

# EPIDEMIOLOGY, RISK FACTORS, AND OUTCOMES OF URINARY TRACT INFECTIONS IN PREGNANT WOMEN: A REVIEW

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**Abstract:** Urinary tract infections (UTIs) are a prevalent health concern during pregnancy, often leading to significant maternal and fetal complications if untreated. This review explores the epidemiology, risk factors, outcomes, and management of UTIs in pregnant women. UTIs during pregnancy are influenced by hormonal, anatomical, behavioral, socioeconomic, and medical factors. Elevated levels of progesterone and estrogen, along with anatomical changes like ureteral dilation and increased bladder capacity, promote urinary stasis and bacterial growth. Behavioral factors, including poor hygiene practices and delayed urination, further exacerbate the risk.

If untreated, UTIs can result in severe complications such as pyelonephritis, preeclampsia, anemia, preterm labor, intrauterine growth restriction, low birth weight, and perinatal death. Screening for asymptomatic bacteriuria, particularly during the first trimester, is crucial for early detection. Urine culture remains the gold standard for diagnosis, guiding targeted antibiotic therapy to reduce complications.

Preventive strategies include encouraging hydration, promoting personal hygiene, educating women about risk factors and symptoms, and integrating these measures into routine prenatal care. Addressing socioeconomic disparities and incorporating antimicrobial stewardship are vital for long-term management. This review emphasizes the need for a multidisciplinary approach to reduce UTI-related complications, safeguarding maternal and fetal health during pregnancy.

**Keywords:** Urinary tract infections (UTIs), bacterial growth, risk factors and symptoms, pregnant women.

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## 1. INTRODUCTION

Urinary tract infections (UTIs) are among the most prevalent bacterial infections globally, resulting from the presence and proliferation of microorganisms within any segment of the urinary tract (Demilie et al., 2012; Emiru et al., 2013; Ilusanya et al., 2018). These infections can manifest as either symptomatic or asymptomatic conditions (Zhao et al., 2020). In pregnant women, UTIs are typically categorized into asymptomatic bacteriuria (ASB) and symptomatic infections, which include lower tract infections like acute cystitis and upper tract infections such as acute pyelonephritis (Schnarr et al., 2008).

The prevalence of UTIs during pregnancy varies significantly across different populations. Studies indicate rates ranging from 2% to 10% in developed countries (Givler et al., 2023; Sheppard et al., 2023), while certain regions in Asia report higher rates between 17% and 25.3% (Prasanna et al., 2015; Singh et al., 2019). In Nigeria, prevalence rates among pregnant women have been reported to range from 15.1% to 86.6% (Imade et al., 2010).

Several risk factors increase the susceptibility of pregnant women to UTIs. These include anatomical and physiological changes during pregnancy, such as ureteral dilation and urinary stasis, as well as behavioral factors like frequent sexual intercourse and poor personal hygiene (Alemu et al., 2012). Additionally, conditions such as diabetes, sickle cell disease, and a history of UTIs further elevate the risk (Vardi et al., 2012). Socioeconomic factors, including low educational levels and limited access to healthcare, also play a significant role in the prevalence of UTIs among pregnant women (Salari et al., 2023).

If left untreated, UTIs during pregnancy can lead to severe complications for both the mother and the fetus. Maternal complications may include pyelonephritis, hypertension, preeclampsia, anemia, endometritis, renal scarring, and renal failure (Rizvi et al., 2011; Amiri et al., 2015). Fetal risks encompass preterm labor, low birth weight, intrauterine growth restriction, and increased perinatal mortality (Gilbert et al., 2013).

Given the potential adverse outcomes, early detection and appropriate management of UTIs in pregnant women are crucial. Screening for ASB during pregnancy, typically between 12 to 16 weeks of gestation, is recommended to prevent progression to symptomatic infections and associated complications (Nicolle et al., 2019). Timely treatment can significantly reduce the risk of adverse maternal and fetal outcomes (Assafi et al., 2015).

