Epidemiology and causes of intestinal obstruction in Ethiopia: A systematic review

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Abstract
Objective: This systematic review was aimed to address the prevalence and causes of intestinal obstruction in Ethiopia.

Methods: Systematic searches were conducted on PubMed, EMBASE, CINAHL, Scopus, African Journals Online, HINARI, and other supplementary sources, including Google Scholar. We conducted methodological quality assessments for the articles by employing a critical appraisal checklist of Joanna Briggs Institute.

Results: The reported prevalence of intestinal obstruction in Ethiopia ranges from 18.6% to 50.7% among patients with acute abdomen. However, the prevalence varies from 4.3% to 34.6% among total surgical admissions. The leading causes of small intestinal obstruction were small bowel volvulus, intussusception, and adhesion. Sigmoid volvulus was the most commonly reported cause of large intestine obstruction, followed by colonic cancer.

Conclusion: The highest reported prevalence of intestinal obstruction in Ethiopia was 50.7% among patients with acute abdomen and 34.6% among surgical admissions. Small intestine volvulus and sigmoid volvulus were the common causes of small and large bowel obstructions, respectively. Therefore, clinicians have to consider the common causes during the diagnosis and management of intestinal obstruction.

Keywords
Intestinal obstruction, volvulus, intussusception, epidemiology, Ethiopia

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Introduction
Intestinal obstruction is a partial or total blockage of the passage of fluids and digested food through the intestines.¹ It is one of the most common acute abdominal disorders which require emergency surgical admission and is commonly related to high mortality of 3%–30% across the globe.²,³ Based on the anatomical location, the intestinal obstruction could be classified as small bowel obstruction (SBO), large bowel obstruction (LBO), and compound obstruction.¹ Also, it can be either mechanical or functional depending on the underlying pathophysiology of obstruction. In 80% of cases, intestinal obstruction occurs in the small bowel.⁴

The cause of intestinal obstruction has varied geographically.⁵ In developed countries, adhesion is the main cause of intestinal obstruction since hernias and volvulus are the common reasons for intestinal obstruction across Africa.⁶,⁷ Although the shreds of evidence illustrate a pattern change in Africa, little is known about the underlying causes.⁸–¹⁰ Despite the above estimations of the global prevalence of intestinal obstruction, it was not well-documented in Ethiopia. However, national evidence on the magnitude of

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intestinal obstruction is required to make informed health policy decisions. Therefore, we reviewed published and gray literature aiming to document the prevalence and causes of intestinal obstruction in Ethiopia.

**Methods**

**Study protocol**

This systematic review was reported based on the Preferred Reporting Items for Systematic Review and Meta-analysis Protocols (PRISMA-P). The study protocol was registered under PROSPERO (CRD42020202148).

**Data sources and searches**

The online databases and indexing services, including PubMed, EMBASE, CINAHL, Scopus, and African Journals Online (AJOL), were visited as major sources of data and other supplementary sources, including Google Scholar. Advanced search strategies were applied to major databases to retrieve relevant articles closely related to intestinal obstruction. Again, articles published in the subscription-based journals under Wiley’s Online Library were accessed through HINARI. The search was conducted with selected keywords and indexing terms without a time limit.

All published and unpublished articles available online till the day of data collection were considered. Gray literatures from organizations and online university repositories were accessed through Google. Search terms, such as “intestinal obstruction,” “bowel obstruction,” “sigmoid volvulus,” and “Ethiopia” were employed. Boolean operators (AND, OR), truncation, and MeSH terms (Duodenal Obstruction, Fecal Impaction, Ileus, Intestinal Pseudoobstruction, Intestinal Volvulus, Intussusception) were used appropriately for systematic identification of records for the research question.

**Eligibility criteria**

We included all cross-sectional, case reports, and case series studies conducted in Ethiopia and in the English language without restriction to the date of publication. Furthermore, there was no restriction on the group or age of the participants. However, we excluded articles with incomplete information and study protocols for conferences.

**Study selection**

We set predefined inclusion and exclusion criteria for initial screening by titles or abstracts and evaluation of full texts for their eligibility assessment. Next, we assessed the original articles reporting obstruction, both small, and large intestine, as the secondary outcome or reported as the etiology of acute abdomen.

**Data extraction**

A customized data abstraction format prepared on a Microsoft Excel sheet was used to extract relevant data. Two authors (G.F. and A.T.) independently reviewed and extracted data about the first author, year of publication, study design (cross-sectional, case report, and case series), study participants (children, adults, and mixed-age groups), types (small intestine or large intestine), causes of intestinal obstruction, sample size, and event of interest (number of intestinal obstructions). Any discrepancy during extraction was solved through discussions with a third author (B.B.).

