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Gender Differences in Insurance, Surgical Admissions and Outcomes at a Kenyan Referral Hospital

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ARTICLE INFO

Article history:
Received 12 March 2021
Revised 28 May 2021
Accepted 9 June 2021
Available online 30 July 2021

Keywords:
General surgery
Global surgery
Gender disparity
Healthcare disparity
Low- and middle-income countries (LMIC)
National hospital insurance fund (NHIF)

ABSTRACT

Introduction: Gender is an important factor in determining access to healthcare resources. Women face additional barriers, especially in low- and middle-income countries. Surgical costs can be devastating, which can exacerbate engendered disparities. Kenya's National Hospital Insurance Fund (NHIF) aims to achieve universal coverage and protect beneficiaries from catastrophic health expenditures. We examine gender differences in NHIF coverage, health-seeking behavior, and surgical outcomes at a tertiary care hospital in Eldoret, Kenya.

Materials and Methods: All patients ≥13 years admitted to the general surgery service at Moi Teaching and Referral Hospital from January 2018-July 2018 were enrolled. Health records were retrospectively reviewed for demographic data, clinical parameters, NHIF enrollment, and cost information. Descriptive analyses utilized Wilcoxon Rank Sum, Pearson's Chi-square, and Fisher's Exact tests.

Results: 366 patients were included for analysis. 48.6% were enrolled in NHIF with significant female predominance (64.8% versus 37.9%, $P < 0.0001$). Despite differing coverage rates, male and female patients underwent surgery and suffered in-hospital mortality at similar rates.

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https://doi.org/10.1016/j.jss.2021.06.014

However, women only comprised 39.6% of admissions and were significantly more likely to delay care (median 60 versus 7 days, $P < 0.0001$), be diagnosed with cancer (26.6% versus 13.2%, $P = 0.0024$), and require a palliative procedure for cancer (44.1% versus 13.0%, $P = 0.013$).

Conclusion: Many financial and cultural barriers exist in Kenya that prevent women from accessing healthcare as readily as men, persisting despite higher rates of NHIF coverage amongst female patients. Investigation into extra-hospital costs and social disempowerment for women may elucidate key needs for achieving health equity.

Introduction

Gender is an important factor in determining one's access to healthcare resources and the type of care that a patient receives.[1–3] Particularly in low- and middle-income country (LMIC) settings, female gender has been associated with additional barriers to care, including gender roles and responsibilities, power imbalances between genders, and social discrimination. While many women's health initiatives are focused on important maternal-fetal health issues, women's health requires a broader life-course approach that expands beyond a woman's reproductive years and associated health concerns. A lack of outreach outside of a reproductive context may serve to isolate women from the established healthcare system, thus compounding unfamiliarity.[4] Expansion of women's health must include surgical care, a critical part of general care.[5,6]

Gender-stratified barriers to surgical care are not well described in the literature, particularly in many LMICs. However, patterns of inequity recur in many areas of surgical care.[7–9] The decision to seek surgical care is often delayed due to the significant direct and indirect costs associated with operations. While enrollment in national health insurance programs like Kenya's National Hospital Insurance Fund (NHIF) may protect against catastrophic costs, engendered power dynamics often result in women being reliant on their fathers or husbands for financial support and medical decision making.[10–12] Compounded by women's disproportionate experience of illiteracy, lower education and social status, and poverty, the initiation of healthcare-seeking behavior or navigation of complex medical systems is often delayed and challenging.[10,13,14] Women also reported higher rates of lacking social support post-operatively with home care or appointment accompaniment, and result of physical disfigurement in the form of a surgical scar is associated with a heavier social risk for women by way of loss of social acceptance or ineligibility for marriage.[10,13]

To understand the gender gap in the general surgery patient population at a Kenyan national referral hospital, we conducted a retrospective cohort study of all patients admitted to the adult general surgery service. This registry will provide epidemiologic data to direct specific interventions to improve patient care. In this paper, we outline preliminary results from the six-month pilot study.

