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# Magnitude Of Re-Laparotomy and Associated Factors Among Adult Patients Undergoing Laparotomy in Tibebe Gion Specialized Hospital, Northwestethiopia

Bekele, Tewlegn

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**BAHIR DAR UNIVERSITY**

**COLLEGE OF MEDICINE AND HEALTH SCIENCE**

**SCHOOL OF MEDICINE**

**DEPARTMENT OF Surgery**

**Magnitude Of Re-Laparotomy and Associated Factors**

**Among Adult Patients Undergoing Laparotomy in Tibebe Gion Specialized  
Hospital, Northwestethiopia**

**By: Bekele Tewlegn Animut (Md, Year Iv Surgery RESIDENT)**

**A THESIS REPORT TO BE SUBMITTED TO THE DEPARTMENT OF  
SURGERY, SCHOOL OF MEDICINE AND HEALTH SCIENCES, BAHIR  
DAR UNIVERSITY FOR THE PARTIAL FULFILLMENT OF THE  
REQUIREMENT FOR GENERAL SURGERY SPECIALTY PROGRAM**

**SEPTEMBER, 2023**

**BAHIR DAR, ETHIOPIA**

**BAHIR DAR UNIVERSITY**  
**COLLEGE OF MEDICINE AND HEALTH SCIENCE**  
**SCHOOL OF MEDICINE**  
**DEPARTMENT OF SURGERY**

**MAGNITUDE OF RE-LAPARATOMY AND ASSOCIATED FACTORS  
AMONG ADULT PATIENTS UNDERGOING LAPAROTOMY IN TIBEBE  
GION SPECIALIZED HOSPITAL, NORTHWEST ETHIOPIA**

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## Approval of Thesis for Defence

I certify that I have supervised, read, and evaluated this thesis titled magnitude and associated factors of re laparotomy among adult patients undergoing laparotomy at Tibebe Gion specialized hospital in Bahir Dar city, Amhara northwest Ethiopia.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

AL	Anastomotic Leak
ASA	American Society Of Anaesthesiology
BDU	Bahir Dar University
BPM	Beats per Minute
CAD	Coronary Artery Disease
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
DM	Dabetes Mellitus
G.C	Gregorian Calendar
GOO	Gastric Outlet Obstruction
HIV	Human Immune Virus
HTN	Hypertension
IAI	Intra-Abdominal Infection
LBO	Large Bowel Obstruction
PUD	Peptic Ulcer Disease
PI	Principal Investigator
RL	Re-laparotomy
SPSS	Statistical Package Of Social Sciences
SBO	Small Bowel Obstruction
TGSH	TibebeGhion Specialized Hospital



## Contents

ACKNOWLEDGEMENT .....	iii
LIST OF ACRONYMS AND ABBREVIATIONS.....	iii
List of Tables .....	iv
LIST OF FIGURES .....	V
Abstract .....	VI
INTRODUCTION .....	1
1.1 BACKGROUND .....	1
1.2 STATEMENT OF THE PROBLEM .....	2
1.3. SIGNIFICANCE OF THE STUDY.....	4
2. LITERATURE REVIEW .....	5
2.1. Magnitude of Re-Laparotomy.....	5
2.2. Socio Demographic Factors .....	6
2.3. Surgical Factors Associated with Re-laparotomy.....	8
2.4. Co Morbidities and Behavioral Factors .....	10
2.5 Conceptual Framework.....	11
3.OBJECTIVES OF THE STUDY.....	13
3.1 GENERAL OBJECTIVE.....	13
3.1 SPECIFIC OBJECTIVES .....	13
4. METHODS AND MATERIALS.....	14
4.1. Study area.....	14
4.2. Study design and period.....	15
4.3. Population .....	15
4.3.1. Source population .....	15
4.3.2. Study Population .....	15
4.3. Eligibility Criteria .....	15
4.3.1. Inclusion Criteria.....	15
4.3.2. Exclusion Criteria .....	15
4.4. Sample Size determination and Sampling Technique.....	15

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4.4.1 Sample Size Determination.....	15
4.4.2. Sampling Technique .....	17
4.5. Variables .....	17
4.5.1. Dependent Variable.....	17
4.5.2. Independent Variables.....	17
4.6. Operational Definition .....	17
4.7. Data Collection Procedure and Instrument .....	18
4.8. Data Quality Control.....	18
4.9. Data Processing and Analysis .....	19
4.10. Ethical Consideration.....	19
5. Result .....	20
5.1 Socio-Demographic Characteristics.....	<b>Error! Bookmark not defined.</b>
5.2. Surgical Related Factors .....	20
5.3 Comorbidity Related Factors .....	26
5.4 Factors Associated with Re-Laparotomy .....	26
6. Discussion .....	28
7. Limitation.....	33
8. Conclusion .....	35
9. Recommendation .....	35
10. REFFERENCES .....	37
11. Annex.....	39
Annex 1: general information sheet .....	39

## List of Tables

Content	Page
Table 1: Sample size determination based on objective two .....	15
Table 2: Socio-demographic characteristics in TCSH, 2023 .....	18
Table 3: Indications of laparotomy in TGSH, 2023.....	19
Table 4: Site of pathology in TGSH, 2023.....	19
Table 5: Classification of operative wounds based on degree of microbial contamination.....	20
Table 6: Surgical related factors in TGSH, 2023 .....	24
Table 7: Associated factors of re laparotomy in TGSH, 2023 .....	24

## LIST OF FIGURES

Content	page
Figure 1: Conceptual framework adopted from different literatures .....	11
Figure 2: Indications of Re laparotomy in TGSH, 2023 .....	22
Figure 3: Associated comorbidity for re laparotomy in TGSH, 2023.....	26

## **Abstract**

**Background.** Re-laparotomy refers to operations performed within 60 days of an initial laparotomy. Magnitude of re-laparotomy is highly variable worldwide in various reported studies and highest was seen in gastrointestinal surgeries, while lowest in vascular surgeries. Re laparotomy is one of the causes of morbidity and mortality among patients with abdominal surgery. The costs, length of hospital stay and the psychological impact on patients and their families are high. Either globally or nationally the studies conducted about this problem are minimal. Evidences in Ethiopia shows that magnitude of re-laparotomy and its morbidity and mortality is increasing. In TibebeGion Specialized hospital, study was not conducted on this problem even if increasing number of re-laparotomy cases. Unless efforts are made to prevent it in advance by identifying its potential risk factors, it will continue as major public health problem of the country.

**Objectives:** The aim of the study was to assess the magnitude and factors associated with re-laparotomy among adult laparotomy patients in TibebeGion specialized hospital.

**Methods:** The study was conducted using a cross-sectional and monocentric study over a one-year period and included 389 adult patients who undergo laparotomy in TibebeGhion Specialized Hospital, Department of Surgery from September 2022 to August 2023 G.C. Patients with laparotomy cases were reviewed and analysed. Binary and multi variable logistic regression analysis was used to analyse the association between variables. The data was entered and analysed using SPSS software version 25 and the results were described by using descriptive statistics like summary value, tables of frequency, graphs and the associated factors for re-laparotomy were identified by using multiple binary logistic regression analysis with P value < 0.05 were considered statistically significant.

**Result:** The magnitude of re laparotomy was 9 %, with 95 % ( CI= 6.2-11.8) .In this study ,patients age above 60 years, (AOR = 16.36, 95% CI = [3.5-35]), P value = 0.002), duration of illness more than 120 hours , (AOR = 5.13, 95% CI= [1.35-22]) , pre-operative pulse rate more than 120 beats per minute, (AOR = 9.35, 95% CI= [3.06-19.43], dirty wound at index laparotomy, (AOR = 4.81, 95% CI = [1.23-10.05])were associated with re-laparotomy.

