 59 patients. Classified by their most proximal region, the 31 confirmed malignancies lay in the antrum or pylorus in 11 (35.5%), the gastric body in 11 (35.5%), the cardia or fundus in six (19.4%) and the lesser curve in three (9.7%). Eight tumours (25.8%) spanned more than one region, and only two (6.5%) involved the cardia. In the whole endoscopic cohort, 21 of 59 lesions (35.6%) were confined to the antrum or pylorus.

4. Discussion

This study presents the first systematic description of gastric cancer from a regional tertiary centre on the Zambian Copperbelt. The findings are in keeping with the regional literature: a male-predominant cohort, a substantial minority diagnosed before the age of 50, adenocarcinoma as the dominant histological type, a substantial proportion of poorly differentiated tumours, and a significant gap in tissue diagnosis. Together they describe a setting in which gastric cancer is encountered late, incompletely characterised, and inadequately resourced for anything beyond palliation.[14–16] Because the cohort was defined by endoscopic suspicion and only 31 of 59 patients (52.5%) had confirmed malignancy, the demographic observations below describe the endoscopic cohort as a whole, and comparisons with series of histologically confirmed cancer are indicative rather than like-for-like. The sex distribution of the confirmed cases (male-to-female ratio 1.38:1) was similar to that of the cohort as a whole.

The male predominance (M:F 1.57:1) is consistent with the international literature, in which gastric cancer affects men roughly twice as often as women, though less markedly in African series.[1–2] It approximates the 1.5:1 ratio in the UTH Lusaka case-control study[5] and contrasts with the near-equal sex distribution in the Yaoundé series, where 51.7% of patients were female.[16] The basis of this sex difference, plausibly differential environmental exposure and hormonal modulation of gastric mucosal inflammation, remains poorly understood in Africa.

The age distribution warrants closer attention. A median age of 60 years is broadly consistent with other sub-Saharan African series, but the 23.7% of patients aged 50 years or younger form a clinically important subgroup that population age structure alone does not explain. Early-onset gastric cancer has been documented at UTH Lusaka over decades of endoscopy-based data, where a 21% per-decade rise among patients under 60, with a concurrent decline in those over 60, argues for a genuine cohort effect rather than improved detection.[7–8] Our data, from a geographically and institutionally distinct centre, extend this observation to the Copperbelt. Similar patterns are reported from Tanzania, where 29% of cases were under 50,[15] and for upper gastrointestinal malignancy in Ghana and Kenya,[14] suggesting a sub-Saharan African signature rather than a Zambia-specific peculiarity.

What accounts for this early-onset pattern? HIV was investigated at UTH Lusaka and excluded as a primary driver, with no significant difference in seroprevalence between gastric cancer cases and endoscopy controls;[5] HIV status was not captured here. Smoking and alcohol were independently associated with cancer risk in the Lusaka series (odds ratios 3.4 and 2.8) and with serological markers of proximal gastric atrophy in controls, suggesting a mechanistic rather than confounded relationship,[5] and biomass smoke exposure has been identified as a likely risk factor acting through oxidative stress and DNA damage.[6] In the Copperbelt, where informal urban settlements have high rates of charcoal use and tobacco and alcohol consumption are prevalent, this risk profile is probably replicated and possibly amplified. The mining legacy of the province, and the documented non-occupational metal exposure of its mining communities,[12] add a further hypothesis, though no study has linked such exposure to gastric cancer. Occupation, diet, body mass index, alcohol and tobacco use and socio-economic status were not recorded here, so whether any of them distinguishes the early-onset subgroup cannot be answered by this audit.

The molecular basis of early-onset disease in Zambia is only beginning to be explored. A pilot study from UTH Lusaka found E-cadherin loss in 36% of gastric cancer specimens, with significantly higher rates in younger patients and in diffuse-type tumours.[9] E-cadherin loss drives epithelial–mesenchymal transition and is the hallmark of diffuse gastric carcinogenesis;[9–10] its association with younger age raises the possibility of germline CDH1 mutation and hereditary diffuse gastric cancer, for which testing is not available regionally.[10] Five patients in this series were aged 40 years or younger; without genetic testing their tumours cannot be classified by hereditary risk and their families cannot be counselled. A multicentre comparison of the cytogenetic and molecular features of tumours in younger and older patients, including germline testing and genome-wide association analysis, is the logical next step.

The histological profile, adenocarcinoma in 96.8% of confirmed malignancies after reclassification of non-standardised descriptors, with poorly differentiated or undifferentiated grade in 25.8%, mirrors African series: adenocarcinoma accounted for 87.5% of gastric cancers in Yaoundé,[16] and comparable proportions are reported from Senegal, Togo and Nigeria.[14] Poorly differentiated and undifferentiated carcinomas are biologically aggressive, more commonly associated with peritoneal dissemination and diffuse-type histology, and substantially less amenable to curative resection.[14] In a health system where most patients probably present with advanced disease, high-grade histology compounds an already unfavourable prognosis; median survival after diagnosis has been reported at 142 days at UTH Lusaka,[18] and there is no evidence to suggest materially better outcomes in the Copperbelt.