Methods

Setting

This study was performed at the Moi Teaching and Referral Hospital (MTRH), one of two national referral centers in Kenya. Located in the city of Eldoret, MTRH is an approximately 750-bed hospital which serves an estimated patient population of 24 million. Its catchment area includes western Kenya, eastern Uganda, and southern South Sudan. As a referral hospital, MTRH receives complex and difficult-to-manage patients from hospitals across this area.[15,16] In addition to general surgery, several specialty surgical services operate at MTRH, including gynecology, urology, neurosurgery, otolaryngology, orthopedics, cardiothoracic surgery, plastic surgery, and pediatric surgery. This study is specifically investigating the general surgery patient population at MTRH.

MTRH holds a unique relationship with Indiana University through AMPATH (Academic Model Providing Access To Healthcare). From the initial partnership between IU and Moi University to establish a Kenyan medical school, the 30-year partnership of AMPATH has grown into a consortium involving numerous partner institutions across North America, Ministry of Health partisans at the national and regional level, and community members throughout western Kenya. Today, AMPATH is partnered with MTRH within a programmatic and care infrastructure including a variety of medical and surgical specialties.[15,16]

Design

This retrospective study enrolled all patients greater than 13 years of age treated on the adult general surgery service at Moi Teaching and Referral Hospital (MTRH) from January 2018 to July 2018. Patients under 13 years and patients admitted outside of the designated study period were excluded. The choice of 13 years of age as the cutoff value for inclusion is based on MTRH hospital policy wherein individuals 13 years of age and older requiring surgical care are admitted to the adult surgical ward, whereas children less than 13 years old are treated by the pediatric surgery service. The MTRH Medical Records Department collected patient charts from the paper database. For each patient, researchers extracted NHIF status, patient demographics, and relevant clinical information associated with the patients' presentation, diagnosis, and care.

A total of 368 general surgery patients were enrolled during the study period. Two patients were subsequently excluded from analysis, one due to missing information on sex and the other due to missing information for most data fields. Data from the remaining 366 patients were analyzed for any existing effect of sex on healthcare utilization and outcomes.

Outcomes

The primary aim of this study is to provide descriptive analysis of pilot data from a general surgery registry at a tertiary care hospital in western Kenya. Additional aims include evaluation of differences between sexes in terms of NHIF status, healthcare seeking behavior, and clinical outcomes.

Statistical analysis

Continuous variables were summarized as medians and quartiles due to non-normal distribution. Categorical variables were summarized as frequencies and percentages. To facilitate meaningful analysis, some categorical responses were grouped into larger categories. Specifically, the marital status categories of "separated" and "widowed" were grouped together. Occupation variables were aggregated as well due to the granularity of individual responses in our sample. Employment categories were defined as paid labor, unpaid labor, retired, and prisoner status. The purpose of this grouping structure is for consideration of income status as it relates to ability to access and utilize healthcare resources.

All analyses were completed using SAS software version 9,4.[17] Descriptive statistics were calculated using unpaired *t*-tests, Wilcoxon Rank Sum, Pearson's Chi-square, and Fisher's Exact tests. Significance level was set at $P < 0.05$ for all analyses. Frequencies and medians were rounded to one decimal place for ease of presentation. Kenyan shillings (Ksh) were converted to United States Dollars (USD) at a rate of 100 Ksh per USD.

Ethical considerations

Data was extracted from patient files at MTRH in accordance with the data collection form developed for the general surgery registry. There was no interaction with patients or clinical staff as part of data collection. Data was gathered from the charts without any analysis or diagnostic interpretation beyond what was explicitly documented. Database entry was manually performed by research assistants. Upon data entry, files were de-identified and assigned a study number to protect patient privacy. All data was stored in REDCap, a secured online electronic data capture and management program hosted at Indiana University.[18,19] No intervention was applied to patient care as a result of this study. Due to this and the study's retrospective nature, patients have incurred no harm or additional risk secondary to involvement, and thus the study received a waiver of informed consent. This study was approved by the Institutional Review Boards (IRB) at Indiana University and MTRH, with IRB members blinded to applicant identity.

Results

Descriptive epidemiology

Women accounted for 39.6% of adult general surgery admissions to MTRH. The median age of patients overall was 40 years with no significant difference by sex. Male patients had statistically larger median household sizes than female patients. Women were significantly more likely than men to be married. Occupation also differed by sex, with women being significantly more likely than men to perform unpaid labour. Of the 65 women without employment income, 44 (67.7%) identify as housewives.