**Conclusion and recommendation;** In TGSB, the magnitude of relaparotomy was high. Creating awareness on the community about the importance of early visit of health facilities when they feel illness will decrease the risk of relaparotomy.

**Key words:** Re-laparotomy, site of pathology, peritonitis, wound dehiscence, Bahir Dar

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## **INTRODUCTION**

### **1.1 BACKGROUND**

Laparotomy is a surgical incision into the abdominal cavity for diagnosis or in preparation for major surgery (1). Re-laparotomy (RL) refers to operations performed within 60 days in association with the initial surgery (3). Any surgery occurring outside this adaptation period is termed as repeated surgery (2). These reoperations can be classified as early or delayed; radical or palliative; urgent or elective (4). Urgent Re-laparotomy is defined as emergency re-exploration done only when clinical condition of the patient deteriorated or failed to improve (3). Magnitude of re-laparotomy ranges from 0.5-24% in various reported studies and highest was seen in gastrointestinal surgeries, while lowest in vascular surgeries. Mortality after relaparotomy ranges from 24 to 71 % ( 5). Factors affecting outcome of RL includes patient's socio-demographic characteristics, indication for the first operation, the urgency of the first operation, the duration between first operation and RL(1). Poor selection of patients for re-laparotomy can be deleterious and both the decision to re-operate and the performance of this re-laparotomy should be undertaken by experienced surgical staff (4). Knowledge of various predisposing factors and measures to tackle them can help us to reduce the magnitude of re-laparotomy and early recognition and treatment of postoperative complications are of vital importance to improve their successful outcome (4).



## 1.2 STATEMENT OF THE PROBLEM

Nowadays, 40 to 66 % of elective procedures in abdominal surgery are re-operations. Re-operations show increased operative time and risk for intraoperative and postoperative complications [10].

Five billion people worldwide lack access to safe and affordable surgical and anaesthesia care and it is estimated that conditions that are treated by surgery account for 18% of the global burden of disease and 1.5 million deaths could be averted each year with access to essential surgical procedures such as trauma care, obstetric care, and care of common abdominal emergencies [19].

Study in Spain showed that magnitude of re-laparotomy was (3.33%) and about (17.5%) patients received more than one re-laparotomy (4).

A study conducted in Iraq, by evaluating file records of patients undergoing RL following abdominal surgery (2012–2016) , magnitude of RLs was 1.62 %( 9).

There were studies done in India in different part of the country at 2016 – 2017 and 2015, the magnitude of revision laparotomy were 7%(10) and(2.5 %) [23] respectively.

A retrospective study were conducted in South Africa and Tanzania, magnitude of relaparotomy were 24% (8) and7.6%(2) respectively.

In Ethiopia, Studies were done in St. Paul’s Hospital Millennium Medical College, Debre Marko’s hospital and Debre Tabor hospital, magnitude of re-laparotomy were 6.9%(1), 12.3%(7) and 9.1 %13) respectively.

Study conducted in Spain shows that overall mortality was 22%.and mortality of the patients with a single re-laparotomy was 20% vs. 44% if they were re-operated upon twice(4).

Study in turkey showed that .mortality rate of re-laparotomy due to secondary peritonitis and intra-abdominal haemorrhage were 59.3% and 28.5% respectively (5).

Current evidence suggests that re-laparotomy poses a twofold risk of incisional hernia, wound dehiscence, surgical site infection, higher costs and reduced quality of life (10).

On patients who undergone re-laparotomy, the risk of morbidity and mortality is high. The costs, length of hospital stay and the psychological impact on the patients and their families are high and intra-abdominal infections are common surgical emergencies that have been reported as major contributors to non-trauma deaths in the emergency departments worldwide [8].

The magnitude of re-laparotomy differs according to hospital setup, patient characteristics, initial surgery, post-operative care given to patient following first surgery and presence of postoperative sepsis [13].

Study shows that complications from abdominal surgery that may necessitate a second or more surgeries were biliary peritonitis, fecal fistula, anastomotic leak, burst abdomen, obstruction, wound dehiscence, evisceration, haemorrhage, vascular complications, post operation peritonitis, perforation, suture line insufficiency and [14].

Different literatures shows that numbers of preventive measures were tried so far to decrease the magnitude of re-laparotomy including maintaining perioperative normothermia, use of cautery machines for adequate haemostat, perioperative stabilization of co-morbidities, involvement of qualified and experienced surgeons, use of newer antibiotics and suturing materials, creating awareness on the community about the importance of early visit of health facilities and proper follow up(1,3,9, 18).

Although patients and health workers need positive outcomes from first surgeries, re-laparotomy occurs in different parts of the world and either globally or nationally the studies conducted about this problem are minimal. There is a lack of evidence on the magnitude of the problem and associated factors in Ethiopia and in Africa. In this region, even if two studies were conducted in Debre Tabor and Debre Markos Referral hospitals, significant variables like, duration of surgery and preoperative serum albumin were missed(1,7). To the best of our knowledge, there is no published data at TibebeGion Specialized Hospital on this problem.

This study was determine the magnitude of the problem and its associated factor to improve the care, to establish preventive strategies, and provide a baseline data for further study.



### **1.3. SIGNIFICANCE OF THE STUDY**

Although re-laparotomy is expected in abdominal surgeries, lack of research on the problem puts the patient at high risk for morbidity and mortality.

Understanding the magnitude of re-laparotomy and its associated factors is important to identify risk factors associated with the aetiology or progression of the disease. This understanding may lead to better treatments and preventative measures that could ameliorate disease severity, produce better health outcomes, and reduce expenditures.

This study gave relevant information about the magnitude and associated factors of re-laparotomy and measures to tackle them. Subsequently it also help to reduce the magnitude of re laparotomy not only but also it may be used by researchers to do further study and as well for policy makers to develop strategies to tackle the problem.

On the other hand, findings could benefit health care systems to take preventive measures on magnitude of re-laparotomy and its associated factors in surgical patients and in a long term it may represent a channel for ministry of health to establish standards for treating and preventing associated factors with the ambition of putting Ethiopia on track to build a foundation of national guidelines to assure better outcome among re-laparotomy patients.

There was no research done on magnitude of re-laparotomy and associated factors in TGSH and this study was a baseline, showed the level of surgical care in the hospital; and formulate preventive strategies to decrease the problem in the hospital.

## **2. LITERATURE REVIEW**

### **2.1. Magnitude of Re-Laparotomy**

A retrospective study was conducted in Iraq, by evaluating file records of patients undergoing RL following abdominal surgery (2012–2016) and the magnitude of RLs was 1.62%(9).

There was a retrospective study done from 2016 - 2017 in India, the magnitude of revision laparotomy was 7% and second laparotomy was 1%(10). Another study in the country in 2015, about Patterns and Outcomes of Urgent Redo Laparotomy by Indian Journal of Surgery, redo laparotomy was performed in (2.5 %) [23]. In the country another study in Coimbatore, to assess the risk factors of re-laparotomy among patients undergoing laparotomy and the proportion of re-laparotomy was 7% and second re-laparotomy was 1%(11).

A retrospective study was conducted in South Africa on repeat laparotomy in the developing world tertiary level surgical service with magnitude of re-laparotomy was 24% with proportion of planned re-laparotomy was (41%) and negative re-laparotomy was 9%(8).

Study done at MNH tertiary hospital in Tanzania for one year from 2017-2018, magnitude of relaparotomy was 7.6% and second redo laparotomy was 2.1 % ( 2).

In Ethiopia, Addis Ababa, Study done in St. Paul's Hospital Millennium Medical College from 2016 to 2017, magnitude of re-laparotomy was 6.9%. Most (95.3%) had on-demand re-laparotomy (1).

A retrospective study conducted in Debre-Marko's hospital in 2018 Amhara Ethiopia, proportion of re-laparotomy was 12.3%(2).

