



# Incidence, types, and associated factors of external abdominal hernias among adult patients visiting the surgical outpatient department, eastern Ethiopia: a multicentre cross-sectional study

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**Background:** Abdominal hernia is the most common surgical alignment that affects all age groups and sexes. It is characterized by the protrusion of abdominal contents through the abdominal wall's muscles and fascia. In this study, the incidence, types, and associated factors of external abdominal hernias at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital, eastern Ethiopia, were ascertained.

**Objective:** To identify the incidence, types, and associated factors of external abdominal hernia among adult patients who visited the surgical outpatient department of Hiwotfana comprehensive specialized hospital and Jugal regional hospital from 20 October to 5 December 2022.

**Methods:** A cross-sectional study was conducted from 20 October to 5 December 2022, on adult patients who visited the surgical outpatient department at the Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital in eastern Ethiopia. All adult patients who visited the surgical outpatient department of each hospital were enrolled in the study using a stratified random sampling technique. Both descriptive and inferential statistics were conducted, and the results were presented in text, graphs, and tables. Odd ratios for the strength and directions of association were used with a 95% CI, and a *P* value of less than 0.05 was considered to declare statistical significance.

**Result:** A total of 403 participants were included in this study from two different governmental hospitals in Harar town, with a 100% response rate. The incidence of the external abdominal wall hernia was 41 (10.2%). The epigastric hernia had the highest prevalence (41.5%, *n* = 17). Constipation [adjusted odds ratio (AOR) = 2.91, CI = 1.119–7.579], prolonged cough (AOR = 3.993, CI = 1.358–11.741), history of abdominal surgery (AOR = 5.764, CI = 1.837–18.083) and heavy lifting (AOR = 5.476, CI = 2.505–11.969) had statistically significant association (*P* ≤ 0.05).

**Conclusion:** The incidence of external abdominal wall hernia in our area is similar to the other existing literature reported from different areas. Epigastric hernia is the most prevalent type of external abdominal hernia and is commonly encountered in female patients. Constipation, a prolonged cough, previous abdominal surgery, and heavy lifting are significantly associated with an external abdominal wall hernia.

**Keywords:** Abdominal wall hernia, Associated factors, Outpatient department

## Introduction

An abdominal wall hernia is characterized by the protrusion or bulge of abdominal contents through the abdominal wall's muscle and fascia. This may develop as a result of weakened or

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## HIGHLIGHTS

- External abdominal hernia is one of the most commonly performed surgical alignment at all level of hospitals in Ethiopia.
- Hernia formation has been linked to a number of risk factors.
- There are different types of hernias depending on their anatomic locations.

disrupted overlaying fascia, failed wound healing after surgery, or it may be present at birth. Hernias can cause severe discomfort or be asymptomatic bulges that get bigger with Valsalva manoeuvres<sup>[1]</sup>. Abdominal hernia is a common disease of the abdomen that may develop in both sexes and at all ages, with an incidence rate of ~4–5%<sup>[2,3]</sup>. There are different types of hernias, depending on their anatomic locations. Inguinal hernias are the most prevalent (70–75%), followed by femoral (6–17%), and umbilical (3–8.5%) hernias, which occur in decreasing frequency order where other more uncommon variants occupy (1–2%)<sup>[4]</sup>.

Hernia formation has been linked to several risk factors. Among them are age, pregnancy, and probably the most significant, obesity. According to studies, aging has a key role in the tissue breakdown that leads to the development of some groyne hernias<sup>[5]</sup>. The study done in northern Saudi Arabia shows that out of the 11.7% overall prevalence, 51.9% were obese, 53.6% had previous abdominal surgery, 19.1% had previous abdominal trauma, 28.4% had a positive family history of hernias, and 39.9% were grand multipara<sup>[3]</sup>. The study done to determine the prevalence and risk factors for abdominal wall hernias in the general Russian population shows. age, male sex, hard labour, and family history of hernias as confirmed risk factors for any hernia<sup>[6]</sup>.

An estimated 800 000 hernia operations are performed annually in the United States, making it one of the most frequent operations<sup>[7]</sup>. Contrastingly, in Sub-Saharan Africa (SSA), where the incidence may be higher and a disproportionately high number of inguinal hernias go untreated, leading to late presentation with incarceration, strangulation with gangrenous bowel, or giant scrotal hernias are common, patients suffer from a lack of access to hernia repair, which has an unquantified economic cost owing to incapacity<sup>[8]</sup>.