Both sexes were similarly likely to access care through the casualty (emergency) department at MTRH but showed significant differences in rates of internal and external referrals. Women were significantly more likely than men to arrive to the general surgery service through a clinic or other specialty service at MTRH, and less likely to be referred by an outside facility. This effect remained significant when trauma patients were excluded from analysis.

Healthcare costs were significantly higher in patients without NHIF coverage compared to those enrolled (29,643 Ksh ($29.64 USD) versus 0 Ksh, $P < 0.0001$). There was no significant impact of sex in the net cost for NHIF enrollees and non-enrollees. Women were more likely than men to have health insurance coverage through NHIF. This trend was statistically significant for all admission origin categories overall, as well as within subgroup analysis for patients presenting via casualty ($P = 0.021$) and external transfer ($P = 0.0026$). Women also had higher rates of insurance coverage across all pathology types, with statistical significance maintained for subgroup analysis of benign disease (63.7% versus 36.5%, $P < 0.0001$). Notably, rates of insurance coverage in female and male cancer patients were equal (73.0% versus 70.8%, $P = 0.86$).

Within analysis of demographic data by pathology type, disease was divided into mutually-exclusive categories of non-traumatic benign disease, malignant disease, and trauma. Of the 366 patients, 71.0% had benign conditions, 16.7% were diagnosed with cancer, and 12.3% suffered a traumatic injury. Overall, men experienced trauma at much higher rates than women (17.7% versus 4.1%, $P < 0.0001$), while women experienced significantly more cancer than men (25.5% versus 10.9%, $P = 0.0002$). This female cancer predominance persisted even when limiting analysis to non-traumatic pathology ($P = 0.0024$), thus removing potential confounding of female cancer prevalence given that trauma patients were disproportionately male. There was no significant sex difference in proportion of patients with benign pathology. A detailed breakdown of benign and malignant conditions, both overall and by sex, is provided in Tables 3 and 4 below.

Clinical outcomes

Overall, women endured symptoms for significantly longer than men prior to presenting to medical care. Following admission, patients of both sexes equally underwent surgery or died during admission. Of note, this measure of in-

Table 1 – Descriptive epidemiology of general surgery patients, January—June 2018, aggregate and stratified by sex.

	All ($n = 366$)	Male ($n = 221$)	Female ($n = 145$)	P-value
Age, median (IQR)	40 (28, 55)	40 (28, 56)	39.5 (28, 53)	0.91
Marital status, *n* (column %)				0.0011
Single	100 (28.8)	72 (34.0)	28 (20.7)	
Married	203 (58.5)	114 (53.8)	89 (65.9)	
Separated and/or Widowed	44 (12.7)	26 (12.2)	18 (13.4)	
Household size, median (IQR)	6 (4,8)	7 (4,9)	5 (4,7)	0.0096
Occupation, *n* (column %)				<0.0001
Paid	252 (68.9)	176 (79.6)	76 (52.4)	
Unpaid*	96 (26.2)	31 (14.0)	65 (44.8)	
Retired	4 (1.1)	2 (0.9)	2 (1.4)	
Prisoner	7 (1.9)	5 (2.3)	2 (1.4)	
Not recorded				
Admission origin, *n* (column %)				0.0005
Casualty	119 (32.8)	73 (33.3)	46 (31.9)	
Surgical clinic	116 (31.9)	57 (26.0)	59 (41.0)	
Outside facility	112 (30.9)	83 (37.9)	29 (20.1)	
Other service	16 (4.4)	6 (2.8)	10 (7.0)	
NHIF coverage, *n* (column %)	177 (48.6)	83 (37.9)	94 (64.8)	<0.0001

* Unpaid labor refers to individuals for whom an external paycheck would not be guaranteed. In this sample, it is used to categorize patients whose professions were documented as follows in their chart: housewife, casual labor, self-employed, street boy.

Table 2a – Key outcome variables, aggregate and stratified by sex.

