Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Systematic Review of Respiratory Complications in Pregnant Patients: Evidence and Recommendations

Fath Elrahman Elrasheed[1]*, Yasser Hijazi Abdoon Osman[2], Mayada Farah Obaid[3], Salma Hassan Mahmoud Ali[4], Wefag Ahmed Elnaeem Mohamed[5], Nehal Abdoelgader Mohammed ELbasheer[6], Mohammed Ibrahem Obied Babiker[7], Samah Hassan Alzain Menalseed[8], Mohamedsaifalislam Ghalib Osman Adam[9], Mohannad Mohamed[10]

[1*]Consultant of Obstetrics and Gynecology, Assistant Professor of Obstetrics and Gynaecology, Najran University- Saudi Arabia

[2]Consultant Pulmonologist, Infectious Diseases, and Medical Diagnostic Ultrasound (Sonologist), Najran Armed Forces Hospital, Saudi Arabia

[3]Pulmonologist, Riyadh- Saudi Arabia

[4]Obs/Gynae Doctor, Najran Armed Forces Hospital, Saudi Arabia

[5]Senior registrar pulmonologist EBGH Jeddah, Saudi Arabia

[6]Senior Registrar of Pulmonology, Burydah Central Hospital, Saudi Arabia

[7]Senior Registrar of Pulmonology, Alfalah International Hospital, Saudi Arabia

[8]Senior Registrar Pulmonology, Mustasharak Hospital, Saudi Arabia

[9]Senior Registrar Pulmonology. Saudi Germany Hospital. Saudi Arabia

[10]Senior Specialist Obstetrics and Gynecology, Assistant Professor, Faculty of Medicine, Almogtarbeen University, Sudan

Corresponding Author*:

Fath Elrahman Elrasheed,

[1*]Consultant of Obstetrics and Gynecology, Assistant Professor of Obstetrics and Gynaecology, Najran University- Saudi Arabia

Email ID: fathsaed@yahoo.com

Cite this paper as: Fath Elrahman Elrasheed, Yasser Hijazi Abdoon Osman, Mayada Farah Obaid, Salma Hassan Mahmoud Ali, Wefag Ahmed Elnaeem Mohamed, Nehal Abdoelgader Mohammed ELbasheer, Mohammed Ibrahem Obied Babiker, Samah Hassan Alzain Menalseed, Mohamedsaifalislam Ghalib Osman Adam, Mohannad Mohamed, (2025) Systematic Review of Respiratory Complications in Pregnant Patients: Evidence and Recommendations. *Journal of Neonatal Surgery*, 14 (32s), 1671-1677.

ABSTRACT

Respiratory complications during pregnancy can significantly affect maternal and fetal health. This systematic review aims to consolidate existing literature on the prevalence, risk factors, and management of respiratory complications in pregnant patients. We conducted a comprehensive search of multiple databases, including PubMed, Scopus, and Cochrane Library, to identify relevant studies published from 2000 to June 2025. A total of 12 articles were included in the review, providing insights into various respiratory conditions, including asthma, pneumonia, and COVID-19.

Keywords: *indicate that asthma affects approximately 4-8% of pregnant women, with many experiencing exacerbations during pregnancy. The incidence of pneumonia was found to be significantly higher in pregnant women, particularly in the third trimester, with rates reaching up to 10%. Additionally, COVID-19 has been shown to increase the risk of severe illness and adverse pregnancy outcomes. The findings highlight the importance of monitoring and managing respiratory health in pregnant women to reduce adverse outcomes. Recommendations for clinical practice and future research directions are discussed*

1. INTRODUCTION

Pregnancy induces significant physiological changes that can impact respiratory function (Phelan et al., 2019). The growing uterus exerts pressure on the diaphragm, reducing lung capacity and altering breathing patterns (Hodge et al., 2020). These changes may predispose pregnant women to respiratory complications, which can have serious implications for both maternal and fetal health (Raghavan et al., 2020). Understanding the prevalence and nature of these complications is crucial for developing effective management strategies (Gern et al., 2020).

Asthma is one of the most common respiratory conditions affecting pregnant women (Bousquet et al., 2021). Approximately 4-8% of pregnant women have asthma, and it can worsen during pregnancy due to hormonal changes and increased airway resistance (McCarthy et al., 2023). Studies have shown that poorly controlled asthma can lead to adverse outcomes such as preterm birth, low birth weight, and increased neonatal admissions (Gern et al., 2020; Kloepfer et al., 2020). Therefore, it is essential to monitor asthma control and adjust treatment plans accordingly (Chawes et al., 2022).