Institutional based cross-sectional study has been conducted in Debre Tabor hospital from 2019 2021, the proportion of re laparotomy was 9.1 % ( 7).

## **2.2 Factors Associated with Re laparotomy**

### **2.2.1 Socio Demographic Factors**

A study conducted on Repeat laparotomy in a developing world, the average age was 38 years since trauma and complicated appendicitis were the most common indications in these age groups for the index surgery with subsequent need of re-laparotomy(8).

In study conducted in Coimbatore Medical College India, out of 30 patients underwent re laparotomy for anastomosis leak and wound dehiscence, the average age was 52.2 years since the most common indications for the index surgery were LBO secondary to sigmoid Volvulus and colonic malignancy with subsequent need of re-laparotomy as these diseases are more common in this age groups(11).

A study conducted in South Africa, a total of 182 repeat laparotomies were performed and average age was 39 years as appendicitis and penetrating abdominal injury (stab and gunshot) were most common indications for index surgery with subsequent need of re-laparotomy for intra-abdominal abscess collection were on patients who underwent re-laparotomy(15).

The Study done at Muhimbili National Hospital in Tanzania for one year 2017-2018, shows that a total of 101 patients undergo re-laparotomy for anastomosis leak and peritoneal collection with mean age was 37 years and bowel resection and anastomosis and appendectomy were the most common procedures performed at index surgery for viscous perforation and appendicitis, which are more common in these age groups(2).

In Ethiopia study conducted at St. Paul's millennium medical colleague, 149 re-laparotomy were done for intrabdominal abscess collection and wound dehiscence with the mean and median age was 37.8 and 35 years respectively for initial laparotomy was done for complicated appendicitis and bowel obstruction which are more common in young patients(1).

Another study in the country, amhara region at Debre Marko's hospital, 48 re-laparotomies were done for intrabdominal collection secondary to anastomotic leak in age groups of (46-60) as small bowel Volvulus and sigmoid Volvulus are more common in this age groups and most common indications for index surgery(13).

A Similar study in Debre tabor hospital, 56 re-laparotomies were done for intra-abdominal abscess collection and anastomotic leak with the median age was 34 year as appendicitis and SBO were the most common indications for index surgery and these disease are more common in young adults(7).

A study conducted on repeat laparotomy in a developing world showed that a male predominance of (70%) and 30% in women since majority of patients who underwent relaparotomy were those who had trauma and co-morbidities in index surgery as male being more venerable to risk factors for development of chronic illness and trauma(8).

Study conducted in India suggested that the male to female ratio was 25:5 since male is more likely to develop sigmoid Volvulus and colonic cancer which were the most common indications for index surgery and re-laparotomy(11).

A study conducted in South Africa, around (75%) were male and (25%) were female patients since females are less likely to develop appendicitis and expose to penetrating abdominal trauma as these were the most common indications for index surgery and re-laparotomy (15).

Study in Tanzania shows that proportion of re-laparotomy showed equal sex distribution (2).

In Ethiopia study conducted at St. Paul's millennium medical colleague showed equal number of males (, 50.4%) and females (49.6%) had RL (1).

Study in Debre Marko's hospital showed that RL was more in male (64.6% than female (35.4%) due male are more affected by bowel obstruction than females as bowel obstruction was the most common indications for index surgery (7).

Study in Debre tabor showed that, among total laparotomies (71.3%) were male and (28.7%) were female because of SBO and appendicitis were more common in males than females(13).

Study conducted in Debre Marko's hospital showed that from a total of patients undergoing re laparotomies, (67%) were from rural and (33%) were from urban areas (7). A similar study in Debre tabor showed that, on patient's residency, (25%) were from urban and (75%) were from



rural areas as in rural areas people had low awareness, lack of infrastructures and the like which leads delayed presentation that subsequently prone for re laparotomy(7,13).

### **2.2.2 Surgical Factors Associated with Re-laparotomy**

A retrospective study conducted in United States in 2011 showed that duration of illness more than 120hrs and pre-operative pulse rate more than 120 beats per minute had significant association for re-laparotomy (21).

Retrospective study in Mexico showed that most common site of initial surgery were appendix, small intestine, colon , bile duct, stomach and pancreas with the most common mechanisms of injury were viscous perforation , inflammation, obstruction , and ischemia and majority of patients were had generalized peritonitis(16).

A retrospective study conducted in Iraq, the most common indication for RLs were abdominal sepsis, intestinal obstruction and missed injuries with mean duration between first and second operation was 11.55 days and between second and third was 30.5 days with majority were undergoing within the 1st week of index surgery(9).

Retrospective studies in turkey showed that the indications for RL were secondary peritonitis , intra-abdominal haemorrhage and wound dehiscence and site of index surgery were includes biliary tract , colon-rectal and small bowel with majority had one RL and urgent in nature. The median day's interval to first redo-laparotomy was 5 days and the presence of malignancy, mesenteric ischemia, organ failure and anastomosis leak had significant association (10).

There was a retrospective study done in India, indication for first laparotomy were small intestinal , gastric and large bowel perforation and indications for re-laparotomy were anastomotic leak, obstruction, haemorrhage and intra-abdominal sepsis with majority were operated with in 6th-10th days of first surgery(5). Another Study conducted in the country showed that re-laparotomy were most common in dirty, contaminated, and clean-contaminated in descending order at initial laparotomy (17).

Retrospective study done at Nepal, lower gastro- intestinal tract was the most common site of relaparotomy and resection and anastomosis and closure of perforation were the most common initial operation performed with majority were operated in the emergency. Burst abdomen, intra-abdominal collection and fecal peritonitis were common indication for RL and the average duration between 1st and 2nd laparotomy was 9.4 days and between the 2nd and the 3rd was 12.2 days (18).

Study in Nigeria over a 10-year period, patients with long duration of illness, delayed presentation more than 120 hrs and pre-operative pulse rate more than 120 beats per minute had significant association for re operation and anastomotic leak, intra-peritoneal abscess, intestinal re-perforation, bleeding and intestinal obstruction were cause of RL and majority were operated in emergency base and had single re-laparotomy (19).

A study done in Katanga, Democratic Republic Congo, laparotomy-related infections were the primary indication for reoperation and most of them were operated in emergency bases and by non-qualified surgeon (20).

Study done in Tanzania, the most common primary procedure was bowel resection and anastomosis and anastomosis leak , intra-abdominal abscess , bowel fistula and wound dehiscence were causes of RL(2).

A study in Ethiopia at Paul's Hospital Millennium Medical College, the most common indications for re-laparotomy were intra-abdominal abscess, wound dehiscence and anastomotic leak and re-laparotomy for anastomotic leak had significant associations with mortality(1). Another study in the country, Debre Marko's hospital, lower gastrointestinal system surgeries were leading procedure and duration of illness more than 60 hours and emergency surgeries were significantly associated with re-laparotomy(7).

A similar study in the country conducted in Debretabor hospital showed that most common indications of index laparotomy were large bowel obstruction , appendicitis , trauma, perforated peptic ulcer disease and small bowel obstruction with majority were operated in emergency ,had no peritonitis and indications for re laparotomy were intra-abdominal abscess collection , anastomotic leak , wound dehiscence and bowel evisceration(13).

## **2.4. Co Morbidities and Behavioral Factors**

A retrospective study conducted in United States in 2011 and the presences of valvular heart disease, ischemic heart disease and coronary vascular disease, DM, HTN and patients with 2 or more of these predictors had a 55% risk of re-laparotomy (21).

Study done in Italy 2019, for analysis of early re-laparotomy in gastro intestinal surgery, patients who had ischemic heart disease with stent and dilated cardiomyopathy at the time of the first surgery increased the risk of re-laparotomy as these group of patients had poor anaesthesia tolerance and high risk of intra and post-operative complications(24).