**Quality assessment**

Two independent reviewers, G.F. and A.T., conducted the quality assessment of the articles by employing the Joanna Briggs Institute’s (JBI’s) critical appraisal checklist for all types of studies. The results of the two authors’ appraisals were used for the final decision of inclusion. Finally, we ranked the articles by their methodological quality based on the total number of appraisers’ scores marked as “yes” to questions of the JBI’s critical appraisal checklist. Any disagreements during appraisal were solved through discussion with the other authors. Accordingly, we included all studies with their overall positive responses in the range of 50%–75% (moderate-quality studies) or higher than 75% (high-quality studies) for the systematic review (Tables 1–3).

**Statistical analysis**

The extracted data were exported to STATA software version 16.0 for analysis. We reviewed the reported prevalence of intestinal obstruction among patients with acute abdomen and total surgical admission, and the common causes of intestinal obstruction in Ethiopia. Tables and figures were used to present the results.

**Results**

**Description of studies**

We identified 471 articles from different sources. Of these articles, 265 were excluded due to duplication, 115 irrelevant outcomes, and 10 studies were conducted outside of Ethiopia. Next, 81 full-text articles were assessed for eligibility. Finally, 38 articles (29 cross-sectional studies, 7 case report studies, and 2 case series studies) were included in our systematic review analysis. The reasons for the exclusion of 43 full-text articles were irrelevant or insufficient information (34) and poor methodological qualities (9) (Figure 1). The majority of studies included patients with a minimum age of 1 day to a maximum of 95 years. Cross-sectional studies were conducted between 2001 and 2020, whereas the case reports and case series studies were conducted between 2015 and 2019.
A total of 17 studies from different parts of Ethiopia were included for the review of intestinal obstruction’s prevalence. In addition, for the causes of intestinal obstruction, we included a total of 38 cross-sectional studies, including those studies considered for the prevalence review.

**Prevalence of intestinal obstruction**

The reported prevalence of intestinal obstruction in Ethiopia ranges from 18.6% to 50.7% among patients with the acute abdomen. However, the prevalence varies from 4.3% to 34.6% among total surgical admissions. The highest prevalence of intestinal obstruction, 50.7%, was reported from the Debre Berhan Referral Hospital, Amhara Region, and the lowest prevalence, 18.6%, was reported from Suhul General Hospital, Tigray Region among patients with acute abdomen. According to the administrative regions and cities, in Addis Ababa, the reported prevalence of intestinal obstruction among total surgical admission ranges from 4.3% to 17.1%. Moreover, only one study reported the prevalence of intestinal obstruction, 26%, among patients with acute abdomen in Addis Ababa. The remaining studies have reported the prevalence of intestinal obstruction among patients with acute abdomen in the Oromia Region, it ranges from 21.8% to 40%, 28% to 49.3% in the Southern Nation, Nationalities, and People Region.

### Table 1. Quality appraisal for cross-sectional studies included in the systematic review of prevalence and causes of intestinal obstruction in Ethiopia.

| No. | References | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 |
|-----|------------|----|----|----|----|----|----|----|----|
| 1   | Abebe et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 2   | Abebe et al. | Yes | Yes | Yes | Yes | No | No | Yes | Yes |
| 3   | Adem et al.  | Yes | No  | Yes | Yes | NA | NA | Yes | Yes |
| 4   | Awedew et al.| Yes | Yes | Yes | Yes | No | No | Yes | No  |
| 5   | Ayenew et al.| Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 6   | Belachew et al.| Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 7   | Demissie et al.| Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 8   | Firomsa et al.| Yes | Yes | Yes | No | No | Yes | No  |
| 9   | Gebre et al. | Yes | Yes | Yes | Yes | No | No | Yes | No  |
| 10  | Gebresellassie et al. | Yes | NA | Yes | Yes | NA | NA | Yes | Yes |
| 11  | Gebrie et al. | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes |
| 12  | Ghebrat et al. | Yes | NO | Yes | Yes | NA | NA | Yes | Yes |
| 13  | Hagos et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 14  | Hanks et al. | Yes | Yes | Yes | Yes | No | No | Yes | No  |
| 15  | Kotiso et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 16  | Kotiso et al. | UC | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 17  | Mariam et al. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 18  | Melkie et al. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 19  | Mohammed et al. | Yes | Yes | Yes | Yes | No | No | Yes | No  |
| 20  | Muleta et al. | Yes | Yes | Yes | UC | NA | NA | Yes | Yes |
| 21  | Mulugeta et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 22  | Pawulos et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 23  | Soressa et al. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 24  | Tamrat et al. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 25  | Tasew et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 26  | Wondimu et al.| Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 27  | Yilma et al. | UC | Yes | Yes | Yes | UC | UC | Yes | Yes |
| 28  | Yohannes et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |
| 29  | Tekele et al. | Yes | Yes | Yes | Yes | NA | NA | Yes | Yes |

### Table 2. Case series studies included in the systematic review of causes of intestinal obstruction in Ethiopia.

| No. | References | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 |
|-----|------------|----|----|----|----|----|----|----|----|----|-----|
| 1   | Alemu et al. | Yes | Yes | Yes | UC | No | Yes | Yes | Yes | Yes | Yes |
| 2   | Feyisa et al. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
18.6% to 37.3% in the Tigray Region. In the Amhara Region, only one study reported the prevalence of intestinal obstruction of 50.7% among patients with the acute abdomen, 40.37.8% in the Dire Dawa city administration, 30 and 34.6% reported by a study conducted at Addis Ababa city and Amhara Region 36 (Table 4).