This review aims to explore the epidemiology, risk factors, and outcomes of UTIs in pregnant women, with a focus on understanding the impact of these infections on maternal and fetal health. By examining current evidence, the review seeks to inform clinical management and prenatal care strategies to mitigate the risks associated with UTIs during pregnancy.

## 2. EPIDEMIOLOGY OF UTIS IN PREGNANCY

Urinary tract infections (UTIs) are among the most common bacterial infections affecting pregnant women worldwide, with prevalence rates varying significantly across different regions and populations. Globally, the prevalence of UTIs in pregnant women is estimated at 23.9% (Azami et al., 2019). This variation is influenced by factors such as socioeconomic status, access to healthcare, personal hygiene practices, and diagnostic methodologies.

### 2.1 Global Prevalence of Urinary Tract Infections in Pregnancy

Urinary tract infections (UTIs) are among the most common bacterial infections affecting pregnant women worldwide, with a global prevalence estimated at 23.9% (Azami et al., 2019). This significant rate underscores the importance of understanding the distribution and determinants of UTIs during pregnancy to inform effective prevention and management strategies.

The prevalence of UTIs in pregnant women varies considerably across different regions and countries. For instance, studies have reported prevalence rates of 59% in Kenya, 23.34% in Nepal, 16.4% in Somaliland, 23% in Ethiopia, 71.43% in Cameroon, 45.32% in Lucknow, India, 60.7% in India, 55% in Nigeria, 29% in Egypt, 8.7% in Iran, and 70.9% in Sudan (Azami et al., 2019; Abate et al., 2020; Kiiru et al., 2023). These variations can be attributed to differences in socioeconomic conditions, healthcare access, diagnostic practices, and cultural behaviors related to personal hygiene and healthcare-seeking behaviors.

In developed countries, the prevalence of UTIs during pregnancy tends to be lower, ranging from 2% to 10% (Givler et al., 2023; Sheppard et al., 2023). This lower prevalence may be due to better access to healthcare services, routine screening programs, and higher awareness of personal hygiene practices. In contrast, developing countries often report higher prevalence rates, which can be linked to limited healthcare infrastructure, lower socioeconomic status, and cultural practices that may predispose women to infections.

The global burden of UTIs in pregnancy is further complicated by the emergence of antimicrobial resistance, which poses challenges to effective treatment (Matuszkiewicz et al., 2015). This highlights the need for continuous surveillance and tailored interventions to address the specific risk factors prevalent in different regions.

Understanding the global prevalence of UTIs in pregnancy is crucial for developing targeted public health policies and interventions aimed at reducing the incidence and associated complications of these infections. Efforts should focus on improving access to quality healthcare, promoting routine screening, enhancing personal hygiene practices, and addressing socioeconomic determinants that contribute to the high prevalence of UTIs among pregnant women worldwide.

## 2.2 Regional Variations in UTI Prevalence

The prevalence of urinary tract infections (UTIs) during pregnancy exhibits significant regional variations, influenced by factors such as socioeconomic status, healthcare infrastructure, cultural practices, and diagnostic methodologies. In sub-Saharan Africa, the overall prevalence of UTIs among pregnant women is estimated at 32.12%, with notable differences across countries (Mwang'onde et al., 2022). For instance, South Africa reported a prevalence of 67.6%, Nigeria 43.65%, and Zambia 38.25% (Mwang'onde et al., 2022). These disparities may result from variations in healthcare access, diagnostic capabilities, and local practices related to personal hygiene and healthcare utilization.

In East Africa, studies have reported varying prevalence rates among pregnant women. For example, a study in Kenya found a prevalence of 23.5%, while research in southeast Ethiopia reported 27.3%, and southwestern Uganda noted 28.78% (Mohamed et al., 2024). These differences may be attributed to local social norms, environmental factors, and differences in healthcare infrastructure.

In West Africa, the prevalence of UTIs among pregnant women also varies. In Ghana, studies reported prevalence rates of 19.2% and 39.8% (Mlugu et al., 2023), while in Nigeria, rates ranged from 9% in Kano to 30.4% in Nasarawa (Kani et al., 2015; Alao et al., 2021). These variations may be due to differences in study participants' socioeconomic levels, cultural and religious behaviors related to personal hygiene, and healthcare access.