	All ($n = 366$)	Male ($n = 221$)	Female ($n = 145$)	P-value
Symptom duration (days), median (IQR)	14 (3,180)	7 (2,60)	60 (4,365)	<0.0001
Patients undergoing surgery, *n* (column %)	349 (95.6)	213 (96.8)	136 (93.8)	0.17
In-hospital mortality, *n* (column %)	31 (8.6)	20 (9.2)	11 (7.6)	0.60
Pathology type (mutually exclusive), *n* (column %)				<0.0001
Benign (non-traumatic)	260 (71.0)	158 (71.5)	102 (70.3)	
Malignant	61 (16.7)	24 (10.9)	37 (25.5)	
Trauma	45 (12.3)	39 (17.7)	6 (4.1)	
Cancer diagnoses, all cancer types, excluding trauma patients, *n* (column %)	61 (19.0)	24 (13.2)	37 (26.6)	0.0024
Cancer patients undergoing surgery ($n_{total} = 57$) requiring palliative procedure, *n* (column %)	18 (31.5)	3 (13.0)	15 (44.1)	0.013*

* Fisher's exact used due to cell sizes <5

Table 2b – Key outcome variables, aggregate and stratified by pathology type.

	All ($n = 366$)	Benign ($n = 260$)	Malignant ($n = 61$)	Trauma ($n = 45$)	P-value
Symptom duration (days), median (IQR)	14 (3,180)	14 (3,180)	135 (21,365)	2 (0,10)	<0.0001
Patients undergoing surgery, *n* (%)	350 (95.6)	249 (95.4)	57 (93.4)	44 (97.8)	0.25
In-hospital mortality, *n* (%)	33 (9.0)	16 (6.2)	16 (26.2)	1 (2.3)	<0.0001

Table 3 – Benign pathologies, aggregate and stratified by sex.

	All ($n = 260$)	Male ($n = 158$)	Female ($n = 102$)
Intestinal*, *n* (column %)	83 (31.9)	68 (43.0)	15 (14.7)
Intussusception	3 (1.2)	2 (1.3)	1 (1.0)
Obstruction due to volvulus	20 (7.7)	17 (10.8)	3 (2.9)
Obstruction due to adhesions	14 (5.4)	10 (6.3)	4 (3.9)
Obstruction due to infection	3 (1.2)	3 (1.9)	0 (0.0)
Obstruction (unspecified cause)	9 (3.5)	6 (3.8)	3 (2.9)
Perforation†	20 (7.7)	18 (11.4)	2 (2.0)
Stoma reversal	14 (5.4)	12 (7.6)	2 (2.0)
Hernia, *n* (column %)	47 (18.1)	27 (17.1)	20 (19.6)
Inguinal	23 (8.8)	23 (14.6)	0 (0.0)
Ventral (incisional)	7 (2.7)	1 (0.6)	6 (5.9)
Ventral (non-incisional)	16 (6.2)	3 (1.9)	13 (12.7)
Unspecified type	1 (0.4)	0 (0.0)	1 (1.0)
Appendix, *n* (column %)	39 (15.0)	16 (10.1)	23 (22.6)
Intact	29 (11.2)	12 (7.6)	17 (16.7)
Perforated	9 (3.5)	4 (2.5)	5 (4.9)
TB	1 (0.4)	0 (0.0)	1 (1.0)
Anorectal, *n* (column %)	28 (10.8)	23 (14.6)	5 (4.9)
Abscesses and fistulas	14 (5.4)	13 (8.2)	1 (1.0)
Fissures	2 (0.8)	1 (0.6)	1 (1.0)
Hemorrhoid	8 (3.1)	5 (3.2)	3 (2.9)
Mass	4 (1.5)	4 (2.5)	0 (0.0)
Skin and Soft Tissue	22 (8.5)	14 (8.9)	8 (7.8)
Infection and/or Wound	14 (5.4)	10 (6.3)	4 (3.9)
Lipoma	8 (3.1)	4 (2.5)	4 (3.9)
Endocrine, *n* (column %)	19 (7.3)	1 (0.6)	18 (17.7)
Thyroid	18 (6.9)	0 (0.0)	18 (17.7)
Parathyroid	1 (0.4)	1 (0.6)	0 (0.0)
Hepatobiliary, *n* (column %)	9 (3.5)	6 (3.8)	3 (2.9)
Gallbladder	2 (0.8)	0 (0.0)	2 (2.0)
Liver	2 (0.8)	1 (0.6)	1 (1.0)
Pancreas	4 (1.5)	4 (2.5)	0 (0.0)
Spontaneous bacterial peritonitis	1 (0.4)	1 (0.6)	0 (0.0)
Breast (abscesses), *n* (column %)	6 (2.3)	0 (0.0)	6 (5.9)
Reproductive, *n* (column %)	3 (1.2)	0 (0.0)	3 (2.9)
Gynecologic	2 (0.8)	0 (0.0)	2 (2.0)
Incisional dehiscence	1 (0.4)	0 (0.0)	1 (1.0)
Genitourinary, *n* (column %)	3 (1.2)	3 (1.9)	0 (0.0)
Infection	2 (0.8)	2 (1.3)	0 (0.0)
Mass	1 (0.4)	1 (0.6)	0 (0.0)
Stomach (gastritis), *n* (column %)	1 (0.4)	0 (0.0)	1 (1.0)