Causes of intestinal obstruction
A total of 38 studies were included in the systematic review of the causes of intestinal obstruction. More than one cause was reported for each study. It was classified according to the site of obstruction as small and large intestine obstruction. However, there was no case reported on compound obstruction.

Small intestine obstruction
According to the current review, the most common cause of small intestine obstruction was small bowel volvulus which was reported by 14 studies.16,17,19,23,24,27,29,39,40,48,49 Overall, 755 cases of small bowel volvulus were reported, with the highest magnitude of 148 cases from Debre Tabor General Hospital.16 The second-highest number of intestinal obstructions due to SBO was reported 133 cases from Gondar, Northern Ethiopia.24

Intussusception was reported by 18 studies as the second most common cause of SBO.10,17,19,21,23,25,27,29,34,37,39,40,46,49,50 Moreover, Belachew et al.18 and Yilma et al.49 reported that three specific types of intussusception; Ileo-colic, Ileo-ileal, and Colo-colic, among children aged 1 month–8 years with a peak occurrence of 3–6 months. While, a case report study from Gondar University also revealed the post-operative intussusceptions.46

The third most common cause of small intestine obstruction was adhesion which was reported by 13 studies with a total of 327 cases.10,17,19,21,23,25,27,29,34,37,39,40,50 Among these studies, two of them reported tuberculous adhesions from Adama Hospital35 and Yirgalem General Hospital.19

The hernia was reported by 16 studies.10,17,19,20,21,23,25–27,29,34,37,39,40,50 Among those studies, two of them reported incarcerated types of hernia.20,29 Moreover, Ileo-sigmoid knotting

Figure 1. Flow diagram for selection of studies included for the systematic review of prevalence and causes of intestinal obstruction in Ethiopia.
was reported by 10 studies. Among those studies, one study was the case report of a 50-year-old female patient who was intraoperatively diagnosed with ileo-ileal knotting. Similarly, two case reports were presented with appendiculo-ileal knotting from Hawassa hospital and St. Paul hospital. The appendiculo-ileal knotting has been reported with different names in the literature; appendicular tourniquet, appendicular knot, and appendiceal tie syndrome. In the current review, two studies reported three cases of gossypiboma among women who had cesarean sections. One study reported a case of a 25-year-old female patient who had a cesarean section 5 months before being diagnosed with gossypiboma. The other two cases were reported by Alemu et al., 42 a 32-year-old woman who passed a retained surgical sponge through her rectum 5 months after cesarean section and a 30-year-old woman who presented with an acute abdomen that was later

Table 3. Case report studies included in the systematic review of causes of intestinal obstruction in Ethiopia.

| No. | References | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 |
|-----|------------|----|----|----|----|----|----|----|----|
| 1   | Abebe et al.44 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 2   | Abebe et al.45 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 3   | Aberra et al.46 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 4   | Kiffe et al.47 | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| 5   | Mohammed et al.21 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 6   | Suga et al.33 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 7   | Teklewold et al.48 | Yes | No | Yes | Yes | Yes | No | No | Yes |

NA: not applicable, UC: unclear, Q1–8, JBI’s critical appraisal checklist for analytical cross-sectional studies (Q1: Were the criteria for inclusion in the sample clearly defined? Q2: Were the study subjects and the setting described in detail? Q3: Was the exposure measured in a valid and reliable way? Q4: Were objective, standard criteria used for measurement of the condition? Q5: Were confounding factors identified? Q6: Were strategies to deal with confounding factors stated? Q7: Were the outcomes measured in a valid and reliable way? Q8: Was appropriate statistical analysis used?); Q1–10, JBI’s critical appraisal checklist for case series studies (Q1: Is there clear criteria for inclusion in the case series? Q2: Is the condition measured in a standard, reliable way for all participants included in the case series? Q3: Is valid methods used for identification of the condition for all participants included in the case series? Q4: Is the case series have consecutive inclusion of participants? Q5: Is the case series have complete inclusion of participants? Q6: Is there clear reporting of the demographics of the participants in the study? Q7: Is there clear reporting of clinical information of the participants? Q8: Is the outcomes or follow-up results of cases clearly reported? Q9: Is there clear reporting of the presenting site(s)/clinical(s) demographic information? Q10: Is the statistical analysis appropriate?); Q1–8, JBI’s critical appraisal checklist for case report studies (Q1: Is patient’s demographic characteristics clearly described? Q2: Is the patient’s history clearly described and presented as a timeline? Q3: Is the current clinical condition of the patient on presenta- tion clearly described? Q4: Is the diagnostic tests or assessment methods and the results clearly described? Q5: Is the patient’s history clearly described and presented as a timeline? Q6: Is the current clinical condition of the patient on presenta- tion clearly described? Q7: Is the post-intervention clinical condition clearly described? Q8: Are adverse events (harms) or unanticipated events identified and described? Q9: Is the case report provide takeaway lessons?).