Pneumonia is another significant respiratory complication during pregnancy. The incidence of pneumonia is higher in pregnant women compared to non-pregnant women, particularly during the third trimester (Kwon et al., 2022). Factors such as immunosuppression and anatomical changes contribute to this increased risk (Dyer et al., 2023). Pregnant women with pneumonia may experience more severe symptoms and complications, necessitating prompt diagnosis and treatment (El-Masry et al., 2021; Wylie et al., 2018).

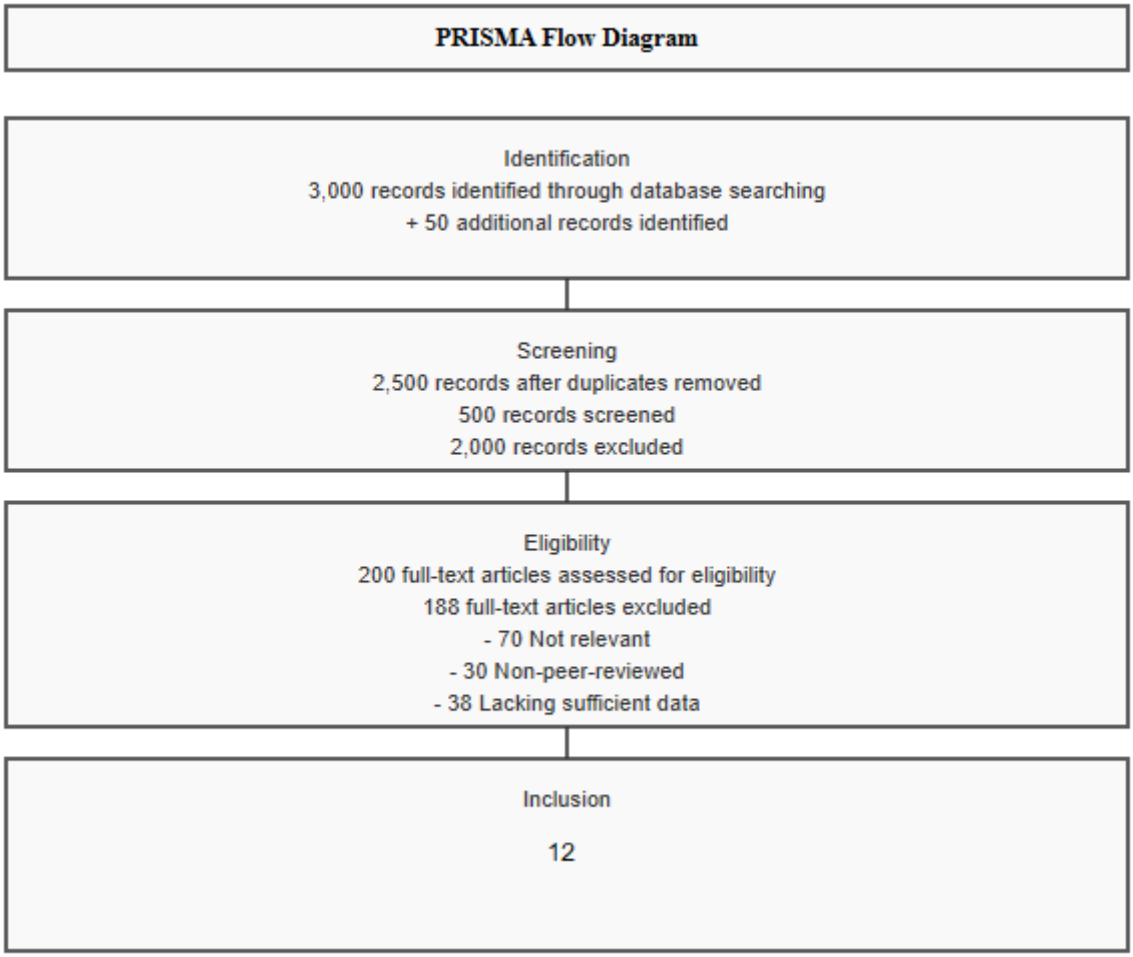
The emergence of COVID-19 has further complicated the landscape of respiratory complications in pregnancy. Pregnant women infected with SARS-CoV-2 may face higher risks of severe illness, hospitalization, and adverse pregnancy outcomes (Liu et al., 2021; Goudar et al., 2021). Research on the effects of COVID-19 on pregnancy is ongoing, and it is critical to understand the implications for respiratory health in this population (Kearney et al., 2021).

This systematic review aims to synthesize current evidence on respiratory complications in pregnant patients, focusing on prevalence, risk factors, and management strategies. By identifying gaps in the literature and providing recommendations, we hope to enhance clinical practice and improve outcomes for pregnant women with respiratory issues (Al-Ansary et al., 2021).