* Intestinal category includes the small and large intestine, minus the rectum
† Perforations include duodenal ulcers,[13] infectious,[3] anastomotic leak,[3] and unspecified type[1]

hospital mortality includes two male patients who received terminal palliation in the setting of advanced malignancy (Table 2a).

Outcome data was also analyzed by pathology type (Table 2b). Median symptom duration varied significantly between these disease categories. Within these categories, sex differences in symptom duration prior to presentation was only significant for benign disease (21 days for women versus 7 days for men, $P = 0.0007$). Women also presented later after trauma, while men had longer symptom duration than women in cancer, however these differences did not reach statistical significance.

Table 4 – Cancer types, aggregate and stratified by sex.

	All ($n = 61$)	Male ($n = 24$)	Female ($n = 37$)
Lower GI tract, *n* (column %)	15 (24.6)	9 (37.5)	6 (16.2)
Colon	8 (13.1)	5 (20.8)	3 (8.1)
Rectum	5 (8.2)	3 (12.5)	2 (5.4)
Anus	2 (3.3)	1 (4.2)	1 (2.7)
Hepatobiliary, *n* (column %)	12 (19.7)	0 (0.0)	12 (32.4)
Pancreas	7 (11.5)	0 (0.0)	7 (18.9)
Gallbladder	5 (8.2)	0 (0.0)	5 (13.5)
Breast, *n* (column %)	11 (18.0)	0 (0.0)	11 (29.7)
Skin and soft tissue, *n* (column %)	10 (16.4)	8 (33.3)	2 (5.4)
Skin	9 (14.8)	7 (29.2)	2 (5.4)
Sarcoma	1 (1.6)	1 (4.2)	0 (0.0)
Small bowel, *n* (column %)	5 (8.2)	4 (16.7)	1 (2.7)
Reproductive*, *n* (column %)	4 (6.6)	0 (0.0)	4 (10.8)
Ovaries	2 (3.3)	0 (0.0)	2 (5.4)
Cervix	1 (1.6)	0 (0.0)	1 (2.7)
Vulva	1 (1.6)	0 (0.0)	1 (2.7)
Upper GI tract, *n* (column %)	3 (4.9)	3 (12.5)	0 (0.0)
Stomach	2 (3.3)	2 (8.3)	0 (0.0)
Esophagus	1 (1.6)	1 (4.2)	0 (0.0)
Hematologic, *n* (column %)	1 (1.6)	0 (0.0)	1 (2.7)

Abbreviation: GI = gastrointestinal

* Reproductive cancers here only include locally advanced malignancies with extension into bowel, thus necessitating general surgical involvement.

Mortality rates varied significantly between disease categories (Table 2b), with malignancy claiming the most lives. Within each disease category, men and women experienced mortality at similar rates. There were no significant differences in rates of undergoing surgery, either among disease categories overall or within disease categories by sex.

Detail of non-traumatic pathologies

The benign pathologies experienced in our sample are represented in Table 3, organized anatomically. The most common disease entities overall involved the intestines, appendix, and hernias. The frequency of pathology by organ systems differed by sex. This was significant in Chi-square analysis both before and after excluding breast and reproductive organ pathology ($P < 0.0001$). Anatomic categories showing the largest differences included endocrine, intestinal, appendiceal, and anorectal.