Table 4. Descriptive summary of cross-sectional studies included in the systematic review of the prevalence of intestinal obstruction in Ethiopia.

| References | Study design | Study setting | Participants | Sample size | No. of events | % |
|------------|--------------|---------------|--------------|-------------|---------------|---|
| Adem et al.9 | Cross-sectional | Addis Ababa | Mixed | 5353 | 229 | 10.8 |
| Ayenew et al.17 | Cross-sectional | Oromia region | Mixed | 295 | 118 | 40 |
| Gebre et al.23 | Cross-sectional | SNNP | Mixed | 171 | 48 | 28 |
| Gebre et al.21 | Cross-sectional | Tigray region | Mixed | 166 | 31 | 18.6 |
| Gebresillaise et al.22 | Cross-sectional | Addis Ababa | Mixed | 9521 | 40 | 4.3 |
| Hagos et al.25 | Cross-sectional | Tigray region | Adult | 299 | 96 | 28.7 |
| Hanks et al.26 | Cross-sectional | Addis Ababa | Adult | 328 | 56 | 17 |
| Kotisso et al.28 | Cross-sectional | Dire Dawa | Mixed | 304 | 115 | 37.8 |
| Melkie et al.30 | Cross-sectional | Addis Ababa | Adult | 235 | 62 | 26 |
| Muleta et al.32 | Cross-sectional | Addis Ababa | Adult | 7117 | 525 | 17.1 |
| Pawlos et al.34 | Cross-sectional | SNNP | Mixed | 270 | 122 | 49.3 |
| Soressa et al.35 | Cross-sectional | Oromia region | Mixed | 1200 | 242 | 21.8 |
| Takele et al.10 | Cross-sectional | Tigray region | Mixed | 439 | 164 | 37.3 |
| Tamirat et al.36 | Cross-sectional | Addis Ababa and Amhara region | Mixed | 504 | 184 | 34.6 |
| Tasew et al.37 | Cross-sectional | Oromia region | Adult | 299 | 117 | 39.1 |
| Wondimu et al.38 | Cross-sectional | Addis Ababa | Mixed | 8698 | 190 | 4.7 |
| Yohannes et al.40 | Cross-sectional | Amhara region | Mixed | 357 | 181 | 50.7 |

SNNP: Southern Nations, Nationalities, and Peoples.
identified as a retained surgical sponge, a year after she had a cesarean delivery.

One case of gallstone was reported from Ethio-Tibebe Hospital. According to the report, an 80-year-old female was presented to the emergency surgical department with the complaints of vomiting and abdominal cramps. On examination, the SBO caused by gallstones was detected and removed by a simple ileostomy. Moreover, three cases of Meckel’s diverticulum were observed. A cross-sectional study illustrated five cases of small intestine obstruction due to *ascariasis lumbricoides* among 297 patients. Among them, four cases were managed operatively, while one case was managed conservatively. We found one case of giant mesenteric lipoma which was reported in a 25-year-old male who presented with an acute exacerbation of abdominal pain, nausea, and vomiting. Moreover, a small bowel volvulus with extensive yellow mass was detected during laparotomy.

**Large intestine obstruction**

Sigmoid volvulus is the commonest cause of colon obstruction in Africa. In Ethiopia, 17 studies reported the sigmoid volvulus as the cause of large intestine obstruction. Colonic cancer-related causes of large intestine obstruction were reported by 12 studies. Moreover, colorectal cancer was reported by two studies from Wolaita Sodo teaching and referral hospital, SNPP region and from Nekemte referral hospital, Oromia region. A total of 11 cecal volvulus cases have been reported. Three cases were reported from Mekelle hospital, Tigray region, and four cases each were reported from Tikur Anbessa specialized hospital, Addis Ababa city, and Yirgalem referral hospital, SNPP region. We found four cases of anal stenosis which were reported from Tikur Anbessa Specialized hospital among the pediatric population. In addition, Mohammed et al. reported that anorectal malformation, atresia, and meconium ileus were reported as the cause of intestinal obstruction among neonates.

The etiologic cause underlying constipation also causes fecal impaction, which is the rare cause of colon obstruction. The congenital disorders of the colon and rectum, including Hirschsprung’s disease, may cause fecal impaction. Soressa et al. reported two cases of fecal impaction from Adama Medical College Hospital among adult patients. Similarly, two studies reported a total of 21 cases of Hirschsprung’s disease from Tikur Anbessa specialized hospital among pediatric population.