In the African population, even though it is one of the diseases with a high prevalence and is commonly performed operation in hospitals, there is not enough literature considering the incidence, types, and associated factors of abdominal hernia. Only a few studies have been done in Sub-Saharan Africa, including Ethiopia.

Despite the common occurrence and clinical significance of abdominal wall hernias, there is no existing publication on abdominal wall hernias in the eastern part of Ethiopia. Therefore, this study was aimed at determining the incidence, types, and associated factors of external abdominal hernia among adult patients visiting the outpatient department at the Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital in eastern Ethiopia.

## Methods and materials

### Study design

A hospital-based cross-sectional study was used to assess the incidence, types, and associated factors of external abdominal hernia in adult patients who visited surgical outpatient department (OPD) at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital, eastern Ethiopia.

Source population: All adult patients who visited the surgical outpatient department at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital from 20 October 2022, to 5 December 2022, comprised the study's target population.

Study population: Sampled adult patients who visited the surgical outpatient department at Hiwotfana Comprehensive

Specialized Hospital and Jugal Regional Hospital from 20 October 2022, to 5 December 2022.

### Inclusion criteria

All adult individuals who visited the surgical outpatient department during the period of study.

### Exclusion criteria

Patients who were unable to respond due to severe illness or mental health problems.

### Sample size determination and sampling technique

#### Sample size determination

The following single proportion formula<sup>[9]</sup> was used:

$$n = \frac{Z^2 P (1 - P)}{d^2}$$

Where  $n$  = sample size,

$Z$  =  $Z$  statistic for a level of confidence of 95%, value is 1.96

$P$  = the prevalence of external hernia, 11.7%<sup>[10]</sup>.

The proportion of lifting heavy objects among hernias, 61.7%  
 $d$  = precision (in proportion of one; if 5%,  $d = 0.05$ ).

Sample size was calculated for each specific objective, by taking the largest sample size ( $n = 366$ ), 10% was added for the non-response rate (Table 1).

$$n = 403$$

#### Sampling procedure and sampling technique

Two government hospitals were selected purposefully. The proportional allocation of samples from the two hospitals was based on the monthly case flow of each hospital's OPDs in similar months last year. Participants were selected using a systematic random sampling technique with skipping intervals of two until the calculated sample size was attained. The total number of cases seen at two hospitals was 876, according to the registered logbook of OPD (Fig. 1).

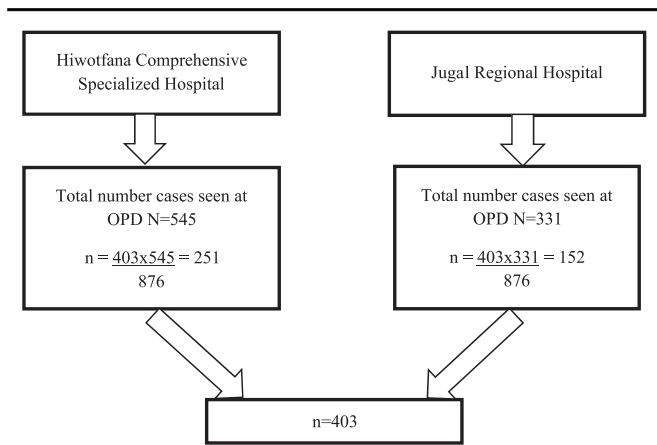
## Data collection methods

### Data collection instruments

Data collection checklists and questionnaires were prepared from literature and locally adapted after being validated by two consultant surgeons<sup>[10,11]</sup>. The data that was collected had: sex, age, residence, smoking, marital status, parity, family history of hernia, straining during urination, constipation, chronic cough, previous abdominal surgery, history of abdominal trauma, lifting heavy objects, site of hernia, and duration after diagnosis.