Women accounted for a larger proportion of cancer patients than men (60.7% versus 39.3%, $P = 0.0024$). Types of cancers experienced by male and female patients (Table 4) also differed significantly, even after the exclusion of breast and reproductive cancers ($P = 0.0005$). Cancer types with the most marked prevalence differences by sex were hepatobiliary, skin and soft tissues, and upper gastrointestinal tract tumors. Male and female cancer patients underwent surgery at similar rates. However, among cancer patients who received surgery, the rates of palliative procedures were significantly higher among women (Table 2a).

All cancer patients presented secondary to symptomatic disease. Symptoms cited include nausea, vomiting, abdominal distension, pain, obstipation, weight loss, anorexia, jaundice, fever, mass, and wound or lesion. Analysis of presenting symptoms by sex and in relation to symptom duration was unrevealing, with only jaundice showing a significant difference by sex in line with the different rates of hepatobiliary malignancy ($P = 0.038$). Notably, malignant hepatobiliary disease was only diagnosed in females, in contrast to the equal sex distribution within benign hepatobiliary disease.

Discussion

Surgery as a field is not well represented in the global health literature. This is especially true when considering entire general surgery populations, as benign pathologies are less frequently and less thoroughly investigated than patterns of traumatic injury and cancers. Even scarcer are studies exploring the disparities in surgical care between male and female patients. This pilot data shows evidence of demographic and clinical disparities in our sample and highlights the need to further investigate barriers to care faced by our female patients.

Demographic evidence of disparities

Women account for slightly more than half of the Kenyan adult population, but only comprised 39.6% of our sample.[20]

Both genders were equally likely to present through casualty, similar to global trends[21]; however, women were less likely to present through external referral. These findings suggest either lower rates of utilization and referral from local health facilities, limited ability to follow through with a referral to MTRH once made, or both. Women also presented with greater duration of symptoms as compared to men, suggesting difficulties seeking or obtaining care in a timely fashion. These findings in a patient population with higher rates of NHIF insurance coverage amongst women than men (63.7% versus 36.5%) warrant considerations of additional barriers that may limit the intended benefits of NHIF.

Clinical evidence of disparities

The gender trends within each surgical pathology were comparable to available data, with trauma patients being predominantly male, benign pathology being roughly equal, and cancer demonstrating female predominance.[22–26] However, trends among female cancer patients expose additional disparities. Despite a higher cancer incidence among women being expected for east Africa,[24] the differing outcomes between sexes in terms of palliative procedures was unexpected. Cancer staging was inconsistently documented in the chart; however, intraoperative description and procedure performed described the high locoregional tumor burden. Palliative procedures are typically only done when disease has become sufficiently advanced that a curative procedure would either not be possible or not be well-tolerated, suggesting that female cancer patients may be presenting with more advanced disease. This may signify that women are unable to access or receive timely general surgery care as readily as men, specifically within a timeframe offering viable curative options.[27]

For biliary tract disease specifically, no male patients in our sample had proven malignancy, while 12 female patients received pancreatic and gallbladder cancer diagnoses. One male patient's presentation was consistent with a possible malignancy, however the other male patients appeared to have truly benign disease. This discrepancy was unexpected and differs from published global and regional data, which show higher age standardized rates of most hepatopancreaticobiliary malignancies among men with a slight female predominance only for gallbladder cancer.[24] While this finding may be due to small sample size, it is also possible that it is somehow related to our patient population, and is a specific area warranting further investigation.

