Section: Obstetrics & Gynaecology

Systematic Review Article

CHALLENGES IN DIAGNOSING ACUTE ABDOMEN IN PREGNANCY IN RESOURCE-LIMITED SETTINGS: A SYSTEMATIC REVIEW OF OBSTETRIC AND SURGICAL EMERGENCIES

Huda Noushad Pooventhodi[1], Fathima Shaza Movval Soopi[2], Ramesan C[3]

[1]*Former Junior Resident, Department of General Surgery, Government Medical College, Manjeri, Kerala, India.*
[2]*Former Assistant Surgeon, Government District Hospital, Kanhangad, Kasaragod, Kerala, India.*
[3]*Associate Professor, Department of General Surgery, Government Medical College, Manjeri, Kerala, India.*

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Corresponding Author:
Dr. Huda Noushad Pooventhodi,
Former Junior Resident, Department of General Surgery, Government Medical College, Manjeri, Kerala, India.
Email: hudanoush@gmail.com

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ABSTRACT

Background: Acute abdomen in pregnancy poses diagnostic challenges in resource-limited settings due to physiological changes, overlapping obstetric/surgical etiologies, limited imaging, and health system constraints**.**
Objective: To systematically review diagnostic and management challenges of acute abdomen in pregnancy in low-resource settings and propose context-specific recommendations.
Materials and Methods: Following PRISMA 2020 guidelines (including PRISMA-A), we searched PubMed, Scopus, and Google Scholar (Jan 2000–Oct 2025) for English-language peer-reviewed articles using terms like "acute abdomen", "pregnancy", "low-resource", "surgical/obstetric emergencies". Inclusion: observational studies, case series/reports, reviews from LMICs (low- and middle-income countries) addressing diagnosis/management of acute abdominal conditions in pregnancy. Exclusion: high-income settings only, opinion pieces. Data extracted on etiology, diagnostics, barriers, outcomes; quality assessed via Newcastle-Ottawa Scale (observational) and JBI checklists (case reports). Thematic synthesis conducted (no meta-analysis due to heterogeneity).
Results: From 352 records (plus 10 from references), 278 unique records were screened; 48 full-texts assessed; 18 studies included (mostly case reports/series from Africa/Asia). Key challenges: (1) pregnancy-altered anatomy/physiology masking signs, (2) nonspecific symptoms overlapping obstetric emergencies, (3) limited ultrasound accuracy/operator training, (4) unavailable CT/MRI, (5) referral delays, (6) surgical/anesthesia capacity gaps, (7) high morbidity from appendicitis/obstruction/rupture. Risk of bias: moderate-high (observational designs). Underutilized solutions: POCUS (Point-of-Care Ultrasound) training, referral protocols. **Limitations:** Heterogeneity, publication bias toward successful cases, few prospective LMIC studies.
Conclusion: Enhanced POCUS training, standardized protocols, and surgical capacity building are essential to improve outcomes in resource-limited settings.
Keywords: Acute abdomen, pregnancy, low-resource settings, obstetric emergencies, surgical emergencies, diagnostic challenges.

INTRODUCTION

Acute abdomen in pregnancy—characterized by the sudden onset of severe abdominal pain—is a complex challenge requiring prompt and accurate diagnosis. In resource constrained settings, where health-care infrastructure, diagnostics, and specialist care are limited, the stakes are even higher. Physiological and anatomical changes in pregnancy (e.g., displacement of intra-abdominal organs, leukocytosis, increased plasma volume) mask or mimic signs of surgical

pathology, making differentiation between obstetric and non-obstetric causes difficult.

Moreover, in many low- and middle-income countries (LMICs), access to advanced imaging (CT, MRI), multidisciplinary teams, and timely referral is inconsistent or absent. These limitations contribute to diagnostic delays, misdiagnosis, and increased maternal-fetal morbidity and mortality. Understanding the specific challenges in these settings is crucial to designing interventions that are context-appropriate and resource-sensitive.

This systematic review examines the literature on the epidemiology, diagnostic difficulties, management constraints, and proposed strategies to address acute abdomen in pregnancy in resource-limited environments, focusing on surgical versus obstetric emergencies.