**Table 1**  
Sample size calculated for each specific objective

No	Objectives	The assumption for sample size calculation	Sample size	Reference
1	To determine the incidence of an external abdominal wall hernia	The prevalence of external hernias is 11.7%, $d = 5\%$ .	159	Kibret <i>et al.</i> <sup>[10]</sup>
2	To determine the types of external abdominal hernias	The proportion of epigastric hernias among all hernias is 34%, $d = 5\%$ .	345	
3	To assess the associated factors of external abdominal hernias	The proportion of lifting heavy objects among hernias is 61.7%, $d = 5\%$ .	366	



**Figure 1.** Proportional allocation of samples at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital based on the daily case flow of each hospital's OPDs. OPD, outpatient department.

**Data collectors and procedures**

Four BSC nurses were given training on the data collection process. All the data collectors were given one-day training about the clinical presentation, types and associated factors of abdominal hernia, the objective of the study, the variables on the questionnaire, and their implications. Then, they were assigned to interview and review the medical records of patients and fill out the data collection checklist and questionnaire. All data collection activities were supervised by trained surgical residents and the principal investigator.

**Data quality control**

The compilation format was prepared in simple English with sufficient training for the data collectors for improved readability and understanding. The collected data was cross-checked by one supervisor.

**Variables**

**Dependent**

Incidence of external abdominal wall hernia.  
Types of external abdominal wall hernias.

**Independent**

Sex, age, place of residence, occupation, smoking, family history of hernia, parity, difficulty of urination, constipation, chronic cough, history of abdominal surgery, abdominal trauma, lifting heavy objects.

**Methods of data analysis**

The collected data was entered, coded, and cleaned by Epi Info 7.2.5. Then the data was extracted to SPSS, version 26.0, and analysis proceeded. Data were analyzed with descriptive analysis, such as frequencies, percentages, mean, median, and standard deviations, and inferential analysis was also conducted with the  $\chi^2$  test and Logistic regression analysis. A crude odd ratio was calculated to see the association between each independent variable and dependent variable. All variables with a *P* value of less than 0.25 were further analyzed with multivariate logistic

regression analysis to control for confounders. The associations were considered significant at a 95% CI and the *P* value was set at less than 5%. The work has been reported in line with the STROCSS criteria<sup>[12]</sup>.

**Result**

**Socio-demographic characteristics**

A total of 403 participants were included in this study from two different governmental hospitals in Harar town, with a 100% response rate. The patient's age range was from 19 to 86 years, with a mean and standard deviation of 41.11 and 16.398, respectively. Both sexes had nearly equal frequency; 205 (50.9%) were male subjects. More than half of the study participants (57.1%, *n* = 230) came from rural areas, and 308 (or 76.4%) of the patients were Muslims. Two hundred forty-nine (61.8%) of patients were either farmers (32%, *n* = 129) or housewives (29.8%, *n* = 120). Three hundred thirty-seven (83.6%) of the study participants were married (Table 2).

**Table 2**

**Sociodemographic characteristics of adult patients visiting surgical OPD at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital, eastern Ethiopia, 2022 (*n* = 403)**

Characteristics	Frequency	Percent
Sex		
Female	198	49.1
Male	205	50.9
Age		
19–45	256	63.5
> 45	147	36.5
Place of residence		
Rural	230	57.1
Urban	173	42.9
Occupation		
Civil servant	25	6.2
Daily labourer	15	3.7
Farmer	129	32.0
Housewife	120	29.8
Merchant	22	5.5
Self-employed	53	13.2
Student	39	9.7
Religion		
Muslim	308	76.4
Orthodox	86	21.3
Protestant	9	2.2
Educational status		
Able to read and write	101	25.1
Collage or above	37	9.2
Preparatory (grade 11–12)	24	6.0
Primary education (grades 1–8)	33	8.2
Secondary education (grades 9–10)	33	8.2
Unable to read and write	175	43.4
Marital status		
Divorced	6	1.5
Married	337	83.6
Separated	2	0.5
Single	53	13.2
Widowed	5	1.2

OPD, outpatient department.