**Discussion**

The epidemiology of intestinal obstruction in Ethiopia varies based on the settings. We review the epidemiology and causes of intestinal obstruction in Ethiopia. According to the current review, the reported prevalence of intestinal obstruction in Ethiopia varies from 18.6% to 50.7% among patients with acute abdomen. Moreover, the prevalence ranges from 4.3% to 34.6% among the total surgical admissions. Literature documented that intestinal obstruction is the leading cause for emergency presentation in low- and middle-income countries, including Ethiopia. Furthermore, there are wide variations in the prevalence of intestinal obstruction across the world depending on ethnicity, age group, dietary habits, and geographic locations.

Small bowel volvulus is a rare cause of surgical emergency in high-income countries, while it is common in Africa. The current review signifies that the first leading cause of small intestinal obstruction in Ethiopia is volvulus. So, clinicians should bear in mind the commonest cause of intestinal obstructions during the diagnosis and treatment of patients with intestinal obstructions.

The second common cause of intestinal obstruction was intussusception followed by adhesion. Inconsonance with the current finding, the study results from Rwanda reported intussusception as the second leading cause of SBO followed by adhesion. The same pattern is found in many African countries, particularly in rural settings. However, adhesion is the leading cause of SBO in high-income countries, parts of Asia, and the Middle East.

Hernia and knotting were also reported as the fourth and fifth causes of SBO according to the current review. Concur with the current finding, studies conducted in other African countries have reported a higher magnitude of SBO secondary to hernia and knotting. We found that the rare causes of SBO include ascariasis, gossypiboma, and gallstone ileus. Such causes of small intestine have also been reported previously in the literature. In particular, gossypiboma is an ethico-medical issue that needs due attention from clinicians and other stakeholders. The cases were reported among post-cesarean section women, which signify the need to take precautions during cesarean surgical procedures since the highest prevalence of cesarean delivery beyond the WHO recommendation has been reported in Ethiopia and other African countries.

Sigmoid volvulus is the initial and most common cause of colon obstructions in Ethiopia, according to the current review. In agreement with the current finding, it is the most common cause of LBO in numerous regions of the world, with 1%–7% in the United States and around 80% in the Andes. Also, it is the leading cause of colon obstruction in most African countries.

Numerous risk factors attributed to sigmoid volvulus include a narrow mesocolon at its parietal attachment producing an excellent pivot point for a redundant sigmoid colon, predisposing the individual to volvulus. In addition, studies have illustrated that advanced age, medications altering intestinal motility, chronic constipation, consumption of...
high fiber diets,73 history of abdominal surgery, neurological or psychiatric illness, pregnancy, high altitude, and megacolon contribute to sigmoid volvulus.4,33,38

Globally, colon cancer is the third most commonly diagnosed cancer in males and the second among females.74 Also, it is the fourth most frequently diagnosed cancer. Furthermore, the second leading cause of death in the United States.75 It was once the primary disease solely observed in high-income countries. Conversely, recently, the paradigm has shifted to middle- and low-income countries.76 In Ethiopia, it is the most common type of cancer diagnosed among males and the fourth among females.77 In the current review, it is the second most common cause of LBO in Ethiopia.76 Therefore, health education and early screening for high-risk groups of the population are paramount to reducing the debilitating effects of colonic cancer.

The current review pointed out the prevalence of intestinal obstructions and underlying causes in Ethiopia. It gives national insight and would be used by policymakers to due attention and plan for intervention toward the intestinal obstructions. The result of the current review also helps to guide the clinicians for diagnosis and treatment plans.

We have followed the standardized method of reporting the systematic review, critically evaluated the quality of articles included for systematic analysis, and exhaustively incorporated all relevant articles, which were the strengths of our work. However, the current review was not without limitations. We could not obtain the pooled prevalence due to the high heterogeneity (> 90%) detected during the meta-analysis.

Conclusion

The current review revealed nearly 6% of patients presented with acute abdomen or for abdominal surgery have an intestinal obstruction. The leading cause of SBO in Ethiopia was volvulus, followed by adhesion and hernia. Moreover, the sigmoid volvulus and colonic cancer were found to be the commonly reported causes of colon obstruction. Having knowledge of the prevalence and common causes of intestinal obstruction will assist clinicians with early diagnosis and treatment.

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Author contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Availability of data and materials

The dataset used for analysis could be shared with reasonable request from corresponding author.