MATERIALS AND METHODS

Search Strategy

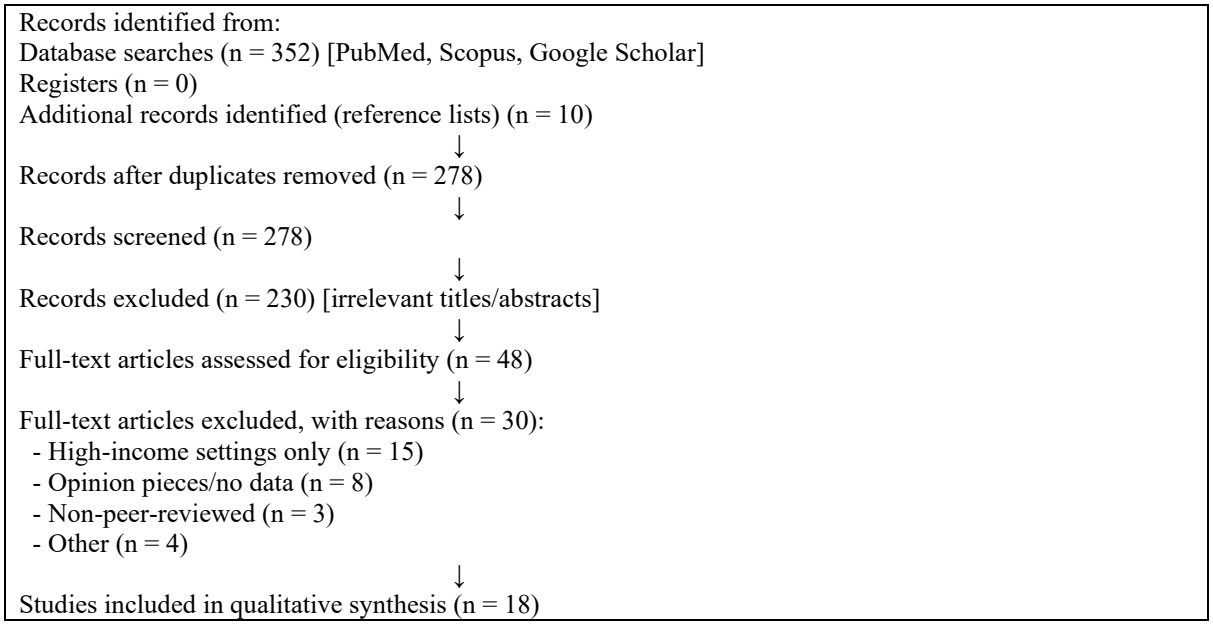
This systematic review was conducted and reported in accordance with the PRISMA 2020 guidelines. We performed a systematic search of PubMed, Scopus, and Google Scholar for articles published between January 2000 and October 2025. Search terms included "acute abdomen", "pregnancy", "surgical emergencies", "obstetric emergencies", "developing countries", "low-resource", "intestinal obstruction in pregnancy", "appendicitis in pregnancy", and "uterine rupture". Reference lists of key articles were also scanned to identify additional relevant literature.

Inclusion and Exclusion Criteria

Inclusion: Peer-reviewed original studies (cohorts, case series, case reports), systematic reviews, or retrospective analyses that addressed diagnosis, management, or system-level issues of acute abdominal conditions in pregnant women, specifically in resource-poor or low/middle-income settings.

Exclusion: Studies from exclusively high-income settings with no discussion of relevance to low-resource environments; opinion pieces without data; non–peer-reviewed sources.

Data Extraction: From each article, the following were extracted: country/setting, sample size, type of abdominal emergency, diagnostic tools used (clinical, lab, imaging), delays or barriers to diagnosis, management approach, outcomes (maternal/fetal), and proposed solutions. Quality was appraised using adapted criteria from the Newcastle–Ottawa Scale for observational data and standard checklists for case reports.



RESULTS

Epidemiology & Etiology

Prevalence in Pregnancy

Although acute abdomen in pregnancy is relatively uncommon, its incidence in LMICs may be underreported due to diagnostic and reporting challenges. For example, a retrospective study by Bhandari et al. (2017) from Nepal reported 56 pregnant patients undergoing appendectomy over several years, underscoring the burden even in resource-constrained settings.[1]

Surgical emergencies (non-obstetric) such as appendicitis, cholecystitis, and intestinal obstruction frequently coexist with obstetric conditions like ectopic pregnancy or uterine rupture, particularly in regions with limited prenatal surveillance.