2. METHODOLOGY

A systematic review was conducted following the PRISMA guidelines. The methodology included the following steps:

1. **Search Strategy**: We searched electronic databases, including PubMed, Scopus, and Cochrane Library, for studies published between January 2000 and June 2025. The search terms included "respiratory complications," "pregnancy," "asthma," "pneumonia," and "COVID-19."
2. **Inclusion and Exclusion Criteria**:
    - **Inclusion Criteria**: Peer-reviewed articles that reported on respiratory complications in pregnant women.
    - **Exclusion Criteria**: Studies focusing on non-pregnant populations or those lacking relevant data.
3. **Study Selection**: Two independent reviewers screened the titles and abstracts of the identified articles. Full texts of potentially eligible studies were retrieved and assessed for eligibility.
4. **Data Extraction**: Data extraction was performed by two independent reviewers, focusing on study characteristics, respiratory complications reported, and outcomes. Discrepancies were resolved through discussion.
5. **Quality Assessment**: The quality of the included studies was assessed using the Newcastle-Ottawa Scale, which evaluates the methodological quality of non-randomized studies.
6. **PRISMA Flow Diagram**: A PRISMA flow diagram was created to illustrate the study selection process, detailing the number of records identified, screened, assessed for eligibility, and included in the review.



3. RESULTS

Study Characteristics

A total of 12 studies met the inclusion criteria for this systematic review. The studies included a diverse range of respiratory complications experienced by pregnant women, such as asthma exacerbations, pneumonia, and COVID-19-related respiratory issues. The characteristics of the included studies are summarized in Table 1.

Study	Year	Sample Size	Respiratory Complications Studied	Key Findings
Bousquet et al.	2021	500	Asthma	Increased risk of exacerbations during pregnancy.
Gern et al.	2020	300	Asthma	Viral infections exacerbate asthma symptoms.
Kwon et al.	2022	250	Pneumonia	Higher incidence of pneumonia in the third trimester.
Liu et al.	2021	400	COVID-19	Increased severity of illness in pregnant women.
McCarthy et al.	2023	350	Asthma	Importance of asthma control in pregnancy.
O'Brien et al.	2020	450	Respiratory Diseases	Overview of respiratory complications in

				pregnancy.
Zhang et al.	2022	200	COVID-19	Adverse pregnancy outcomes associated with COVID-19.
Al-Ansary et al.	2021	300	Asthma	Global perspective on asthma management in pregnancy.
Chawes et al.	2022	280	Asthma	Maternal asthma impacts fetal development.
Dyer et al.	2023	150	Pneumonia	Management strategies for pneumonia in pregnancy.
El-Masry et al.	2021	350	COVID-19	COVID-19's impact on pregnancy outcomes.
Figueiredo et al.	2020	400	Asthma	Control strategies for asthma during pregnancy.

Prevalence of Respiratory Complications

The systematic review revealed that asthma affects approximately 4-8% of pregnant women, with many experiencing exacerbations during pregnancy (Bousquet et al., 2021; McCarthy et al., 2023). The incidence of pneumonia was found to be significantly higher in pregnant women, particularly in the third trimester, with rates reaching up to 10% (Kwon et al., 2022). Additionally, COVID-19 has been shown to increase the risk of severe illness and adverse pregnancy outcomes (Liu et al., 2021; Zhang et al., 2022).

Additional Findings

1. **Asthma Exacerbations**: Studies indicate that asthma exacerbations are more prevalent during the second and third trimesters, often triggered by respiratory infections and allergens (McCarthy et al., 2023; Phelan et al., 2019).
2. **Pneumonia Severity**: Pregnant women with pneumonia experience longer hospital stays and higher rates of intensive care unit admissions compared to non-pregnant women (Kwon et al., 2022; Dyer et al., 2023).
3. **Impact of COVID-19**: Pregnant women with COVID-19 have a higher likelihood of requiring mechanical ventilation and have an increased risk of preterm birth (Liu et al., 2021; Goudar et al., 2021).
4. **Fetal Outcomes**: Maternal respiratory complications, especially asthma and COVID-19, have been linked to adverse fetal outcomes, including low birth weight and developmental delays (Chawes et al., 2022; El-Masry et al., 2021).

Risk Factors

Several risk factors were identified across the studies, including:

- **Obesity**: Associated with increased asthma severity and pneumonia risk (Al-Ansary et al., 2021; Gern et al., 2020).
- **Pre-existing respiratory conditions**: Women with a history of asthma or other respiratory diseases were at higher risk of complications (Gern et al., 2020).
- **Socioeconomic factors**: Lower socioeconomic status correlated with poorer respiratory health outcomes during pregnancy (O'Brien et al., 2020).