### Incidence of external abdominal wall hernia

A total of 41 patients out of 403 participants had an external abdominal hernia, making the overall incidence 10.2%. There were 23 (11.6%) subjects with hernias among females, while among males, 18 (8.8%) were affected. Twenty-two (53.5%) of external abdominal hernia cases occurred at the age of 45 or older. The prevalence of external abdominal hernias among rural and urban participants was 10.4% and 9.8%, respectively. Among the total number of hernia cases that were observed in married female patients, 10 (47.6%) of them were diagnosed as primiparas and multiparous, and 11 (52.4%) of them had a history of more than four deliveries (grandmultipara). Eight (10.1%) of the participants had a family history, and only one (12.5%) of them had an external abdominal hernia during the study time. The prevalence was higher in smokers (14.3%) as compared with non-smokers (9.6%). Participants who had constipation, prolonged cough, abdominal surgery, abdominal trauma, and heavy lifting had a high prevalence of external abdominal hernia when compared with their counterparts (Table 3).

### Types of external abdominal hernia

Of the total cases of external abdominal hernia, the most frequent hernia type was epigastric (41.5%,  $n = 17$ ), followed by inguinal (29.3%,  $n = 12$ ). Para-umbilical, umbilical, and incisional hernias account for 9.8%, 4.9%, and 14.6%, respectively. From the total number of epigastric hernias, 14 (82.4%) were found in female participants. Except for one case, 11 (91.7%) inguinal hernias were found in male patients (Fig. 2). From inguinal hernias, seven (58.3%) were right indirect, two (16.7%) were left indirect, one (8.3%) was right in-direct, one (8.3%) was left direct, and one (8.3%) was bilateral indirect type (Fig. 3).

### Factors associated with external abdominal hernia

A binary logistic regression was performed to reveal factors associated with the prevalence of external abdominal hernias. Age above 45, constipation, prolonged cough, history of abdominal surgery, history of abdominal trauma, and heavy lifting were found to be significantly associated with the prevalence of external abdominal hernias at  $P$  less than 0.25. Multivariate analysis was performed with factors that were found statistically significant in bivariate analysis. Constipation [ $P = 0.028$ , adjusted odds ratio (AOR) = 2.91, CI = 1.119–7.579], prolonged cough ( $P = 0.012$ , AOR = 3.993, CI = 1.358–11.741), history of abdominal surgery ( $P = 0.003$ , AOR = 5.764, CI = 1.837–18.083), and heavy lifting ( $P = 0.000$ , AOR = 5.476, CI = 2.505–11.969) were statistically significant on multivariate regression analysis ( $P = 0.05$ ). However, age above 45 and a history of abdominal trauma were not statistically significant associated factors (Table 4). A chi-square test of independence was performed to assess the relationship between parity and external abdominal wall hernia. There was a significant association between the two  $X^2(3, N = 177) = 14.019, P = .003$ .

### Discussion

In this study, we found that the incidence of an external abdominal wall hernia was 41 (10.2%). The result is in line with

**Table 3**

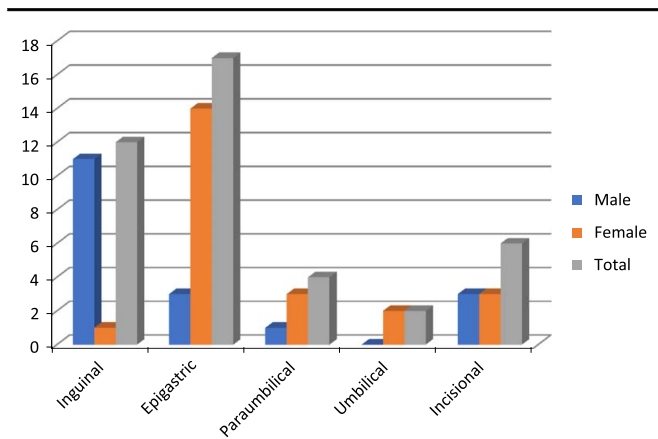
**Distribution of external abdominal wall hernia by socio-demographics, clinical, and behavioural factors of adult patients visiting surgical OPD at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital, eastern Ethiopia, 2022 ( $n = 403$ )**