Common Causes

Surgical (Non-Obstetric) Emergencies

1. **Appendicitis:** The most common non-obstetric surgical cause of acute abdomen in pregnancy. Its incidence is similar in developing settings to global rates, but delayed presentation is common (Bhandari et al., 2017).[1]

2. **Intestinal Obstruction:** (Webster PJ et al., 2015) recommend that urgent MRI of the abdomen should be undertaken to diagnose the etiology of SBO in pregnancy. In cases of adhesional small bowel obstruction, conservative treatment may be safely commenced, with a low threshold for laparotomy.[2]
3. **Other Rare Surgical Causes:** initial clinical assessment supported with imaging led to a successful outcome of acute abdomen in pregnancy in a low – middle resource country. (Anwar Sadat Seidu and colleague in Ghana., 2020),[3]

Obstetric Emergencies

1. **Uterine Rupture:** (Berhe Y et al., 2014) In resource-poor settings, uterine rupture is a reflection of ill-equipped, badly managed, and under resourced health care systems that seem largely indifferent to the reproductive health needs of women.[4]
2. **Ectopic Pregnancy:** Misdiagnosis can occur when obstructive or surgical symptoms mimic obstetric emergencies; resource-limited settings may lack serial hCG or high-resolution ultrasound.

Diagnostic Challenges

Physiological and Anatomical Alterations in Pregnancy

Pregnancy causes marked anatomical changes: the enlarging uterus displaces abdominal viscera, and peritoneal signs such as guarding may be muted (Tan & Tan, 2013).[5] These shifts make clinical examination less reliable. In addition, leukocytosis and mild tachycardia may be physiologic, reducing specificity of laboratory clues.

Overlap of Clinical Presentation

Symptoms of acute abdomen in pregnancy may mirror normal gestational complaints: nausea, vomiting, and abdominal discomfort. Obstetric emergencies, including abruption or uterine rupture, further complicate the picture. For instance, bowel obstruction may be mistaken for hyperemesis or preterm labor in low-resource settings.

Imaging Constraints in Low-Resource Settings

- **Ultrasonography:** (Wang Z et al., 2023) Ultrasound has moderate sensitivity for identifying appendicitis in pregnant women and may be utilized as an alternative diagnostic method.[6] Operator dependence, equipment quality, and lack of trained sonographers exacerbate the problem in low-resource settings.
- **Advanced Imaging (CT/MRI):** Often unavailable, unaffordable, or considered risky for the fetus. In many rural or underfunded settings, such imaging is not routinely offered. Even when available, referral delays may limit usefulness.
- **Diagnostic Laparoscopy:** Several physiologic changes in pregnancy may impact the presentation of abdominal pain in pregnancy. A high index of doubt must be used when evaluating a pregnant patient with abdominal pain. General anesthesia is considered safe in pregnancy. Intraoperative monitoring and tocolytics should be individualized. Laparoscopic surgery should be performed in the second trimester when possible and appears as safe as laparotomy (Kilpatrick & Monga, 2007).[7]

Laboratory Limitations

Routine labs (CBC {complete blood count}, CRP {C-Reactive protein}) are less reliable in pregnancy because of physiological changes. Elevated WBC may be normal, and other markers of inflammation may be non-specific, leading to over- or under-diagnosis.

Health System Barriers and Referral Delays

In many low-resource settings, peripheral health centers lack surgical expertise, obstetricians, anesthesiologists, and appropriate diagnostics. Referral systems are weak, transport is limited, and financial barriers may delay transfer. These factors together lead to late presentations and increased risk of complications.

Human Resource Constraints

Lack of multidisciplinary teams further complicates the situation. Surgeons and obstetricians in low-resource settings may have limited experience with pregnant patients needing non-obstetric surgery; anesthetic support may be inadequate. These deficiencies compromise both decision-making and surgical safety.

Management Challenges and Outcomes

Appendicitis in Pregnancy

- **Complicated Appendicitis Burden:** A systematic review and meta-analysis by Pitesa R et al.,(2025) found a significantly higher proportion of complicated appendicitis (perforation, abscess) in low- and lower-middle-income countries compared with higher-resource settings.[8]
- **Outcomes:** (Janicki MB et al., 2025) reported that it took twice as long to treat pregnant patients with antibiotics and perform an appendectomy. More perforations occurred in pregnant patients compared to nonpregnant patients.[9]
- **Open vs Laparoscopic Surgery:** (Hoffmann M et al., 2024) Ultrasound showed less diagnostic accuracy in pregnant women in our study. MRI is a useful tool to reduce uncertainty and the rate of negative appendectomies.[10]
- **Conservative Management Debate:** A meta-analysis by (Candrawinata et al.,2023) compared antibiotic-only therapy vs surgery in pregnant appendicitis. Though antibiotics may appear attractive where surgical resources are limited, the review found maternal and fetal risks, and current guidelines recommend caution.[11]
- **Practice Patterns in LMICs:** (Tanoli O et al., 2023) A sustained commitment from