In India, Coimbatore, a retrospective study conducted to assess the risk factors of re-laparotomy among patients undergoing laparotomy, the presence of diabetic mellitus increases risk of intra-abdominal and surgical site infection that increases the patient to undergo the re-laparotomy (10).

Study in turkey Institute of Medical Sciences showed that the significant factors were systemic hypertension; COPD, CAD and high ASA score (9).

Study done in Italy showed that patients having decompensated diabetes had high risk of relaparotomy since it predispose to immune compromised, COPD, cerebral vasculopathies were significantly associated morbidity and mortality(24).

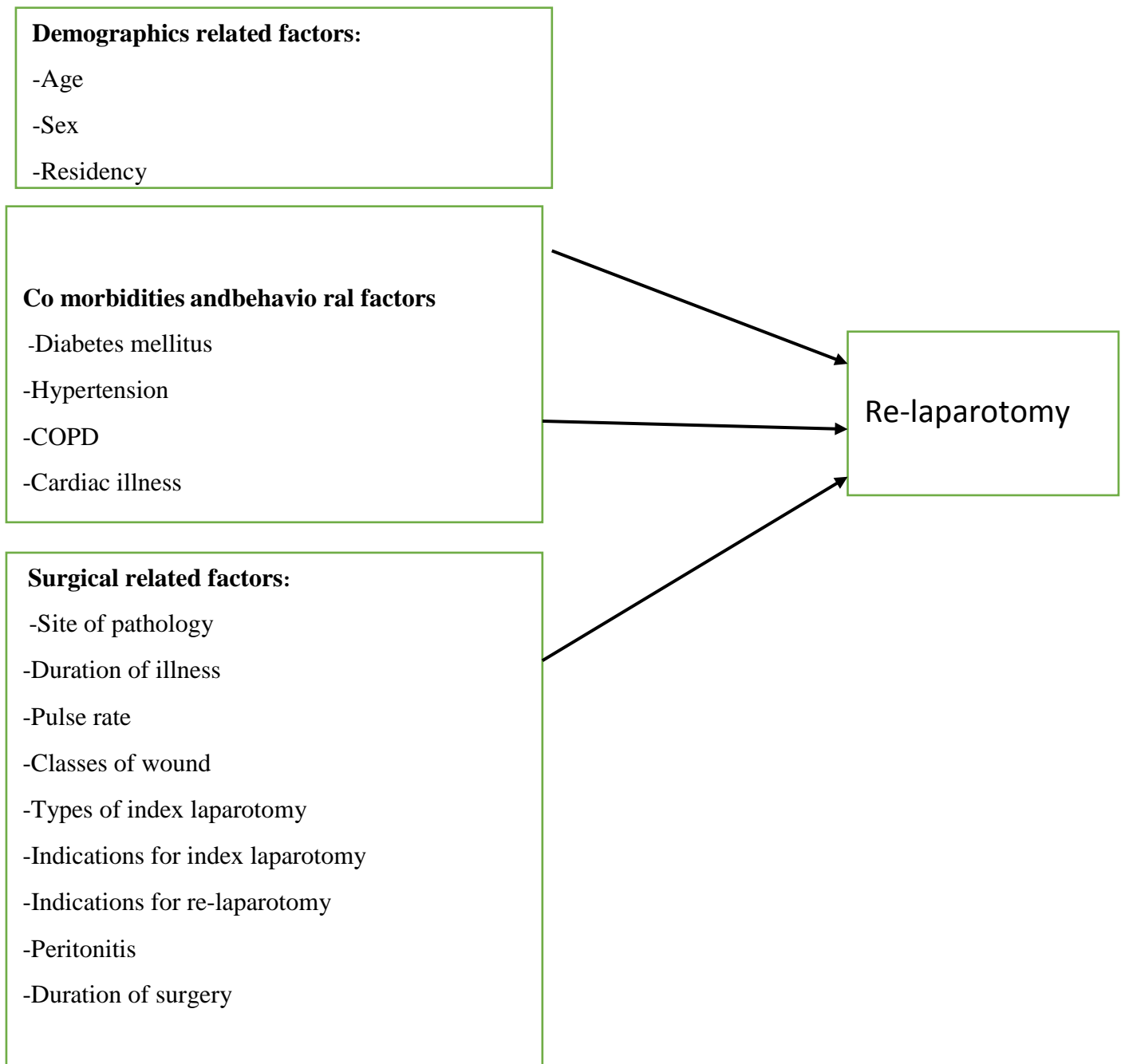
In Katanga, Democratic Republic Congo, a cross-sectional study showed that re-laparotomy related co morbidities were arterial hypertension, cancer and poor physical status(4).

In Ethiopia Amhara region, Debre Markos referral hospital, a study on the prevalence and associated factors of re-laparotomy; diabetes mellitus was associated with re-laparotomy as a co morbidity (7).

Another study done in Debretabor hospital. Amhara Ethiopia, the total presence of diabetes mellitus, HTN, cardiac disease, HIV and bronchial asthma, were significantly associated(13).



## 2.5 Conceptual Framework



*Figure 1: Shows Conceptual framework adopted from different literatures*

### **3. OBJECTIVES OF THE STUDY**

#### **3.1 GENERAL OBJECTIVE**

- To assess the magnitude and factors associated with re-laparotomy among adult laparotomy patients in TibebeGion Specialized Hospital, North-West Ethiopia, 2023.

#### **3.1 SPECIFIC OBJECTIVES**

- To determine the magnitude of re-laparotomy among adult laparotomy patients in TibebeGion Specialized Hospital, North-west Ethiopia, 2023.
- To identify factors associated with re-laparotomy among adult laparotomy patients in TibebeGionSpecialized Hospital, North-west Ethiopia, 2023.

## 4. METHODS AND MATERIALS

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### 4.1. Study area

The study was conducted from September 1 - 30, 2023 in Bahir Dar city at TibebeGhion specialized hospital. Bahir Dar is the capital city of Amhara National Regional State, located 565 km Northwest of Addis Ababa with estimated population of 168,899 as per 2021 world population review. TibebeGion Specialized Hospital is one of the three governmental hospitals in the town with estimated catchment population of seven million. The new and main campus (TibebeGhion Campus) is located on the outskirts of the vibrant Bahir Dar city (one of the ten most beautiful cities in Africa and one of the twelve UNESCO learning cities Award of 2015) about 10 Km south from the city centre and about 7Km from the new bus station (“AddisuMeneharia”) on the way to Adet District and about 23 Km from the Blue Nile falls (locally called “Tis Abay). The clinical teaching disciplines of the College of Medicine and Health Sciences are currently integrated with TibebeGhion Specialized Hospital of Bahir Dar University. TibebeGhion Specialized Hospital is one of specialized hospitals in Amhara regional state, which is a teaching hospital under College of Medicine and Health Sciences of Bahir Dar University located in Bahir Dar, Ethiopia. The hospital started its activity in November, 2018 G.C and is working in different departments of which surgery is the one. There are 8 wards and 8 OPDs in the department under this surgical ward has around 113 beds. Regarding to the human power, there are 9 subspecialists, 22 General surgeons, 45 Residents and 40 nurses. TibebeGion Specialized Hospital is selected because it is the largest tertiary referral hospital and it is possible to obtain a sufficient number of RL patients coming from different parts of Amhara region. It is also a teaching hospital of Bahir- Dar University with adequate beds, and serves as a training center for undergraduate and postgraduate medical student and other health professionals who shoulder the health problems of the community and the country at large.

## **4.2. Study design and period**

Institutional based cross-sectional study was conducted from September 1- 30/2023 in TGSH.