Characteristics	External hernia		Total ( $n = 403$ )
	Yes, $n$ (%)	No, $n$ (%)	
Sex			
Male	18 (8.8)	187 (91.2)	205
Female	23 (11.6)	175 (88.4)	198
Age of patients			
19–45	19 (7.4)	237 (92.6)	256
> 45	22 (15)	125 (85)	147
Place of residency			
Rural	24 (10.4)	206 (89.6)	230
Urban	17 (9.8)	156 (90.2)	173
Parity for married female patients			
Nulliparous	—	7 (100)	7
Primiparous	1 (5)	19 (95)	20
Multiparous	9 (8)	103 (92)	112
Grand multipara	11 (28.9)	27 (71.1)	38
Family history of external abdominal hernia			
Yes	1 (12.5)	7 (87.5)	8
No	40 (10.1)	355 (89.9)	395
Cigarette smoking			
Yes	7 (14.3)	42 (85.7)	49
No	34 (9.6)	320 (90.4)	354
Difficulty of urination			
Yes	3 (8.8)	31 (91.2)	34
No	38 (10.3)	331 (89.7)	369
Constipation			
Yes	9 (29)	22 (71)	31
No	32 (8.6)	340 (91.4)	372
Prolonged cough			
Yes	7 (25)	21 (75)	28
No	34 (9.1)	341 (90.9)	375
Abdominal surgery			
Yes	6 (28.6)	15 (71.4)	21
No	35 (9.2)	347 (90.8)	382
Abdominal trauma			
Yes	4 (28.6)	10 (71.4)	14
No	37 (9.5)	352 (90.5)	389
Lifting of heavy objects			
Yes	17 (26.2)	48 (73.8)	65
No	24 (7.1)	314 (92.9)	338

OPD, outpatient department.

research done at UOGCSH, Northwest Ethiopia, and Arar City, Northern Saudi Arabia, which found 11.7% and 11.5%, respectively<sup>[10,11]</sup>. This study's finding was lower when compared with a study done in the general Russian population, in which the overall abdominal wall hernia was 20.9%<sup>[6]</sup>. This difference may be due to the study population, which includes all adult patients older than 10 years, and also to the fact that their medical reports were used along with clinical and ultrasound examinations, which are only history and physical examinations, and only adult patients older than 18 years were included in our study. In our study, external abdominal hernias were more common in females (56.1%) than males (43.9%), which is consistent with the study conducted in UOGCSH Northwest Ethiopia (51.1% vs. 48.9%) and in Arar City, Northern Saudi Arabia, in 2017 (63.4% vs. 36.6%)<sup>[10,11]</sup>. In contrast, western studies report that abdominal

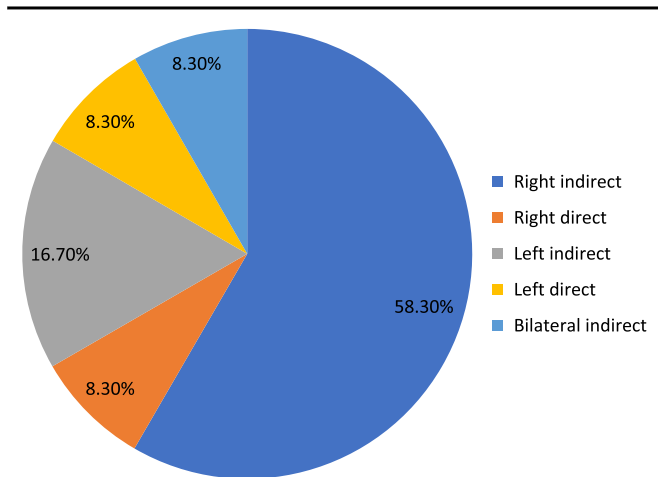




**Figure 2.** Types of external abdominal hernia among adult patients visiting surgical OPD at Hiwotfana Comprehensive Specialized Hospital and Jugal regional hospital, eastern Ethiopia, 2022 (n = 403). OPD, outpatient department.

wall hernias are more prevalent in male patients, like the study done in Pakistan, which reported 67.27% in males and 32.72% in females, and the study done in Kryukovo rural community (Central Russia), which reported 31.2% of men and 14.6% of women had abdominal wall hernias<sup>[6,13]</sup>. In our study, female patients with a history of grand-multi-parity accounted for 28.5%, which showed a significant association ( $P < 0.05$ ), possibly increasing the external abdominal hernia among women with a similar report from Northern Saudi Arabia of a  $P$  value less than 0.05<sup>[11]</sup>. This can also be related to the commonest type of hernia detected in different study areas.