governments, hospitals, healthcare providers, and industry is essential for the long-term adoption of laparoscopic surgery in LMICs. Achieving this requires stronger advocacy efforts and broader dissemination of the economic and social benefits of minimally invasive surgery.[12]

Intestinal Obstruction in Pregnancy

- **Epidemiology & Risk:** Johri G et al., (2016) reported a case of adhesive small-bowel obstruction in the second trimester in India, highlighting delayed radiographic evaluation due to pregnancy.[13]
- **Maternal-Fetal Risk:** Small bowel obstruction (SBO) during pregnancy carries substantial risk: in a review of 46 cases, the fetal loss rate was ~17%, and maternal mortality around 2% (Webster PJ et al.).[2]
- **Diagnostic Confusion:** A case from Tanzania (Lugata J et al., 2025) described first-trimester intestinal obstruction misdiagnosed as ectopic pregnancy, due to nonspecific symptoms and limited imaging.[14]
- **Uterine Rupture & Obstruction Overlap:** A BMC study (Shen J et al., 2023) reported a case of intestinal obstruction associated with uterine rupture.[15]
- **Other Rare Causes:** In Ghana, intussusception in pregnancy was managed successfully after prompt ultrasound assessment and laparotomy (Anwar Sadat Seidu et al, 2020).[3]

Obstetric Emergencies (Uterine Rupture)

- **High Burden in Poor Settings:** (Berhe Y et al.,2014) Uterine rupture remains a major obstetric problem in resource-poor countries. In industrialized, high-resource countries, uterine rupture occurs most often in women who have had a previous caesarean delivery, whereas in resource-poor nations, uterine rupture is more commonly associated with obstructed labor, injudicious obstetric interventions/manipulations (often performed by untrained birth attendants), lack of antenatal care, grand multiparity, and poor access to emergency obstetric care.[4]
- **Mortality and Morbidity:** Maternal-fetal mortality rates remain high in such settings; the study underscored the need for better emergency obstetric care infrastructure.

Other Rare Conditions

- **Mechanical Obstruction by Myoma & Ectopic:** In a low-resource case report, Adamou et al., 2018) described intestinal obstruction due to a leiomyoma (fibroid) compressing bowel in a woman with a ruptured ectopic pregnancy.[16]
- **Bowel Torsion:** A case report (Şagiroğlu et al., 2024) highlighted the challenges in diagnosing small bowel torsion in a pregnant woman, a condition that is a rare but life-threatening surgical emergency for both the mother and fetus.[17]

Interventions and Strategies to Overcome Challenges

Given the barriers identified, several pragmatic strategies emerge from the literature to improve diagnosis and management in resource-limited settings.

Clinical Protocols and Risk Stratification

Developing structured protocols tailored to low-resource environments can help standardize assessment. These protocols should combine clinical evaluation (history, vital signs), laboratory tests adapted for pregnancy, serial examinations, and risk stratification for time-sensitive referral.

Point-of-Care Ultrasound (POCUS)

Training non-specialist providers (midwives, general practitioners) in basic POCUS can bridge gaps in imaging. Portable ultrasound machines are increasingly affordable, and even limited training can improve detection of free fluid, distended bowel loops, or cholelithiasis.

Strengthening Referral Systems

Improved transportation, telecommunication, and referral algorithms are vital. Early recognition at peripheral centers and timely transfer to surgical or obstetric care with multidisciplinary teams can reduce delays. Use of telemedicine (video call, image sharing) can help peripheral clinicians seek specialist input.

Surgical Capacity Building

- **Training Surgeons and Obstetricians:** In regions with few specialists, cross-training in emergency surgery in pregnancy is essential.
- **Promoting Laparoscopy Where Possible:** (Tanoli O et al., 2023) For laparoscopic surgery to be embedded long term in LMICs, strong engagement from policymakers, institutions, staff, and industry is vital. Continued advocacy and effective communication of its broad benefits are key to securing this engagement.[12]
- **Safe Anesthesia and Perioperative Care:** Strengthening anesthesia services and perioperative monitoring is essential to make surgery safer.