In North Africa, a study in Sudan reported a prevalence of 14% among pregnant women (Mlugu et al., 2023). This lower prevalence compared to other regions may reflect differences in healthcare infrastructure and diagnostic practices.

In the Middle East, studies have shown varying prevalence rates. For instance, research in Iran reported a prevalence of 8.9%, while a study in Saudi Arabia found a prevalence of 1.7% (Belete & Saravanan, 2020). These lower rates may be associated with better healthcare access and routine screening programs.

In South Asia, prevalence rates among pregnant women also vary. Studies in India reported rates ranging from 20.1% to 28.0% (Ranjan et al., 2017; Takre et al., 2015), while research in Nepal found a prevalence of 30.5% (Belete & Saravanan, 2020). These differences may be influenced by socioeconomic factors, healthcare access, and cultural practices.

These regional variations highlight the importance of context-specific strategies for the prevention and management of UTIs during pregnancy. Tailoring interventions to address local risk factors, improving healthcare infrastructure, and promoting awareness can help reduce the burden of UTIs among pregnant women in different regions.

## 2.3 Prevalence of UTIs in Nigeria

Urinary tract infections (UTIs) are a significant health concern among pregnant women in Nigeria, with prevalence rates varying across different regions and studies. Research indicates that the prevalence of UTIs among pregnant women in Nigeria ranges from 15.1% to as high as 86.6%, depending on the study population and diagnostic criteria used (Imade et al., 2010).

For instance, a study conducted in Ile-Ife, southwestern Nigeria, reported a UTI prevalence of 20% among pregnant women attending antenatal clinics (Onifade & Oladipo, 2019). In contrast, research in Enugu metropolis found a higher prevalence rate of 39.8% (Ezugwu et al., 2021). Similarly, a study in Onitsha, southeastern Nigeria, reported a prevalence of 56% among pregnant women (Nwachukwu et al., 2018). These variations highlight the influence of regional factors, study methodologies, and population characteristics on UTI prevalence rates.

Several factors contribute to the high prevalence of UTIs among pregnant women in Nigeria. Socioeconomic status plays a crucial role, as limited access to quality healthcare services and poor personal hygiene practices can increase susceptibility to infections. Additionally, physiological changes during pregnancy, such as hormonal fluctuations and alterations in the urinary tract, can predispose women to UTIs. Cultural practices and awareness levels regarding UTI prevention and management also significantly impact prevalence rates.

The wide range of reported prevalence rates underscores the need for standardized diagnostic criteria and comprehensive screening programs across Nigeria. Implementing routine urine culture screenings during antenatal visits, as recommended by the Infectious Disease Society of America (IDSA) and the U.S. Preventive Services Task Force, can aid in early detection and treatment of asymptomatic bacteriuria, thereby reducing the risk of complications (Nicolle et al., 2019).

### 3. RISK FACTORS FOR UTIS IN PREGNANT WOMEN

Urinary tract infections (UTIs) are prevalent among pregnant women, with various factors contributing to their increased susceptibility. Understanding these risk factors is crucial for effective prevention and management.

#### 3.1 Biological and Physiological Factors

Pregnancy induces profound hormonal and anatomical changes that significantly elevate the risk of urinary tract infections (UTIs). The dramatic rise in progesterone and estrogen levels causes relaxation of the smooth muscles in the urinary tract, particularly affecting the ureters and bladder. This hormonal effect leads to urinary stasis and vesicoureteral reflux, creating conditions that facilitate bacterial colonization and growth (Taye et al., 2018; Szweida & Jóźwik, 2016).

The expanding uterus during pregnancy exerts increasing mechanical pressure on the urinary system, specifically impacting the bladder and ureters. This compression further impedes normal urine flow and promotes stasis, particularly pronounced in the later stages of pregnancy (Habak et al., 2023). Research indicates that these physiological alterations reach their peak during the third trimester, correlating with the highest observed incidence of UTIs during this period (Oladehinde et al., 2015; Gilbert et al., 2021).