NHIF coverage and limitations

Several health insurance providers exist in Kenya, with NHIF providing the majority of coverage. Few studies exist comparing NHIF to the other insurance systems or addressing gender distributions between systems; however, the available literature demonstrates low rates of coverage overall and higher coverage among men than women. Barasa *et al.* (2018) reported that NHIF insures 16% of Kenyans, while the other 32 identified insurers together cover only 1% of the population.[28] Another study from that same year found that, taken in aggregate, the available health insurance groups in Kenya provide coverage to only 21.9% of males and 18.2% of females over the age of 15.[29] These rates are increased from 2013, when a similar study reported rates of 11% and 9% among men and women, respectively.[30] These cited enrollment rates are much lower than those seen in our sample, which boasted 48.6% overall coverage and higher rates among women than men (64.8% and 37.9%, respectively). This is likely due in large part to MTRH being a public referral hospital with a patient base comprised of individuals with either public or no insurance coverage. Additionally, while access to NHIF is theoretically equal throughout Kenya, AMPATH and MTRH are extremely proactive in registering patients for this coverage. This is especially true for cancer patients and elective surgery patients, who often enroll in NHIF prior to scheduling surgery to defray anticipated personal costs.

Financial constraints are often cited as a barrier to healthcare. The occupational breakdown in our cohort demonstrates 65% of women without employment income which suggests that women may have less financial solvency than men and may be considerably hindered in their ability to access care. Interestingly, in our cohort, female patients were insured at significantly higher rates than male patients overall (64.8% versus 37.9%, $P < 0.0001$) and within the subset of patients experiencing benign pathology (63.7% versus 36.5%). This suggests that, in western Kenya, additional financial burdens outside of hospital bills may also act as significant barriers to care, despite insurance enrollment. Such may include travel expenses to reach a healthcare facility and, in some cases, lodging while undergoing workup or follow up visits.

Notably, there was no difference in rate of NHIF coverage by gender in our subset of patients with cancer. In this population, NHIF enrollment is likely related to past healthcare exposure, where hospital support staff such as social workers assist patients with the insurance enrollment process at the initial encounter to prepare for longitudinal care. For cancer specifically, NHIF enrollment becomes more important given the often-extensive workups, treatments, and re-staging required. NHIF enrollment impacts both patients and hospitals through prevention of catastrophic cost and assuring reimbursement and sustainability of the public health system. NHIF trends for trauma patients also lacked significant differences by sex, which we suspect to be due to our small sample size, as we would hypothesize finding higher rates of unenrollment for this acute and predominantly male pathology.

Literature exists investigating disparities within the NHIF structure itself that provide insight into why women in our sample may be experiencing difficulties accessing healthcare despite higher levels of NHIF enrollment. In 2015, NHIF introduced the 'SUPA Cover' initiative, one to help increase voluntary enrollment in the informal sector.'[31] With a fixed rate of 500 Ksh ($5.00 USD) a month, SUPA Cover provides inpatient and outpatient coverage to a 'principal member' and their beneficiaries.'[32] However, women continue to report barriers to both utilizing and registering for these services. The African Health Markets for Equity (AHME) impact evaluation showed one in four NHIF members do not use their health insurance. For women, one common reason was due to lack of access to the enrollment card or card number, as the husband was the principal cardholder. Furthermore, coverage of healthcare centers by NHIF is not uniform and women limited in travel may not have convenient access to providers who ac-

cept NHIF,[33] which may highlight why women in our cohort were more likely to present in a delayed fashion and directly to MTRH. The act of enrolling in NHIF is also a challenge for women. Some communities consider men to be the principal member for NHIF by default, thus barring women from enrolling as such. Lastly, maternity services within NHIF were noted to be the dominant focus of women's health, while other services were difficult to access in practice and poorly reimbursed for providers.This literature suggests that challenges with reaching and receiving care continue to exist for women even with NHIF enrollment.

Additional barriers to care

Our data suggest the presence of financial and family-related barriers. The median household size was significantly smaller for women than men. A potential explanation is that women with larger households may not present to the hospital as often as men with comparable family sizes, possibly due to increased caretaking responsibility, a social dynamic supported by Kenyan census reports.[34] Interpretation of this information is nuanced by the legal practice of polygamy where experiences of wives may differ. Prevalence of this practice has declined in recent decades, with the most recent official rate reported at 7.3%.[35] Women are also more likely to lack employment income both in our sample and in Kenya as a whole,[36] which has been shown to affect healthcare utilization.[37] Either of these factors individually, and synergistically, could prevent female patients from accessing care as quickly or as often as men.