Conservative Management with Caution

While antibiotic management of appendicitis may be tempting in areas lacking surgical capacity, systematic reviews (e.g., Candrawinata et al., 2023) warn of potential risks.[11] Conservative management should only be considered when surgical resources are unavailable, and with close monitoring and clear criteria for escalation.

Awareness, Education, and Training

Continuous education of healthcare workers at all levels (nurses, midwives, doctors) about atypical presentations of surgical emergencies in pregnancy is critical. Simulation-based training and mentoring can build clinical judgment for “red-flag” symptoms.

Health System Investment

Policymakers should prioritize investments in:

1. **Diagnostic infrastructure:** portable ultrasound, basic lab, safe transfusion capacity.

2. **Surgical and obstetric surgical capacity:** establishing centers that can handle pregnant surgical emergencies.
3. **Referral and transport networks:** enabling rapid transfer from rural clinics to tertiary centers.

DISCUSSION

Our review underscores that in resource-limited settings, diagnosing acute abdomen in pregnancy is particularly challenging, due to a confluence of clinical, systemic, and infrastructural barriers.

Diagnostic complexity arises from the physiological changes of pregnancy, the nonspecific nature of symptoms, and the overlap with obstetric emergencies. Imaging limitations—especially lack of advanced modalities—and reliance on operator-dependent ultrasound amplify risk of misdiagnosis or delay. Laboratory markers are less reliable, and human resource constraints (lack of specialists) further limit timely diagnosis and safe management.

Management challenges are significant. Appendicitis studies show higher rates of complicated disease in LMICs (Pitesa et al., 2025).[8] (Zorn J et al., 2022) Meckel's diverticulum, although less commonly the cause of a small bowel obstruction in the adult population, needs to be on the differential diagnosis and we need to have a high clinical suspicion for this possibility to ensure appropriate treatment in a timely manner.[18] Uterine rupture remains a major obstetric problem in resource-poor countries. In industrialized, high-resource countries, uterine rupture occurs most often in women who have had a previous cesarean delivery, whereas in resource-poor nations, uterine rupture is more commonly associated with obstructed labor (Berhe Y et al., 2014).[4]

Nevertheless, promising strategies exist. Building clinical algorithms, training in POCUS, strengthening referral systems, and cross-training surgical and obstetric teams can mitigate many of the challenges. Importantly, any intervention must be adapted to local realities: what works in one low-resource setting may not be feasible in another due to differences in infrastructure, transport, workforce, and funding.

Limitations of the Evidence: Much of the literature comes from case reports or small case series. There is a lack of large prospective studies from very low-income countries. Publication bias may favor successful cases. Moreover, resource-limited settings are heterogeneous: infrastructure, health systems, and epidemiology vary widely.

Recommendations

Based on the evidence, we propose:

1. **Develop locally-adapted clinical protocols** for evaluation of acute abdomen in pregnancy, including red-flag criteria, observational pathways, and decision-support tools.
2. **Implement POCUS training programs** for non-specialist providers, using portable ultrasound devices, with mentorship and referral linkage to specialists.
3. **Strengthen referral networks** with transport and communication systems, and establish telemedicine hubs for remote consultation.
4. **Build surgical capacity** by training general surgeons, obstetricians, and anesthetists in managing pregnant patients, including laparoscopic skills and perioperative care.
5. **Prioritize infrastructure investments**: affordable imaging, blood transfusion services, neonatal care, and dedicated obstetric-surgical emergency units.
6. **Promote research:** multi-center, prospective studies in low-resource settings to define optimal diagnostic and management strategies, and to evaluate the cost-effectiveness of interventions.

CONCLUSION

Diagnosing and managing acute abdomen in pregnancy in resource-limited settings is fraught with challenges. The intersection of overlapping symptomatology, altered physiology, limited diagnostics, and system-level constraints poses significant risks to mothers and fetuses. However, context-appropriate strategies—such as building clinical capacity, expanding use of point-of-care diagnostics, strengthening referral and surgical infrastructure, and investing in tailored protocols—offer realistic pathways to improving outcomes.

To reduce morbidity and mortality, stakeholders must commit to structural changes, capacity building, and sustained research focused on the unique challenges of acute abdominal emergencies in pregnancy within low-resource environments.

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