## **4.3. Population**

### *4.3.1. Source population*

-All adult patients treated with laparotomy surgery at TGSH

### *4.3.2. Study Population*

-Adult patients treated with laparotomy surgery at TGSH within the last one Year from September 1/2022 to August 30/2023

## **4.3. Eligibility Criteria**

### *4.3.1. Inclusion Criteria*

- Adult patients who undergone both elective and emergency laparotomy surgery in TGSH.

### *4.3.2. Exclusion Criteria*

-Adultpatients who referred from other institution after index laparotomy performed.

- Adult patients who referred to other institutions after initial laparotomy done in TGSH.

-Patients who undergone laparotomy in TGSH with obstetrics and gynaecologic indications

## **4.4. Sample Size determination and Sampling Technique**

### *4.4.1 Sample Size Determination*

Sample size for the study was determined for first objective by using Single population proportion formula, by considering the following assumptions: proportion of re-laparotomy (p) 9.1%% taken from a study conducted in Debretabor general hospital allowing an error of 3% of



in detecting the estimated magnitude and risk factors of re-laparotomy by chance alone (d) with 95% confidence interval, the sample size is calculated as,

$$n = (Z\alpha/2)^2 p(1 - p)/d^2$$

$$n = [1.96]^2 [(0.091) [1 - 0.091]/[0.03]^2$$

$$n=353 +36 =389$$

Where; n=the number of samples required at confidence interval (97%) (1.96)

P=proportion (9.1%)

d= margin of error (3%)

The sample size was also determined for the second objective using Epi info 7 by considering the assumptions which are presented by table 1.

Table 1: sample size determination based on objective two

Variables	Confidence interval	Power	Design effect	Assumptions Ratio of exposed to unexposed	Percent of outcome in unexposed group	Odds ratio	Sample size	Reference
Age	95	80%	1	1:1	4.07%	4.96	196	(14)
Duration of illness	95	80%	1	1:1	4.7%	31.58	30	(9)
Co morbidity	95	80%	1	1:1	9.5%	3.45	80	(21)

#### 4.4.2. Sampling Technique

Systematic random sampling technique was used and the sample was selected from the previous one-year laparotomy in TGSB, which was taken from the hospital operation theatre log book by dividing the number of total laparotomy cases done in study period to sample size with  $K=903/389= 3$ , so we take every three cases. When the selected study unit or card becomes non eligible or incomplete for the study, it was replaced by another card.

### 4.5. Variables

#### 4.5.1. Dependent Variable

.Re laparotomy

#### 4.5.2. Independent Variables

**.Demographics related factors:** Age, sex, residency.

**. Surgical related factors:** Site of pathology, Classes of wound, duration of surgery, duration of illness, pulse rate, peritonitis, type of index surgery, indication for index surgery, indication for re-laparotomy.

**. Co morbidities:** Diabetes mellitus, Hypertension, COPD, cardiac illness.

### 4.6. Operational Definition

**.Index surgery:** is the first or initial abdominal surgery.

**.Duration of illness:** the time from onset of the disease to hospital visit.

**.Site of pathology:** site of abdominal organs that contains the pathology for which initial laparotomy and re-laparotomy was done like stomach, small bowel, colon, gall bladder.

**.Type of index surgery;** either emergency or elective.

**.Classes of wound:**

**.Cleans;** mean no infection present or no hollow viscous that contains microbes are entered

**.Clean/contaminated;** means hollow viscous opened or entered without significant spillage of contents.

**.Contaminated;** means early accidental wounds with extensive bacterial introduction. Hollow viscous opened with significant spillage.

**.Dirty;** means delayed traumatic wounds or with necrotic tissue, overt infection and perforated viscous with high degree of contamination.

**.Co –morbidity:** chronic medical diseases diagnosed by physician

#### **4.7. Data Collection Procedure and Instrument**

The data collection was conducted by using a standard structured checklist which was prepared in English. The checklist was developed by reviewing different literatures. Data was collected by utilizing the prepared checklist format and collect from patients' card, from patients who undergone laparotomy surgery from September 1/2022 to August 30/2023. Patient's medical record numbers was identified from operation theatre log book by PI.

The instruments that were used are; structured checklist, pen, pencil, patient card, and patient's registration log book.

#### **4.8. Data Quality Control**

One-day training for the data collectors (GP) prior to data collection was given. The method of training includes lectures, explanation supplemented with practical role play exercises that focus on purposes of the survey, meaning of each question and how to collect the data, confidentiality of information, and role & responsibility of data collectors. During the data collection period the collected data was reviewed and checked for completeness and signed by the data collector. Principal Investigator had supervise the data collectors and samples of checklist was re-checked at random bases.

#### **4.9. Data Processing and Analysis**

All the checklists was coded, cleaned and entered into to SPSS version 25 software for analysis. Diagrams like pie chart and bar chart was used to display the visual impression of data.

Binary logistic regression analysis was used to identify potential confounders that are associated with the dependent variables and those variables with p-value of  $< 0.25$  on binary logistic regression analysis were entered into multiple logistic regression. The degree of association between independent and dependent variables was assessed by using odds ratio with 95% confidence interval and variables with p value  $< 0.05$  was taken as statically significant. Hosmer-Lemeshow goodness-of-fit statistic was used to check the model fitness for multiple logistic regressions.

#### **4.10. Ethical Consideration**

Ethical approval was obtained from the institutional review board of college of medicine and health sciences, Bahir Dar University. The assigned IRB number is 005. Accordingly, Permission letter to access charts of patients for retrieving data and to conduct the study was obtained from TGS hospital office of medical director and head of department of surgery. Moreover, confidentiality was maintained when handling each case; all the information retrieved was kept in the way that did not affect personal privacy and confidentiality.

## 5. Results

### 5.1 Socio-Demographic Characteristics

In this study, 389 laparotomies were considered and the median age of participants was 52 years with interquartile range from 38 to 67 years and most laparotomies were done in the age group of above 60 years 245(63%). Among the total laparotomies 263(67.6%) were male and 267(68.6%) were from rural. A total of 35 re laparotomy was done and 20(57.14%) were male, 18(57.14%) re laparotomy were performed in the age group of >60 year with 31 (88.57%) patients were from rural see (table 2).

Table 2: Socio-demographic characteristics in TGSH, 2023

Variables	Frequency		Percent (N=389)
Age	15 to 30	11	2.8
	31 to 45	59	15.2
	46 to 60	74	19.02
	Above 60	245	63
Sex	Male	263	67.6
	Female	126	32.4
Residency	Urban	122	31.4
	Rural	267	68.6

## 5.2. Surgical Related characteristics

A total of 35 patients had re laparotomy for various complications; which makes the magnitude of re laparotomy was 9%, 95 % ( CI= 6.2-11.8) with 5 patients had additional second re laparotomy. Indications for index laparotomy were symptomatic cholelithiasis 77(19.8%), trauma 62 (15.9%) and stoma closure 60(15.8%). The proportion of re-laparotomy based on the indication of index laparotomy were; trauma 9(25.7%), LBO 8 (22.57%), stoma closure 7(20%), SBO 5 (14.28%), acute appendicitis 3 (8.57), malignancy 2 (5.7%) and perforated PUD 1(2.85%) see (table 3).

**Table 3: Indications of laparotomy in TGSH, 2023**

Indications	Laparotomy		Re laparotomy	
	Frequency	Percentile	Frequency	Percentile
Acute appendicitis	55	14.1	3	5.45
SBO	37	9.5	5	13.51
LBO	54	13.8	8	14.81
Trauma	62	15.4	9	14.51
Stoma closure	60	15.9	7	11.66
Perforated PUD	23	5.9	1	4.34
Symptomatic cholelithiasis	77	19.7		
Malignancy	5	1.3	2	40
GOO	16	4.1		
Total	389	100	<b>35</b>	<b>100</b>

From the index laparotomy 102(26.2%) were performed in the large bowel and 62 (15.9%) were in the small bowel. Re laparotomy performed in pathologies for multiple sites were 18(4.6%) see (table 4).