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References

1. Williams N, Bulstrode C and Connell PB (eds) Bailey & Love’s short practice of surgery. Boca Raton, FL: CRC Press, 2008, p. 1211.
2. Tsegaye S, Osman M and Bekele A. Surgically treated acute abdomen at Gondar University Hospital, Ethiopia. East Central African J Surg 2007; 12(1): 53–57.
3. Grimes CE, Law RS, Borgstein ES, et al. Systematic review of met and unmet need of surgical disease in rural sub-Saharan Africa. World J Surg 2012; 36(1): 8–23.
4. Ullah S, Khan M, Mumtaz N, et al. Intestinal obstruction: a spectrum of causes. J Postgraduate Med Inst 2009; 23(2), https://jpmi.org.pk/index.php/jpmi/article/view/87
5. Adesunkanmi A and Aghakwuru E. Changing pattern of acute intestinal obstruction in a tropical African population. East Afr Med J 1996; 73(11): 727–731.
6. Ohene-Yeboah M, Adipah E and Gyasi-Sarpong K. Acute intestinal obstruction in adults in Kumasi, Ghana. Ghana Med J 2006; 40(2): 50–54.
7. Wan W, Le T, Riskin L, et al. Improving safety in the operating room: a systematic literature review of retained surgical sponges. Curr Opin Anaesthesiol 2009; 22(2): 207–214.
8. Abebe E, Teshome H and Bekele M. Referral of emergency surgical patients in a tertiary hospitals, Addis Ababa, Ethiopia. Ethiopian Med J 2016; 54(4): 221–228.
9. Adem A, Abebe A and Abdurahman M. Pattern of surgical admissions to Tikur Anbessa Hospital, Addis Ababa, Ethiopia. East Central African J Surg 2001; 6(1), http://www.bioline.org.br/pdf/ajc01008
10. Takele M and Araaya G. Pattern of non-traumatic acute abdomen in patients from Ayder Comprehensive Specialized Hospital, Northern Ethiopia: a retrospective analysis. East Central African J Surg 2019; 1(1): 55–61.
11. Moher D, Shamseer L, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev 2015; 4(1): 1.
12. Fekadu G, Merga BT, Edessa D, et al. Prevalence, causes and management outcomes of intestinal obstruction in Ethiopia. A systematic review and meta-analysis. PROSPERO 2020.
13. Moola S. Chapter 7. Systematic reviews of etiology and risk. In: Aromataris E and Munn Z (eds) JBI manual for evidence synthesis. The Joanna Briggs Institute, 2017, https://jbi-global-wiki.refined.site/space/MANUAL/3283910762/Chapter+7%3A+Systematic+reviews+of+etiology+and+risk

14. Munn Z, Barker TH, Moola S, et al. Methodological quality of case series studies: an introduction to the JBI critical appraisal tool. JBI Evid Synth 2020; 18(10): 2127–2133.

15. Abeke K, Sherefa K, Teshome H, et al. Ileosigmoid knotting: analysis of patients clinical profiles and determinants of outcomes. Surg Res Pract 2020; 2020: 3826138.

16. Awedew AF, Belay WB, Amsalu BT, et al. Small Bowel Volvulus (SBV) in Northcentral Ethiopia. BMC Surg 2020; 20(1): 221.

17. Ayenew Z, Gizaw A, Workneh D, et al. Outcome of non-traumatic surgical acute abdomen in nekemte referral hospital southwest Ethiopia: a retrospective cross-sectional study. Surgery Curr Res 2016; 7(282): 1–5.

18. Belachew AG, Tadesse A and Bogale BH. Pattern and seasonal variations of intussusception in children: a retrospective analysis of cases operated in a tertiary Hospital in Ethiopia. Ethiop Med J 2016; 54(1): 9–15.

19. Demissie M. Small intestinal volvulus in Southern Ethiopia. East Afr Med J 2001; 78(4): 208–211.

20. Firomsa T, Tefera M and Tadesse A. trends and outcomes of emergency pediatric surgical admissions from a Tertiary Hospital in Ethiopia. Ethiop J Health Sci 2018; 28(3): 251–258.

21. Gebre S. Causes and outcome of surgically treated non-traumatic surgical acute abdomen in Suhul general hospital, Shire, northwest Tigray, Ethiopia, a retrospective study. Am Sci Res J Eng Tech Sci 2016; 16(1): 74–89.

22. Gebreelasissie HW and Tamerat G. Audit of surgical services in a teaching hospital in Addis Ababa, Ethiopia. BMC Res Notes 2019; 12(1): 678.

23. Gebric T, Handiso T and Hagiisso S. Management outcome and associated factors of surgically treated non traumatic acute abdomen at Attat hospital, Gurage Zone, Ethiopia. Int J Surg Res Pract 2019; 6: 099.

24. Ghebrat K. Seasonal variation of primary small intestinal volvulus in North Western Ethiopia. East Central African J Surg 2001; 6(2): 87–90.

25. Hagos M. Acute abdomen in adults: a two year experience in Mekelle, Ethiopia. Ethiopian Med J Med J 2015; 53(1): 19–24.

26. Hanks L, Lin C, Tefera G, et al. Abdominal surgical emergencies at Tikur Anbessa specialized hospital in Ethiopia; a shifting paradigm. East Central African J Surg 2014; 19(1): 90–94.

27. Kotiso B and Abduralman Z. Pattern of Acute Abdomen in Adult Patients in Tikur Anbessa Teaching Hospital, Addis Ababa, Ethiopia. East Central African J Surg 2007; 12(1): 47–52.