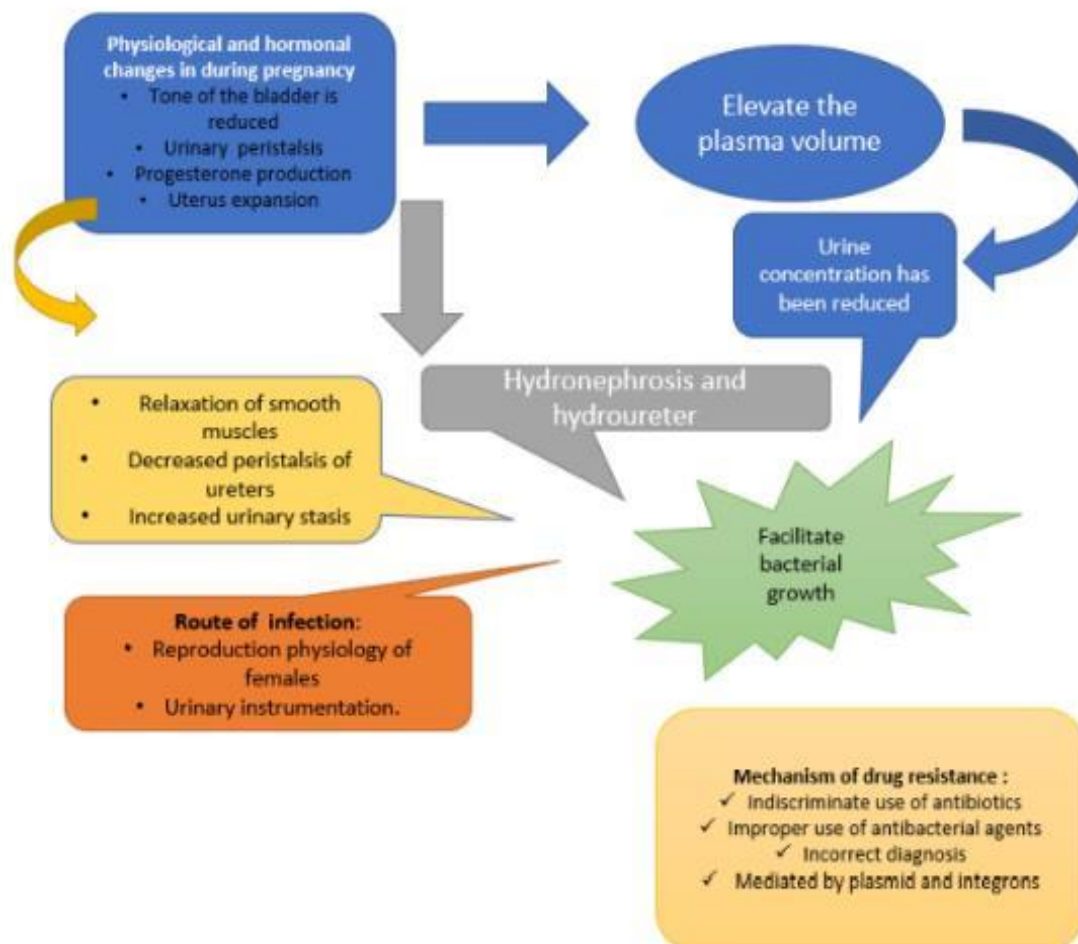


Figure 1: Risk Factors of UTI among Pregnant Women

The significant increase in plasma volume characteristic of pregnancy results in hemodilution, which extends to the urinary system. This dilution reduces the natural antibacterial properties of urine, creating a more favorable environment for bacterial proliferation (Le et al., 2019). Structural modifications of the urinary tract are equally significant, with studies documenting urethral dilation and decreased bladder tone in up to 90% of pregnant women (Habak et al., 2023; Foxman, 2016).