**Table 4: Site of pathology in TGS, 2023**

Site pathology	Index laparotomy		Re laparotomy	
	Frequency	Percentile	Frequency	Percentile
Appendix	57	14.7	3	5.26
Small bowel	62	15.9	8	12.90
Large bowel	102	26.5	18	17.64
Stomach	45	11.6	1	2.22
Biliary tree	79	20.3	1	1.26
Esophagus	14	3.6	0	0
Solid organ	12	3.1	2	16.66
Multiple	18	4.4	2	11.11

Based on the type of wound, the incidence of re laparotomy in dirty wounds were 95.23 %. Mentioned in table 5

**Table 5: Classification of operative wounds in TGSH, 2023**

Type of wound	Index laparotomy		Re laparotomy	
	Frequency	Percentile	Frequency	Percentile
Clean contaminated	8	2.05	5	62.5
Contaminated	41	10.53	7	17.07
Dirty	305	78.40	23	7.5

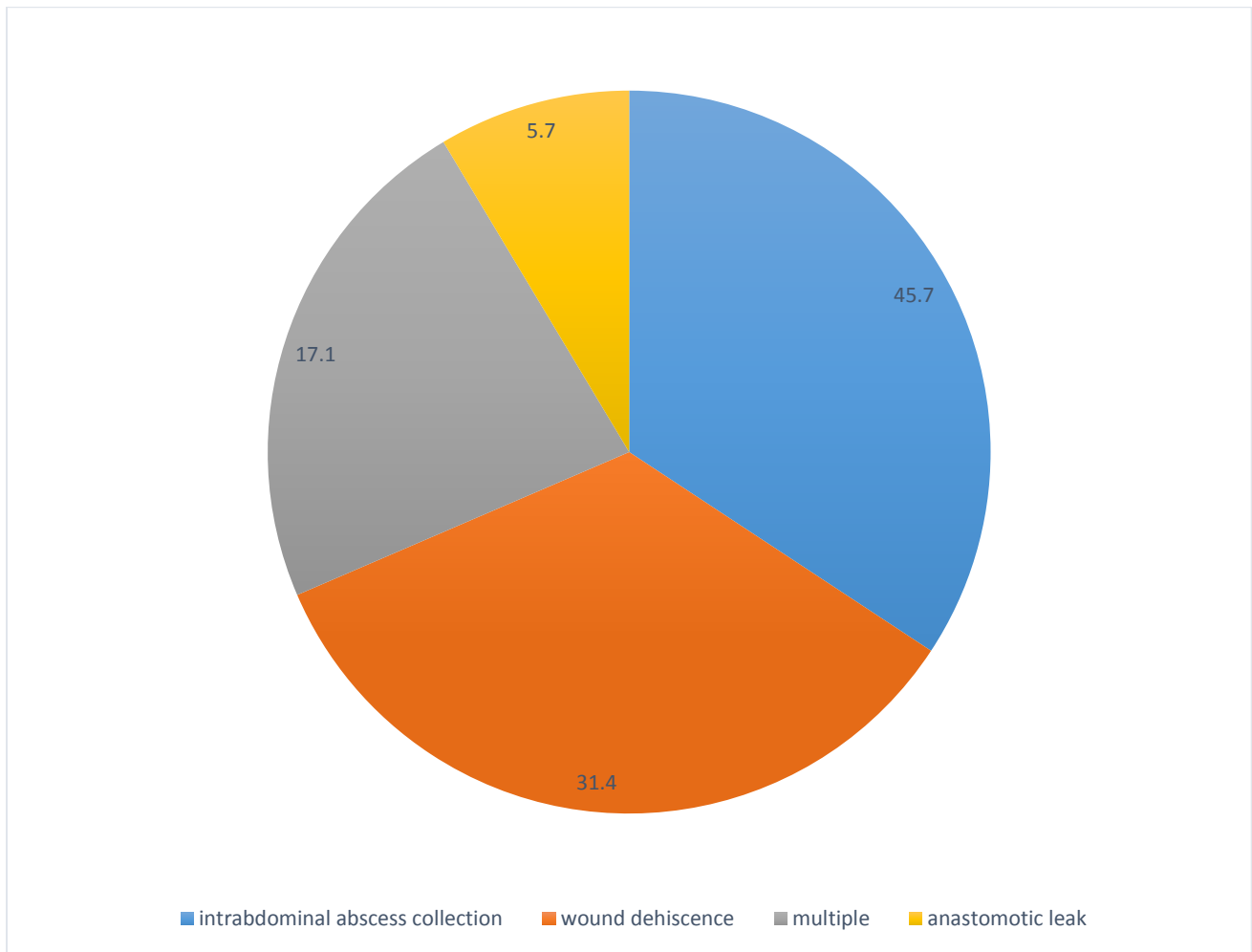


In this study 84(21.59%) participants had peritonitishad and among 35 re laparotomy patients, 29(82.85%) had peritonitis at index laparotomy. Among 389 index laparotomies 150 (38.56%) were emergency and from the total of 35 re laparotomies, 29 index laparotomies were emergency see table 6

**Table 6 surgical related characteristics in TGSH, 2023**

Variables		Frequency	Percent
Peritonitis	Yes	84	21.59
	No	305	78.41
Duration of illness in hours	Less than 12	15	3.9
	12 to 72	66	17
	72 to 120	78	20.1
	More than 120	230	59.1
Pulse rate in beats per minute	Less than 100	15	3.9
	100 to 120	88	22.6
	More than 120	286	73.5
Type of index laparotomy	Emergency	150	38.56
	Elective	239	61.44
Duration of surgery at index laparotomy in hours	Less or equal 3	256	65.8
	3 to 5	112	28.8
	More than 5	21	5.4
Co morbidity	Yes	54	13.9
	No	335	86.1

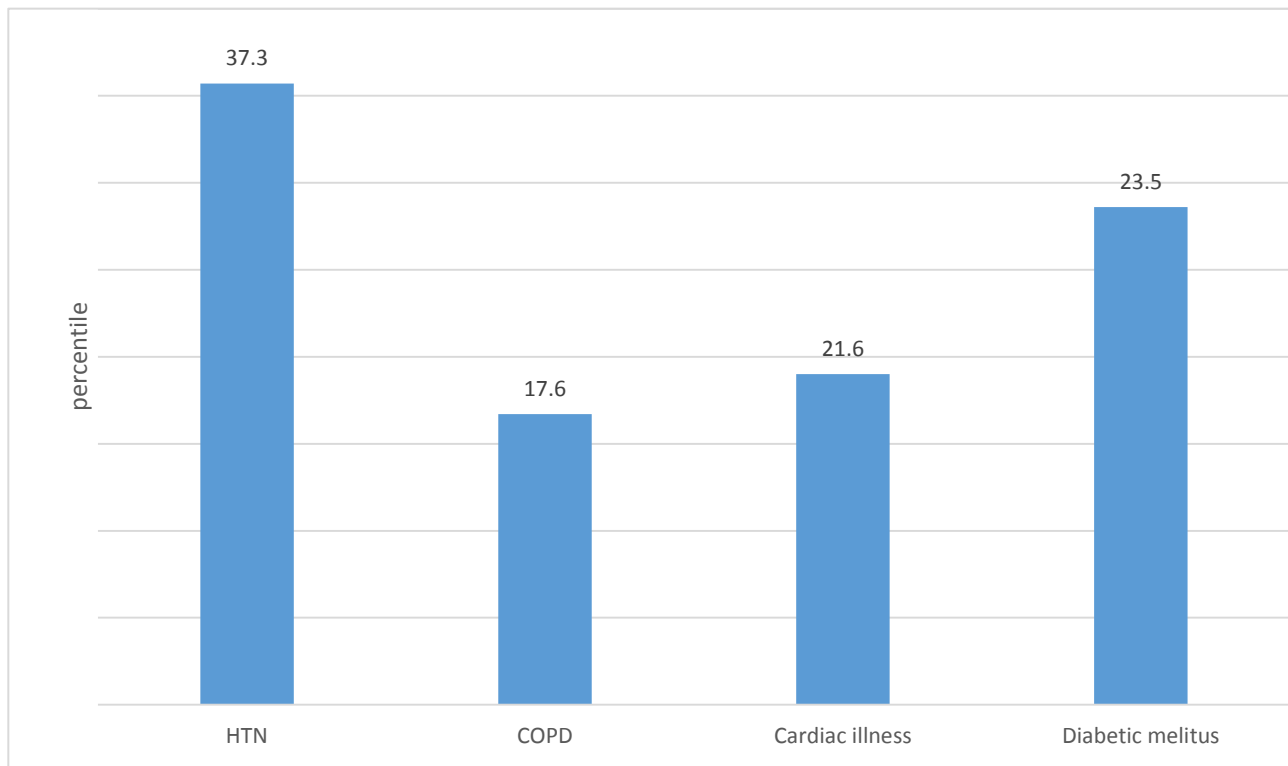
The indications for re laparotomy in this study were intra-abdominal abscess collection 16(45.7%), anastomotic leak 2(5.7%), wound dehiscence 11(31.4%), multiple 6(17.9%), see (figure 2)