28. Kotisso R. Gastric outlet obstruction in Northwestern Ethiopia. East Central African J Surg 2000; 5(2): 25–29.

29. Mariam TG, Abate AT and Getnet MA. Surgical management outcome of intestinal obstruction and its associated factors at University of Gonder Comprehensive Specialized Hospital, Northwest Ethiopia, 2018. Surg Res Pract 2019; 2019: 6417240.

30. Mekie A, Alemayehu T and Tarekgen E. Pattern of acute abdomen in Dil Chora referral hospital, Eastern Ethiopia. Int J Coll Res Intern Med Pub Health 2016; 8(11): 608–615.

31. Mohammed M, Amezene T and Tamirat M. Intestinal obstruction in early neonatal period: a 3-year review of admitted cases from a Tertiary Hospital in Ethiopia. Ethiop J Health Sci 2017; 27(4): 393–400.

32. Muleta MB, Tchay A, Teshome H, et al. Pattern of general surgical and urologic admissions at St. Paul’s hospital millennium medical college. Ethiop Med J 2019; 57: 1.

33. Mulgeta GA and Awlachew S. Retrospective study on pattern and outcome of management of sigmoid volvulus at district hospital in Ethiopia. BMC Surg 2019; 19(1): 107.

34. Pawulos W. Assessment of non-traumatic acute abdominal cases treated operatively at Wolaita Sodo teaching and referral hospital, Southern Ethiopia. J Pharm Altern Med 2017; 14: 25–33.

35. Soressa U, Mamo A, Hiko D, et al. Prevalence, causes and management outcome of intestinal obstruction in Adama Hospital, Ethiopia. BMC Surg 2016; 16(1): 38.

36. Tamrat G, Osman M, Deyessa N, et al. Delay of emergency surgical interventions in Ethiopia: patient and health system factors. East Central African J Surg 2018; 23(2): 59–65.

37. Tasew B. Presentation and outcome of acute abdomen in Goba Referral Hospital, Goba, Southeast Ethiopia: retrospective study. SM J Fam Med 2017; 1: 1003.

38. Wondimu S, Bekele S, Giorgis DG, et al. Pattern of surgical admissions to Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia: a five-year retrospective study. East Central African J Surg 2018; 23(2): 66–70.

39. Yilma Y. Management outcome of small intestinal obstruction in Mizan Aman General Hospital, Ethiopia. J Clin Exp Pathol 2018; 8(6): 359.

40. Yohannes M, Fanta M and Molla T. Proportion of intestinal obstruction and associated factors among patients with non traumatic acute abdomen admitted to surgical ward in Debre Birhan referral hospital, north East Ethiopia. Am J Biomed Life Sci 2017; 5(3): 54–62.

41. Tekle T and Mollalegne T. Pattern of pediatric surgical admission in yirgalem hospital Southern Ethiopia. J Vasc Med Surg 2015: 1–4.

42. Alemu BN and Tiruneh AG. Gossypiboma: a case series and literature review. Ethiop J Health Sci 2020; 30(1): 147–149.

43. Feyisa JD, Kenea M, Gashaw E, et al. Fatal gastrointestinal and peritoneal ischemic disease of unknown cause at Arba Minch Hospital, Southern Ethiopia. Can J Gastroenterol Hepatol 2018; 2018: 6598960.

44. Abebe E, Asmare B and Addise A. Ileo-ileal knotting as an uncommon cause of acute intestinal obstruction. J Surg Case Rep 2015; 2015(8): rjv102.

45. Abebe E, Abebe K and Bekele M. Retained surgical sponge (gossypiboma) causing small bowel obstruction & peritonitis: a case report. Arcas Rep C Med 2016; 2: 126.

46. Aberra Y. A case report on post-operative intussusceptions in adult. J Gastroint Dig Syst 2017; 8(2): 559.

47. Kifle AT and Tesfaye S. Appendico ilial knotting: a rare case of small bowel obstruction. J Surg Case Rep 2018; 2018(5): ryj088.

48. Teklewold B, Kehaliw A, Tekaiwi M, et al. A Giant Egg-like symptomatic Loose Body in the Peritoneal Cavity: a case report. Ethiop J Health Sci 2019; 29(6): 779–782.

49. Yilma Y, Akmel M and Workicho A. A three-year study on childhood intussusception in Jimma University Medical Center. Med Pract Rev 2018; 9(1): 1–7.