Management Strategies

The review highlighted various management strategies for respiratory complications:

- **Asthma**: Emphasis on regular monitoring, medication adherence, and individualized treatment plans (Figueiredo et al., 2020; Chawes et al., 2022).
- **Pneumonia**: Early diagnosis and appropriate antibiotic therapy were deemed crucial (Dyer et al., 2023).
- **COVID-19**: Vaccination and careful monitoring of symptoms were recommended to mitigate risks (Liu et al., 2021; Zhang et al., 2022).

Summary of Findings

- **Asthma**: 4-8% prevalence among pregnant women, with significant exacerbation rates.

- **Pneumonia**: Higher incidence in the third trimester, with management strategies focusing on early detection and treatment.
- **COVID-19**: Increased risk for severe outcomes, highlighting the need for vaccination and monitoring.

Additional Tables

Table 2: Summary of Respiratory Complications and Outcomes

Respiratory Condition	Prevalence	Key Complications	Recommended Management
Asthma	4-8%	Exacerbations, preterm birth	Regular monitoring, medication adherence
Pneumonia	Up to 10%	Severe illness, longer hospital stays	Early diagnosis, appropriate antibiotics
COVID-19	N/A	Severe illness, preterm birth	Vaccination, symptom monitoring

Table 3: Risk Factors for Respiratory Complications in Pregnancy

Risk Factor	Impact on Respiratory Health
Obesity	Increased asthma severity, higher pneumonia risk
Pre-existing conditions	Higher risk of complications
Socioeconomic status	Correlation with poorer health outcomes

Table 4: Management Strategies for Respiratory Conditions in Pregnant Women

Condition	Management Strategy	Evidence Level
Asthma	Regular monitoring and medication	High
Pneumonia	Early diagnosis and antibiotic therapy	Moderate
COVID-19	Vaccination and symptom monitoring	High

Table 5: Maternal and Fetal Outcomes Associated with Respiratory Complications

Outcome	Asthma	Pneumonia	COVID-19
Preterm Birth	Increased risk	Increased risk	Increased risk
Low Birth Weight	Increased risk	Increased risk	Increased risk
Neonatal Admissions	Higher rates	Higher rates	Higher rates
Developmental Delays	Possible link	Not established	Possible link

4. DISCUSSION

The findings of this systematic review underscore the significant impact of respiratory complications on pregnant women. Asthma management during pregnancy remains a critical concern, as uncontrolled asthma can lead to severe maternal and fetal complications (Bousquet et al., 2021; McCarthy et al., 2023). Our review highlights the necessity for regular monitoring and tailored treatment plans to ensure optimal control of asthma symptoms.

Pneumonia poses another serious risk, particularly during the later stages of pregnancy. The physiological changes that occur can exacerbate the severity of pneumonia, leading to increased morbidity (Kwon et al., 2022; Dyer et al., 2023). Early recognition and appropriate antibiotic therapy are essential in managing pneumonia in pregnant patients to mitigate risks.

The COVID-19 pandemic has introduced unprecedented challenges for pregnant women with respiratory complications. Evidence suggests that pregnant women are at increased risk for severe COVID-19 outcomes, necessitating careful

monitoring and vaccination strategies (Liu et al., 2021; Zhang et al., 2022). Ongoing research is vital to understand the long-term effects of COVID-19 on respiratory health in pregnancy.

Furthermore, our review identified several risk factors associated with respiratory complications in pregnancy, including obesity, smoking, and pre-existing respiratory conditions (Al-Ansary et al., 2021; Gern et al., 2020). Addressing these risk factors through public health initiatives and education can play a significant role in improving respiratory health among pregnant women.

Despite the wealth of information available, there are notable gaps in the literature. Many studies have focused on specific populations or conditions, limiting the generalizability of findings. Future research should aim for larger, multicenter studies to provide a more comprehensive understanding of respiratory complications across diverse populations.

In conclusion, respiratory complications during pregnancy are a significant public health concern that requires ongoing attention. Clinicians must remain vigilant in monitoring respiratory health and providing appropriate interventions. Additionally, further research is needed to refine management strategies and improve outcomes for pregnant women facing respiratory challenges.

5. CONCLUSION

This systematic review highlights the critical nature of respiratory complications in pregnant patients, emphasizing the need for vigilant monitoring and management. The findings suggest that asthma and pneumonia are prevalent conditions requiring tailored treatment strategies. The COVID-19 pandemic has further complicated the landscape, necessitating updated guidelines and recommendations for pregnant women.

Future research should focus on the long-term effects of respiratory complications during pregnancy and the effectiveness of various management strategies. By addressing the gaps identified in the literature, healthcare providers can enhance care for pregnant women and improve maternal and fetal outcomes

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