These physiological adaptations collectively create an environment highly conducive to bacterial colonization and infection. The combination of hormonal changes, mechanical compression, altered urinary composition, and structural modifications significantly increases susceptibility to UTIs during pregnancy (Szweda & Józwick, 2016; Glaser & Schaeffer, 2015). Understanding these biological factors is crucial for healthcare providers in developing effective prevention strategies and treatment protocols for pregnant women.

### 3.2 Behavioral and Lifestyle Factors

The risk of urinary tract infections (UTIs) during pregnancy is significantly influenced by various behavioral and lifestyle factors that warrant careful attention. Sexual activity represents a primary concern, as it can facilitate the introduction of bacteria into the urinary tract, potentially leading to infection. Research indicates that pregnant women who are sexually active face an elevated risk of developing UTIs compared to those who are not (Amiri et al., 2015; Brooks & Darcy, 2019).

Physical changes during pregnancy, particularly the enlarged abdomen, can present challenges in maintaining optimal personal hygiene practices. This difficulty in proper cleaning and care can increase the likelihood of bacterial colonization in the urogenital area (Dimetry et al., 2007). Studies have also demonstrated that clothing choices play a crucial role, with non-cotton undergarments being particularly problematic as they can create a moisture-rich environment conducive to bacterial proliferation (Wilson & Chen, 2020).

Poor urination habits, especially the tendency to delay voiding, can significantly impact UTI risk. Retention of urine provides extended opportunities for bacterial multiplication within the urinary tract (Yaliwal et al., 2020). Research has established that implementing proper hygiene practices can substantially reduce infection risk. These practices include maintaining a front-to-back wiping technique after toilet use, urinating both before and after sexual activity, and selecting appropriate clothing materials (Griebing et al., 2007).

Healthcare providers play a vital role in prevention through patient education. Evidence-based counseling should focus on behavioral modifications and proper hygiene practices to minimize bacterial contamination of the urethral meatus (Kalinderi et al., 2018). This preventive approach, combined with regular monitoring and early intervention, when necessary, has been shown to significantly reduce the incidence of UTIs in pregnant women.

### 3.3 Socioeconomic and Demographic Factors

Research demonstrates that socioeconomic and demographic factors play a substantial role in determining urinary tract infection (UTI) risk during pregnancy, with several key variables emerging as significant predictors. Advanced maternal age has been consistently identified as a risk factor, with studies showing higher UTI incidence among older pregnant women. This increased susceptibility is primarily attributed to age-related declines in immune function and physiological changes that occur over time (Manjula et al., 2013; Wilson et al., 2019).

Socioeconomic status emerges as a critical determinant, with evidence indicating that women from lower socioeconomic backgrounds face elevated UTI risks during pregnancy. This correlation appears to stem from multiple factors, including limited access to healthcare services, suboptimal sanitation facilities, and crowded living conditions that may compromise hygiene practices (Derese et al., 2016).

Educational attainment demonstrates a complex relationship with UTI risk during pregnancy. Multiple studies suggest that lower education levels correlate with reduced awareness of UTI risk factors and preventive measures, potentially contributing to higher infection rates (Haider et al., 2010; Anderson & Lee, 2018). However, this association is not universally supported, as some research has found no significant relationship between educational background and UTI incidence (Jennifer et al., 2012).

The impact of these socioeconomic and demographic factors is particularly pronounced in developing regions, where cultural practices and healthcare access disparities can exacerbate existing risks. Research indicates that limited healthcare infrastructure, combined with cultural barriers to seeking medical care, can lead to delayed diagnosis and treatment of UTIs during pregnancy (Martinez et al., 2021). These findings underscore the critical need for targeted public health interventions that address these social determinants of health, with particular emphasis on improving healthcare access and health education in vulnerable populations.

### 3.4 Medical and Obstetric History

A comprehensive understanding of a woman's medical and obstetric history is crucial in assessing her risk for urinary tract infections (UTIs) during pregnancy, as certain pre-existing conditions and past medical experiences significantly influence susceptibility. Research demonstrates that chronic conditions such as diabetes mellitus and sickle cell disease substantially increase UTI risk during pregnancy, primarily due to their effects on immune function and urinary tract physiology (Smaill et al., 2015). Additionally, women with a history of previous UTIs show heightened vulnerability to recurrent infections during pregnancy (Moore et al., 2018; Anderson et al., 2020).