Epigastric hernias accounted for 17 (41.5%) of the total hernia cases, which puts them at the top of all the cases, followed by inguinal hernias 12 (29.5%), which is consistent with the study done in UOGCSH Northwest, Ethiopia, which reported epigastric hernias at 34% and inguinal hernias at 29.8%<sup>[10]</sup>. Nonetheless, the proportion of epigastric hernias reported by other studies worldwide is much lower, which puts inguinal hernias as the most common type of hernia. As the study done in



**Figure 3.** Types of inguinal hernia among adult patients visiting surgical OPD at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital, eastern Ethiopia, 2022 (n = 403). OPD, outpatient department.

the UK reported, inguinal (70–75%), femoral (6–17%), and umbilical (3–8.5%) hernias occur in decreasing frequency order<sup>[4]</sup>. The results of the study done in Pakistan reported a higher prevalence of inguinal hernia (70%) as compared to para-umbilical (14.54%), umbilical (8.18%), and incisional (7.27%)<sup>[13]</sup>. Similarly, a study done in Kutch District, India, reported inguinal (21.8%), followed by obturator (17.3%)<sup>[14]</sup>. Umbilical hernias were found in 10.2%, groyne hernias in 8.3%, and incisional hernias in 2.4% of residents in the general Russian population<sup>[6]</sup>. In a study done at Arar City, Northern Saudi Arabia, in 2017, the most common cases were para-umbilical (33.9%), inguinal (27.3%), and umbilical (20.8% of the cases)<sup>[11]</sup>. This difference in types of external abdominal hernias is due to study differences, which are institutional and community-based types, and associated factors.

In our study the commonest type of inguinal hernia was right side 8 (66.7%) which is similar to the study done in Kutch District, India which reported as right side (58%), left side (39.8%) and bilateral(1.9%), community-based study done in Russia, Kryukovo rural community in the Belgorod region reported the majority of inguinal hernias were right-sided 43 (66%), 16 (25%) were left-sided, 6 (9%) hernias were bilateral and hospital-based study done in the UK also reported right side inguinal hernia in 55% of cases, this reality may be attributed to delay in the descent of right side testis<sup>[4,6,14]</sup>.

Patients with constipation were 2.9 times more likely to have an external abdominal hernia ( $P = 0.028$ , AOR = 2.912, CI = 1.119–7.579). The same result is obtained by the studies done in the Kryukovo rural community in the Belgorod region of Central Russia with  $P$  less than 0.001 and in Ethiopia as well, which is 3.67 times higher among participants who had constipation compared with their counterparts (AOR 3.67, 95% CI 1.68–8.11)<sup>[6,10]</sup>. This could be due to prolonged straining during defecation, which generates high intra-abdominal pressure and results in weakness of abdominal muscle, which in turn leads to a hernia. In our study participants who had a history of prolonged cough had higher odds of having external abdominal wall hernia when compared with the counterpart and statistically significant on multivariate analysis ( $P = 0.012$ , AOR = 3.993, CI = 1.358–11.741) which is similar to the study done at Pakistan with  $P < 0.05$  and in Ethiopia reported chronic cough had 5.18 times higher odds of having external hernia compared with their counterparts (AOR 5.18, 95% CI 2.17–12.3)<sup>[10,13]</sup>. This is due to the repetitive development of increased intra-abdominal pressure during coughing, which results in the sudden protrusion of abdominal content through the naturally weak abdominal wall area. Patients with a history of abdominal surgery were 5.8 times more likely to have an external abdominal hernia ( $P = 0.003$ , AOR = 5.764, CI = 1.837–18.083), which is commonly an incisional hernia. This result of our study was consistent with the study done in India, which reported that previous abdominal surgery acts as a significant risk factor for hernias ( $P$  value  $< 0.05$ ), and Northern Saudi Arabia<sup>[11,14]</sup>. This results from failed fascial healing after surgery, which may be due to technical or post-operative complications. Patients with a history of heavy object lifting were 5.5 times more likely to have an external abdominal hernia ( $P = 0.000$ , AOR = 5.476, CI = 2.505–11.969), which is strongly supported by different studies done in northern Saudi Arabia ( $P$  value  $< 0.05$ ) and northwest Ethiopia (AOR 7.39, 95% CI 3.36–16.2)<sup>[10]</sup>. This could be attributed to the sudden increase in intra-abdominal pressure