The 18.6% of patients with no retrievable histopathological result warrant specific discussion. These patients underwent endoscopy and then disappeared from the diagnostic record, for reasons the records cannot reveal: biopsies may not have been taken, results not entered into DISA, samples lost or never received by the laboratory, or reporting delayed beyond any reasonable clinical window. Where tissue diagnosis determines staging, referral and treatment eligibility, such a diagnostic void is a structural failure. It is consistent with the UTH Lusaka finding that only 42% of histologically confirmed gastric cancer patients were captured in the Zambia National Cancer Registry and only 39 of 94 confirmed cases reached the Cancer Diseases Hospital.[3] Such gaps impair research and may leave patients without a definitive diagnosis or treatment for a potentially controllable cancer. Tracing laboratory request registers would establish the cause.

The practical implications follow. Expanding endoscopic capacity beyond Lusaka is necessary but insufficient: without parallel investment in pathology infrastructure, sample tracking and formal referral pathways from NTH to the Cancer Diseases Hospital, diagnostic access will continue to yield diagnostic incompleteness.[11–19] The 17 patients (28.8%) with non-malignant histology, gastritis or non-specific inflammation, also merit attention as a population at elevated risk of malignant transformation, particularly given H. pylori infection, smoking and atrophic change; an active surveillance programme, currently absent regionally, would be clinically rational and, in the longer term, probably cost-effective compared with managing advanced malignancy.[17–20]

This study has limitations. It is retrospective, relies on clinical records not designed for research, and is subject to ascertainment bias toward patients able to access and afford tertiary endoscopy. The NTH Endoscopy Unit began operating only in 2023, so the audit captures the early experience of a new service, and ascertainment and referral patterns may change as it matures. The cohort was defined by endoscopic suspicion rather than pathology-confirmed diagnosis; some polyps and early lesions without the endoscopic features used here can harbour adenocarcinoma, so this is a profile of endoscopically suspected gastric malignancy rather than a population-based registry, and the true incidence in the Copperbelt remains unknown. Data were limited to age, sex, endoscopic findings, lesion site and histopathological diagnosis; tumour size, indication for endoscopy, comorbidities (including HIV serostatus), occupation, diet, body mass index, alcohol and tobacco use, socio-economic status and H. pylori status were not systematically captured, and stage, the main determinant of prognosis and

treatment eligibility, could not be reported. Demographic findings refer to the whole endoscopic cohort rather than to confirmed cancers alone, the reason for the 11 missing pathology reports could not be established, and molecular characterisation was not feasible. Finally, non-adenocarcinoma descriptors were reclassified without slide re-review (see Methods), which cannot substitute for expert histopathological review. These limitations argue for prospective data collection with a predefined dataset.

5. Conclusion

This study provides the first systematic audit of endoscopically suspected gastric malignancy at a regional tertiary centre in Zambia's Copperbelt Province, establishing a baseline against which future burden, trends, and interventions can be measured. The findings, male predominance, a clinically significant proportion of patients presenting before the age of 50, adenocarcinoma as the dominant histological type, a substantial burden of poorly differentiated or undifferentiated tumours, and an 18.6% rate of unrecoverable histopathological results, are consistent with the emerging picture of gastric cancer across sub-Saharan Africa[14–16] and extend that picture beyond Lusaka for the first time.

These findings are not merely descriptive. They carry direct implications for how endoscopic services in the Copperbelt are resourced, how referral pathways to the Cancer Diseases Hospital are structured, and how pathology laboratory capacity and sample tracking systems are prioritised.[3–11] The early-onset profile of this cohort, replicated now across two geographically distinct Zambian centres strengthens the case for prospective investigation of the environmental, infectious, and molecular drivers of gastric carcinogenesis in this population, including the possible contribution of germline CDH1 mutation in the youngest patients.[9–10] As an immediate next step, the establishment of a Copperbelt cancer registry linked to the national system and equipped to capture staging, treatment, and survival data should be an institutional and policy priority.

Gastric cancer in the Copperbelt has until now been undocumented, not because it is uncommon, but because the infrastructure to capture it has been absent. Closing that gap requires sustained investment in cancer surveillance, pathology systems, and regional research capacity. This audit is a necessary first step; it should not be the last.

Declarations

Ethics approval and consent to participate

This study was a retrospective audit of anonymised, routinely collected clinical data, with no direct patient contact, no intervention, and no collection of identifiable information. The Ndola Teaching Hospital Research Ethics Committee (NTH-REC), Ndola Teaching Hospital, Ndola, Zambia, reviewed the study and granted a waiver of full ethics review and of the requirement for individual informed consent, on the basis that it constitutes a retrospective audit of de-identified, routinely collected clinical data. Administrative permission to access and report on the departmental data was additionally granted by

Ndola Teaching Hospital management. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable. This manuscript contains only anonymised, aggregated data and does not include any individual person's data, images, or identifiable clinical details.

Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding was received to assist with the preparation of this

manuscript.

Authors' contributions

CC: conceptualisation, data curation, formal analysis, investigation, methodology, writing – original draft, writing – review and editing. KS: review and editing. YS: review and editing. GM: writing- review and editing. TM: writing – review and editing. MS: writing – review and editing. All authors read and approved the final manuscript.

Acknowledgements

The authors thank the endoscopy nursing staff and pathology department at Ndola Teaching Hospital for their work in generating and maintaining the clinical records on which this audit is based.

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Figures

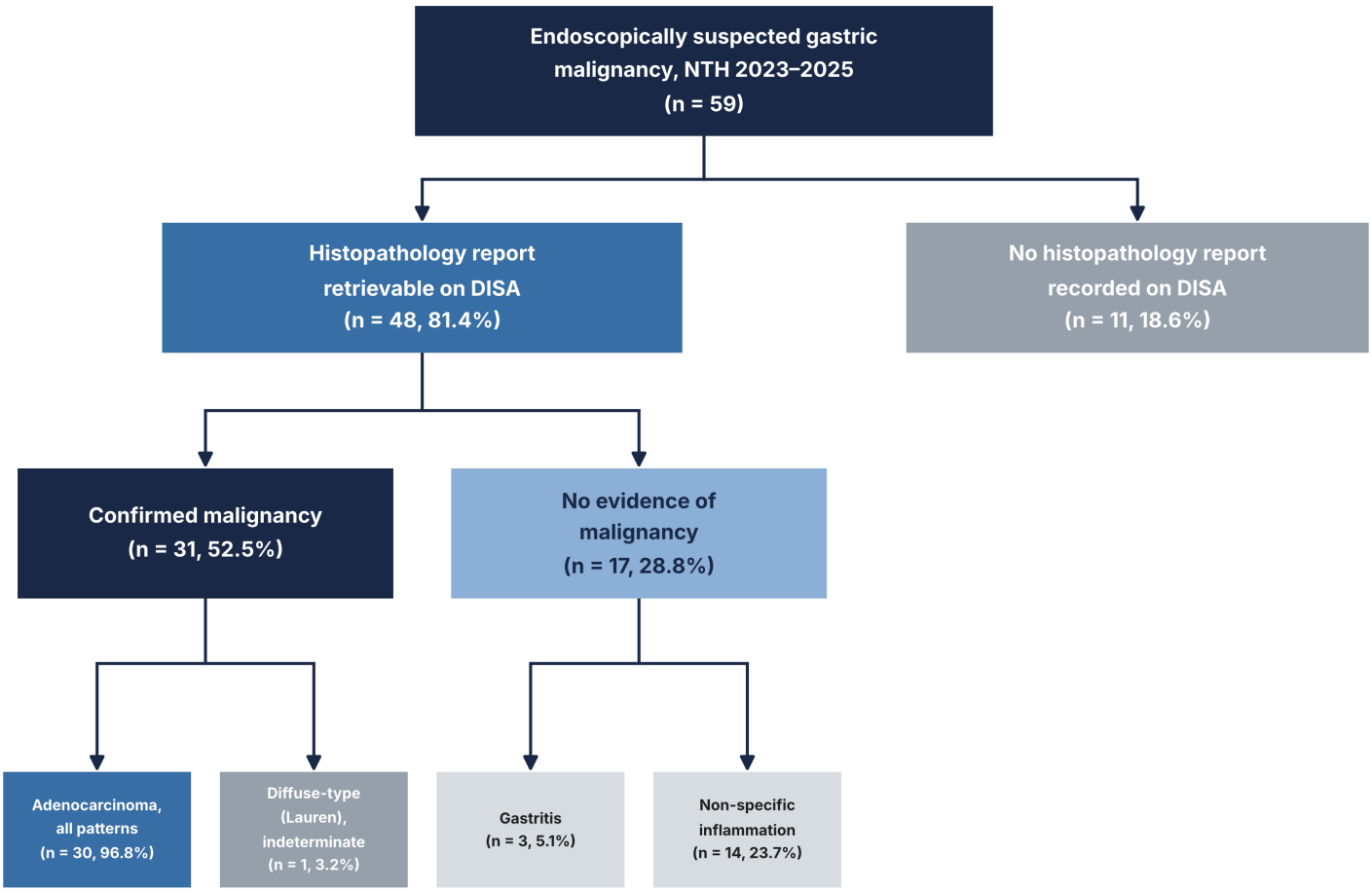


Figure 1

Patient flow diagram for the Gastric Cancer Endoscopic Cohort (n = 59), showing histopathological retrievability, confirmed malignancy status, and final histological classification following reclassification of non-adenocarcinoma carcinoma descriptors (see Methods).