**Figure 2: Indications of Re laparotomy in TGS, 2023**

### 5.3 Comorbidity Related Factors

The total proportion of known chronic illness in the study participants were 54(13.88%). Diabetes Mellitus 12 (23.5%), HTN 19(37.3%), cardiac disease 11(21.6%) and COPD 9(17.6%) and from 35 re laparotomies, 25 had chronic illness with HTN (12) were the most common comorbidities.



**Figure 3. Associated comorbidity in TGS, 2023**

#### 5.4 Factors Associated with Re-Laparotomy

In the simple binary logistic regression analysis; age, peritonitis, type of index laparotomy, comorbidity, duration of illness, pre-operative pulse and classes of wound were the independent variables with p value of less than 0.25.

In multiple binary logistic regression analysis; age, duration of illness, pre-operative pulse rate, and class of wound at index surgery were significant variables with p value of less than 0.05

Patients age above 60 years were 16.36 times more likely to have re-laparotomy as compared with patients whose age was below 60 years, (AOR = 16.36, 95% CI = [3.53-35]).

Patients duration of illness more than 120 hours were 7 times more likely to have re laparotomy as compared with patient's duration of illness less 120 hours, (AOR = 7.05, 95% CI= [2.18-23]).

Patients pre-operative pulse rate more than 120 beats per minute were 9.35 times more likely to have re laparotomy as compared with patient's preoperative pulse rate below 120 beats per minute, (AOR = 9.35, 95% CI= [3.06-19.43]).

And patients with dirty wound at index laparotomy 4.81 times more likely to have re laparotomy; compared with patents have not dirty wound, (AOR = 4.81, 95% CI = [1.23-10.05]) see (table 7).

**Table 7: Associated factors of re laparotomy in TGS, 2023**

Variables		Re laparotomy		COR (95% CI)	AOR (95% CI)	P-value
		Yes	No			
Age	15-30	5	6	1	1	<b>0.023*</b>
	31-45	6	53	0.136(0.032-0.583)	0.99(0.06- 12.34)	
	46-60	6	68	0.106(0.025-0.452)	8.45(1.91- 18.09)	
	>60	18	227	0.095(0.026-0.342)	16.36(3.53- 35)	

Peritonitis	Yes	26	58	14.6(2.30-34.49)	0.620(0.021-18.367)	0.280
	No	9	296	1	1	
Duration of illness in hours	<12	5	10	1	1	<b>0.005*</b>
	12-72	6	60	0.200(0.051-0.781)	0.89(0.01- 6.07)	
	72-120	7	71	0.197(0.052-0.742)	2.5(1.34- 9.05)	
	>120	17	213	0.160(0.049-0.520)	7.05(2.18-23)	
Pulse rate (Bpm)	<100	6	9	1	1	<b>0.049*</b>
	100-120	7	81	0.130(0.036-0.471)	1.47(1.001- 8.32)	
	>120	22	264	0.125(0.041-0.383)	4.12(1.78-13.21)	
Co morbidity	Yes	22	32	17.966(8.661-41.532)	0.49(0.002-10.35)	0.435
	No	13	325	1	1	
Index laparotomy	Emergency	29	121	9.30(2.234-22.412)	1.28(0.07-12.11)	0.299
	Elective	6	233	1	1	
Class of wound	Clean contaminated	5	8	1	1	<b>0.039*</b>
	Contaminated	7	41	.0.273(0.069- 0.991)	2.67(1.08- 11.08)	
	Dirty	23	305	0.121(0.037-0.399)	4.81(1.23-10.05)	

## 6. Discussion

The magnitude of re laparotomy in this study was 9.0 %, 95 % ( CI= 6.2-11.8). On studies conducted in India 17%(10) and South Africa 24%(8) the magnitude of re laparotomy was higher than this result despite having better health systems and the variation may be due to they included only emergency index laparotomy, inclusion of both pediatrics and gynaecological patients, difference in indications, difference in site of pathology and the presence of more associated chronic illnesses(8, 10).

The finding of this study was lower than those studies conducted in Debre Marko's 12.3%(7) and Debre tabor 9.1%(13) but higher than a study conducted at St. Paul's Hospital Millennium Medical College (6.9%) (1). The discrepancy of the magnitude of RL from study to study may be due to different inclusion and exclusion criteria on the variables, different study designs, length study period (1,7,13).

Gender wise distribution of relaparotomy was higher in males than females; the male: female ratio in this study was 2.08:1. The male participants were more in both index laparotomies 67.60% and re laparotomies 20(57.14%) which is comparable to other similar studies in Debre tabor, Debre markos, South Africa and India and the discrepancy was due to males were more affected by index pathology and trauma(7,8,13,15).

In this study relaparotomy were more prevalent in the age group of above 60 year which was 20 (57.14 %)(AOR = 16.36, 95% CI = [3.53-35]) which was supported by a study conducted in India, South Africa and Ethiopia in Debre Marko's and Debre tabor (2,7,11,13,15) but higher than another study conducted in India, Iraq and St Pauls(1,9,10) and the disease pattern and different study design (observational study) may contribute to this discrepancy.

In this study 29 patients were having relaparotomy with index laparotomy was done as emergency basis similarly this finding supports the finding of a research conducted in Nigeria, Congo, Addis Ababa, Debre Markos and Debre tabor(7,13,19,20) . Patients who undergone

emergency laparotomy mostly are not hemodynamically stable, will not be stabilized adequately and not well investigated because of urgent intervention is needed and finally it leads to in need of second surgery.

The indications for re laparotomy in this study were intra-abdominal abscess collection 16(45.7%), anastomotic leak 2(5.7%), wound dehiscence 11(31.4%), multiple 6(17.9%),). The finding was in line with studies in Iraq(9), Turkey(10), India(5), Nepal(18), Nigeria(19), and in St Pauls and in Debre tabor Ethiopia(1,13) with common indications includes anastomotic leak, burst abdomen, entero cutaneous fistula, persistent intra-abdominal abscess, stoma complications, post-operative haemorrhage, persistent or progressive peritonitis, wound dehiscence, and evisceration.. The decrement of in the number of indications in this study may be due difference in investigating modalities, underestimation of complications of index surgery, sample size and study design.