**Table 4**

**Bivariate and Multivariate analyses were conducted to identify factors associated with the prevalence of external abdominal hernias at Hiwotfana Comprehensive Specialized Hospital and Jugal Regional Hospital in 2022 ( $n = 403$ )**

Variables	Variable category	External hernia		Crude OR (95% CI)	Adjusted OR (95% CI)	P
		Yes, n (%)	No, n (%)			
Constipation	Yes	9 (29)	22 (71)	4.347 (1.847–10.231) <sup>1</sup>	2.912 (1.119–7.579) <sup>1</sup>	0.028
	No	32 (8.6)	340 (91.4)			
Prolonged cough	Yes	7 (25)	21 (75)	3.343 (1.325–8.432) <sup>1</sup>	3.993 (1.358–11.741) <sup>1</sup>	0.012
	No	34 (9.1)	341 (90.9)			
Abdominal surgery	Yes	6 (28.6)	15 (71.4)	3.966 (1.446–10.872) <sup>1</sup>	5.764 (1.837–18.083) <sup>1</sup>	0.003
	No	35 (9.2)	347 (90.8)			
Abdominal trauma	Yes	4 (28.6)	10 (71.4)	3.805 (1.137–12.736) <sup>1</sup>	4.623 (0.998–21.423) <sup>1</sup>	0.050
	No	37 (9.5)	352 (90.5)			
Heavy lifting	Yes	17 (26.2)	48 (73.8)	4.634 (2.320–9.253) <sup>1</sup>	5.476 (2.505–11.969) <sup>1</sup>	0.000
	No	24 (7.1)	314 (92.9)			
Age	19–45	19 (7.4)	237 (92.6)	12.195 (1.145–4.209)	1	0.125
	> 45	22 (15)	125 (85)			

OR, odds ratio.

while lifting heavy objects, causing breakage in the fibres of the transversals fascia, which leads to muscle weakness and results in the protrusion of abdominal organs through the defect, an external abdominal wall hernia.

Based on our findings, we recommend that the Ethiopian Ministry Of Health and Harar Regional Health Bureau to facilitate conducting community-based studies to reveal the burden of the disease. A cohort study should be done to fully reflect the cause-and-effect relationship. There is also a need for further studies regarding the burden and risk factors of external hernias in different areas of the country. Patients who will undergo abdominal surgery should get proper preoperative and postoperative care to decrease incisional hernias. Patients who have constipation and a cough should get appropriate treatment in time.

#### Limitations of the study

Because of the cross-sectional nature of the study design, this study could not establish a cause-and-effect relationship. In addition, this study was institution-based, so the findings may not fully reflect the entire population. We used only history and physical examination as a means of diagnosis for abdominal hernia; imaging is not available for all patients to assist in the diagnosis. There is also potential inclusion bias due to the hospital setting, as patients without hernias may be those with underlying conditions seeking medical attention. This can lead to a non-representative sample.

#### Strength of the study

Primary data were used.

#### Conclusion

The incidence of external abdominal wall hernias is similar in our area, as reported in the existing literature from different areas. Epigastric hernia is the most prevalent type of external abdominal hernia and is commonly encountered in female patients, while inguinal hernia is common in male patients. Having constipation, prolonged cough, history of abdominal surgery and heavy lifting had significant association with external abdominal wall hernia.

#### Ethical approval

Ethical approval has been given from Institutional Health Research Ethics Review Committee of Haramaya University, College of Health and Medical Science, Harar with Ref.No. IHRERC/194/2022.

#### Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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#### Author contribution

F.M.B.: principal investigator, conceived and designed the study, acquired data, analyzed and interpreted the findings, and drafted the manuscript. R.S. helped with writing and editing the work platform. M.A., A.A., and B.B. revised and provided critical intellectual feedback. All the authors have read and approved the manuscript for submission.

#### Conflicts of interest disclosure

The authors declare that there is no conflict of interest related to this work.

#### Research registration unique identifying number (UIN)

Name: ClinicalTrials.gov Hyperlink to the registration: <https://clinicaltrials.gov/ct2/show/NCT05972707> Identifiers: NCT05972707 Unique Protocol ID: Haramaya university.

## Guarantor

Fufa Miresa.

## Data availability statement

Any datasets generated during and/or analyzed during the current study are available upon reasonable request.

## Provenance and peer review

Not invited for peer review.

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