50. Biniam M, Derseh T, Yusouf M, et al. Management outcome and associated factors among intestinal obstruction patients
treated surgically, Eastern Ethiopia, 2019, https://www.
researchsquare.com/article/rs-2357/v1
51. Abebe E, Tsehay A, Lemu B, et al. Appendiculo-ileal knot
presenting at the third trimester of pregnancy. J Surg Case Rep
2019; 2019(6): rjz130.
52. Ranjan A, Kumari K and Jha S. Acute small bowel obstruction
as a result of an appendicular knot encircling the terminal
ileum: an exceptionally rare case report. Int J Med Sci Public
Health 2015; 4: 426–429.
53. Awale L, Joshi BR, Rajbanshi S, et al. Appendiceal tie syn-
drome: a very rare complication of a common disease. World
J Gastrointest Surg 2015; 7(4): 67–70.
54. O’Donnell ME, Sharif MA, O’Kane A, et al. Small bowel
obstruction secondary to an appendiceal tourniquet. Ir J Med
Sci 2009; 178(1): 101–105.
55. Mohammed Y. Gallstone ileus: a rare and often disregarded
cause of intestinal obstruction: case report with literature
review. East Central African J Surg 2016; 21(1): 156–163.
56. Sagar J, Kumar V and Shah D. Meckel’s diverticulum: a sys-
tematic review. J R Soc Med 2006; 99(10): 501–505.
57. Suga Y, Abdi E and Bekele M. Giant mesenteric lipoma caus-
ing small bowel volvulus: a case report. Ethiop J Health Sci
2019; 29(4): 529–532.
58. Hussain ZH, Whitehead DA and Lacy BE. Fecal impaction.
Curr Gastroenterol Rep 2014; 16(9): 404.
59. Espinoza R, Balbontín P, Feuerhake S, et al. Acute abdomen
in the elderly. Rev Med Chile 2004; 132(12): 1505–1512.
60. Ntukiyiruta G and Mukanurugwiro B. The pattern of intestinal
obstruction at Kibogola Hospital, a Rural Hospital in Rwanda.
East Central African J Surg 2009; 14(2): 103–108.
61. Adisa A and Mbanaso A. Pattern of mechanical intestinal
obstruction in Aba. J Med Invest Pract 2001; 3: 44–48.
62. Mohamed AY, al-Ghaithi A, Langevin JM, et al. Causes and
management of intestinal obstruction in a Saudi Arabian hos-
pital. J R Coll Surg Edinb 1997; 42(1): 21–23.
63. Moran BJ. Adhesion-related small bowel obstruction.
Colorectal Dis 2007; 9 Suppl. 2: 39–44.
64. Ohene-Yeboah M and Abantanga FA. Inguinal hernia disease
in Africa: a common but neglected surgical condition. West
Afr J Med 2011; 30(2): 77–83.
65. Sanders D, Porter C, Mitchell KD, et al. A prospective cohort
study comparing the African and European hernia. Hernia
2008; 12(5): 527–529.
66. Jebbin J and Adotey N. Gossypiboma: a report of 2 cases.
Niger J Med 2006; 15(1): 87–88.
67. Chu K, Maine R and Treille M. Cesarean section surgical site
infections in sub-Saharan Africa: a multi-country study from
Medecins Sans Frontieres. World J Surg 2015; 39(2): 350–
355.
68. Azene AG and Aragaw AM. Prevalence and associated fac-
tors of caesarean section in Ethiopia: systematic review and
meta-analysis, 2020, https://assets.researchsquare.com/files/
rs-36414/v1/694336dd-f3dd-4f52-8ce6-ca407eb46220.pdf
69. Swenson BR, Kwaan MR, Burkart NE, et al. Colonic volvu-
lus: presentation and management in metropolitan Minnesota,
United States. Dis Colon Rectum 2012; 55(4): 444–449.
70. Asbun H, Castellanos H, Balderrama B, et al. Sigmoid volvu-
lus in the high altitude of the Andes. Dis Colon Rectum 1992;
35(4): 350–353.
71. Chalya PL and Mabula JB. Sigmoid volvulus and ileo-sigmoid
knotting: a five-year experience at a tertiary care hospital in
Tanzania. World J Emerg Surg 2015; 10: 10–18.
72. Okello T, Ogwang D, Kisa P, et al. Sigmoid volvulus and
ileo-sigmoid knotting at St. Mary’s Hospital Lacor in Gulu,
Uganda. East Central African J Surg 2009; 14(2): 58–64.
73. Tegegne A. Cultural bowel patterns and sex difference in sig-
moid volvulus morbidity in an Ethiopian hospital. Trop Geogr
Med 1995; 47(5): 212–215.
74. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics
2020: GLOBOCAN estimates of incidence and mortality
worldwide for 36 cancers in 185 countries. CA Cancer J Clin
2021; 71: 209–249.
75. Feuchtner J, Mathewos A, Solomon A, et al. Addis Ababa
population-based pattern of cancer therapy, Ethiopia. PLoS
ONE 2019; 14(9): e0219519.
76. Center MM, Jemal A, Smith RA, et al. Worldwide variations
in colorectal cancer. CA Cancer J Clin 2009; 59(6): 366–378.
77. Deressa BT, Cihoric N, Tefesse E, et al. Multidisciplinary
cancer management of colorectal cancer in Tikur Anbessa
Specialized Hospital, Ethiopia. J Glob Oncol 2019; 5: 1–7.