In this study the proportion of re-laparotomy based on the indication of index laparotomy were; trauma 9(25.7%), LBO 8 (22.57%), stoma closure 7(20%), SBO 5 (14.28%), acute appendicitis 3 (8.57%), malignancy 2 (5.7%) and perforated PUD 1(2.85%) which supports study conducted in India, Tanzania and Debre tabor Ethiopia (2,5,13,) but other similar study in India found that pathologies in the pancreas and biliary tree were the leading indication (23).

Another study conducted in Mexico, Nepal, India , Debre Marko's Ethiopia found that perforated appendicitis and bowel obstructions as an index laparotomy were the leading indication which ends with relaparotomy(7,14,16,18). The discrepancy in the finding may be different disease pattern and may be they used relaparotomy as the study population but in this study total laparotomy was used.

In this study with bi-variable logistic regression model, variables like age, peritonitis, type of index laparotomy, comorbidity, duration of illness, pre-operative pulse rate and classes of wound were factors associated with re-laparotomy with p value less than 0.25.

In multiple logistic regression variables with significant p value of less than 0.05 includes age above 60 years, duration of illness more than 72 hours, pre-operative pulse rate greater than 120 beats per minute and the presence of dirty wound at index laparotomy.

Patients age above 60 years were 16.36 times more likely to have re-laparotomy; compared with patients whose age was below 60 years, (AOR = 16.36, 95% CI = [3.5-35]), P value = 0.023). This is consistent with other studies from United States, India and South Africa(8,11,15) and from Ethiopia Debre Markos, Debre Tabor and St Paulo's (1,7,13). The reason for the increment was due to older ages induced physiologic change like they will have low immunity, low protein, their wound healing will be delayed, associated comorbidity and chemotherapy utilization increases the risk of RL(1,7,8,11,13,15).

In this study patients with duration of illness more than 120 hours was 7.05 times more likely to have re laparotomy as compared with patient's duration of illness less 120 hours, (AOR = 7.05, 95% CI= [2.18-23]).P value = 0.005).

Patients who presented with long duration of illness will have complicated pathology and Complicated acute abdomens will be manifested by the presence of elevation of heart beat, the presence of peritonitis, dirty surgical wound. And the post-operative course of the patient will be event full. These findings indicate that as the duration of illness increases the risk of having re-laparotomy increases and this findings are consistent with different studies conducted in Ethiopia St. Pauls, Debre Tabor and Debre Marko's(1,7,13) and South Africa (15) United States(21).

In this study patients with pre-operative pulse rate more than 120 beats per minute were 9.35 times more likely to have re laparotomy as compared with patient's preoperative pulse rate below 120 beats per minute, (AOR = 4.12, 95% CI= [1.78-13.21]).P value = 0.049).

Patients who presented with high pre-operative pulse rate is a manifestation of disease severity, dirty surgical wound, disease associated significant physiologic derangement and presence of complications which increases the chance of having second surgery and this findings are consistent with different studies conducted in Debre Tabor in Ethiopia and Congo (13,20).



And patients with dirty wound at index laparotomy was 4.81 times more likely to have re laparotomy as compared with patients who had no dirty wound (AOR = 4.81, 95% CI = [1.23-10.05], P value = 0.039) and this result was in line with other studies conducted in Ethiopia Debre Marko's and Debre tabor(7,13,) and from abroad in united states(21),Italy (24),India(10,11),Turkey(9).The reason for association was accompanied by patients with dirty wound at index laparotomy were at increased risk of developing intra-abdominal abscess collection, surgical site infection, poor wound healing, infection, and increased intra and post-operative complications and subsequent event full post-operative period increases the risk of post-operative complications that mandates second surgery.

## **7. Limitation**

Since this study was retrospective and the data was taken from patient card, relevant information's regarding personal details like alcohol usage, smoking and associated illness like HIV were not documented and surgical details like ASA class , operation room latency , type of operating surgeon , type of anaesthesia profession, pre operate nutritional status like albumin level ,usage of vasopressors were not available or incomplete which were significant factors in the previous studies but, not included in this study. Therewas difficulty in finding some relevant information's regarding pre-operative as well as post-operative cares like the timing of preoperative antibiotics prophylaxis.



## **8. Conclusion**

In this research, the magnitude of re laparotomy was high and Factors associated with relaparotomy were; age above 60 years, duration of illness more than 72 hours, pre-operative pulse rate greater than 120 beats per minute and presence of dirty wound at index surgery.

## **9. Recommendation**

### **To Amhara regional health bureau**

In this study patients with old age, high pre-operative pulse rate, delayed presentation, dirty wound, comorbidity, emergency presentation and peritonitis were at increased risk of re laparotomy. Therefore,

- . To give priority elective surgical services for old ages
- . To Train health service providers to make early referral to appropriate centres
- . To implement strategies for prevention and treatment of non-communicable diseases
- . To encourage elective surgical services with campaign.
- . To collaborate with other stakeholders for building of infrastructures like health centres and roads and to make availability of transportation.
- . Expanding surgical service centres and assigning of well-trained professionals.

### **To TibebeGion specialized hospital**

- .To enhance mentoring and providing regular feedback for those referring health facilities to avoid late referral for those deserved and
- .To assign service providers at primary site in collaboration with other stakeholders.
- .To create better awareness on the community about the importance of elective surgery during they develop mild disease rather than waiting for it worsened and emergency laparotomy becomes obligatory.
- To make proper follow up for patients with comorbidities

**To researchers;**

.Since this study is retrospective and done in a single institution, further studies better with case control study design with large sample size may be needed for better generalization and in non-war period.

.It is better to include factors like alcohol usage, smoking, HIV, ASA class, operation room, latency, nutritional status, vasopressor usage with prospective study.

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## 11. Annex

### Annex 1: general information sheet

Principal investigator name; Dr. Bekele Tewlegn Animut, final year surgery resident. Department of surgery in Bahir Dar University College of medicine and health Science. Conducting a study on magnitude and factors associated with re-laparotomy among adult laparotomy patients in Tibebegeon specialized hospital.

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Name of the data collector \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Date of the data collected \_\_\_\_\_

Name of the supervisor \_\_\_\_\_ Signature. \_\_\_\_\_ Date \_\_\_\_\_

### Annex 2: Checklist

001. Checklist Code \_\_\_\_\_

1. Sex      A. Male      B. Female
2. Age in year's \_\_\_\_\_
3. Residency of the patient    A. urban      B. rural
4. Indication for index laparotomy?  
    A. acute appendicitis      C. LBO      E. trauma  
    B. SBO      D. stoma closure F. perforated PUD  
    F. malignancy    H. symptomatic cholelithiasis I. oesophagus
5. Site of pathology  
    A. Appendix    B. small bowel    C. large bowel    G. Solid organ  
D. stomach    E. biliary tree    F. esophagous    H. multiple
6. Was there peritonitis?    A. Yes    B. No
7. If you answer for question no 6 is yes, A. generalized    B. localized



8. Wound classification

A. clean                      B. clean contaminate                      C. contaminated                      D. dirty

9. Duration of the illness in hours \_\_\_\_\_

10. Preoperative pulse rate (beats/minute) \_\_\_\_\_

11. Duration of index surgery in hours \_\_\_\_\_

12. Type of index laparotomy    A. emergency                      B. elective

13. Does the patient had comorbidities    A. Yes                      B. No

14. If your answer for question no.15 is yes, which co morbidity?

A. Diabetes mellitus                      B. Hypertension                      C. Cardiac disease                      D. COPD

15. Was re-laparotomy done?    A. yes                      B. No

16. If you say yes for question no 17, how many times?

A.1x                      B.2x                      C.3x                      D.4x                      E.>4x

17. If the answer is yes for question no 17, what was the indication?

A. intra-abdominal collection                      D. bowel evisceration

B. anastomosis leak                      E. bleeding

C. Wound dehiscence                      F multiple