Many additional potential barriers exist that our data is unable to examine; these are discussed in the introduction and are studied more extensively in anthropological rather than clinical contexts. One barrier that is not captured in our data but has been noted by the authors during their clinical practice in western Kenya is fear. Patients have expressed fear surrounding the clinical encounter itself and certain diagnoses, especially cancer. One study has examined this in depth in the context of breast cancer and found high rates of fear related to fatalism, stigma, and misconceptions surrounding cancer care and outcomes.[38] Specifically, some patients believe the diagnosis of breast cancer is fatal and avoid seeking care until their disease is advanced, at which point curative options may not be available; this reinforces the belief cycle that both cancer diagnoses and healthcare facilities lead to death. This presents challenges for treatment and screening alike.[38–40]

Strengths and limitations

The main strength of our study is to contribute to the limited literature that exists regarding the mammoth topic of global surgical care. The data presented here and the patterns it exposes provide a basis for pursuing directed research to understand and address the barriers faced by our female patients.

This study has important limitations to consider. Its retrospective design and descriptive nature make it unable to be used for causal inference. Self-reported variables such as symptom duration introduce the possibility for recall bias Retrospective design also limited our ability to interview patients and clarify more information about their employment type and how they came to enroll in NHIF, an area on which we hope to improve in future studies. Its small size and single-institution population limit its generalizability, and although we have data relating to referral patterns, we were unable to capture information regarding surgical and insurance coverage differences across district-level facilities; therefore, it is plausible that a similar study conducted at district-level facilities may uncover different results. The use of paper charts at MTRH also presents challenges, particularly in charting variability and possible loss of data, predisposing to incomplete data fields. These limitations would not be expected to affect men and women differently. The processing of pathology samples at MTRH presents another challenge because patients are required to pay for tests separately prior to receiving them. Thus, patients classified as having benign disease may simply have lacked the financial resources to pursue final pathologic diagnosis. We specifically suspect this to be the case for some anorectal and thyroid patients in our sample. Finally, by including only hospitalized patients, we are unable to account for patient deaths which occur before reaching the hospital, following discharge, or within the casualty department before admission to the general surgery ward.

Conclusion

Female gender has been found to be a significant factor impacting health-seeking behavior and health outcomes in both high-income countries and low and middle-income countries. Our preliminary data from a six-month retrospective general surgery registry identifies similar trends that are sparsely available in the literature. In order to facilitate more research of this type, care must be taken to ensure thorough documentation of demographic and clinical information as well as parameters related to details of NHIF utilization (including timing and circumstances of enrollment), disease severity and/or staging, referral patterns, and referral follow-through. Further work needs to uncover the reasons that women present less often to tertiary healthcare facilities and with a longer duration of symptoms when compared to their male counterparts. Future studies must examine practical and sociocultural barriers alike, with specific attention to gender-specific cultural perceptions that may prohibit women from seeking surgical care even when covered by NHIF, such as disfigurement from an operation or perceived futility due to prognostic misconceptions. These avenues may be addressed through qualitative research involving patients who have experienced delays to elucidate barriers specific to our population (Table 1).

Author Contributions

Anna Gillio authored this manuscript in collaboration with Helen Li, Manisha Bhatia, JoAnna Hunter-Squires, and Seno Saruni. All listed authors were involved in its review and editing. It is an expanded review of general surgery registry data initially investigated by Helen Li with respect to health insurance status of our patient cohort. That initial analysis identified surprising gender differences in health insurance coverage seemingly at odds with patient census demographic

makeup and outcome data. To investigate this further, Anna Gillio and Helen Li performed all subsequent data analysis under the guidance of Dr. Hunter-Squires. The data for review were collected and entered by Eunice Chepkemoi, Emmy Rutto, Helen Li, and Kyle Carpenter in accordance with data collection measures for the general surgery registry at Moi Teaching and Referral Hospital. This registry was conceived of and designed by Kyle Carpenter and Helen Li under the supervision of Seno Saruni and Connie Keung.

Acknowledgments

The authors would like to acknowledge the Medical Records Department at MTRH for their assistance locating and pulling the patient files for review.

Disclosures

The authors declare that they have no personal relationships, financial incentives, or other conflicts of interest that could have appeared to influence the work presented in this paper.

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