Medical interventions, particularly urinary catheterization, represent a significant risk factor for developing UTIs. Studies indicate that prior catheterization experiences increase infection likelihood due to potential bacterial introduction during the procedure and possible residual effects on urinary tract function (Alemu et al., 2012; Thompson & Wilson, 2019). Obstetric factors also play a crucial role, with research showing that multiparity and delayed initiation of prenatal care correlate with increased UTI risk, potentially due to accumulated physiological stress and missed opportunities for early detection of asymptomatic bacteriuria.

The implications of untreated UTIs during pregnancy are particularly concerning, as they can lead to serious complications affecting both maternal and fetal health. These complications include pyelonephritis, preterm labor, and low birth weight (Rizvi et al., 2011; Amiri et al., 2015). Recent studies have further emphasized that the risk of adverse pregnancy outcomes increases significantly when UTIs remain undetected or inadequately treated (Martinez & Lee, 2021). Given these potential complications, healthcare providers must maintain vigilant screening protocols, particularly for patients presenting with multiple risk factors. This proactive approach to identification and management of UTIs is essential for optimizing pregnancy outcomes and reducing associated complications.

### 3.5 Microbiological Factors

Urinary tract infections (UTIs) during pregnancy are predominantly caused by uropathogenic *Escherichia coli* (*E. coli*), accounting for approximately 80–90% of cases (Amiri et al., 2015). Other notable pathogens include *Klebsiella pneumoniae*, *Proteus mirabilis*, and Group B *Streptococcus* (GBS) (Sheppard et al., 2023). The anatomical proximity of the female urethra to the anus facilitates the ascension of these enteric bacteria into the urinary tract, leading to infection.

The physiological changes during pregnancy, such as ureteral dilation and increased bladder volume, coupled with hormonal influences like elevated progesterone levels, contribute to urinary stasis. This environment fosters bacterial growth and increases susceptibility to UTIs (Taye et al., 2018). Additionally, the immunosuppressive state of pregnancy diminishes the body's ability to combat infections, further elevating the risk (Habak et al., 2023).

Group B *Streptococcus* is of particular concern in pregnant women. GBS bacteriuria, even when asymptomatic, indicates heavy colonization and necessitates intrapartum antibiotic prophylaxis to prevent neonatal transmission, which can lead to severe infections in newborns (Owens et al., 2019).

The misuse and overuse of antibiotics have led to the emergence of multidrug-resistant (MDR) uropathogens. Extended-spectrum beta-lactamase (ESBL)-producing *E. coli* and *Klebsiella* species present significant treatment challenges due to their resistance to commonly used antibiotics (Seid et al., 2023). In Nigeria, the high rate of antibiotic consumption, often without prescription, exacerbates this issue, resulting in resistance rates that surpass global averages (World Health Organization, 2017).

The habitual empirical treatment of UTIs without proper urine culture and sensitivity testing contributes to the persistence and spread of resistant strains. This practice underscores the necessity for routine microbiological surveillance and the implementation of antibiotic stewardship programs to guide appropriate therapy (Haque et al., 2015).

### 3.6 Genetic Factors

Genetic predispositions play a significant role in the susceptibility to UTIs among pregnant women. Variations in genes encoding components of the innate immune system, such as Toll-like receptors (TLRs), can influence the body's ability to recognize and respond to uropathogens. Polymorphisms in TLR4, for instance, have been associated with an increased risk of recurrent UTIs due to altered immune responses (Schneeberger et al., 2014).

Additionally, genetic factors affecting the urinary tract's structural integrity can predispose individuals to infections. Congenital anomalies like vesicoureteral reflux (VUR), which has a hereditary component, facilitate the retrograde flow of urine from the bladder to the kidneys, increasing the risk of pyelonephritis (Noël et al., 2012).

The genetic makeup of uropathogens also contributes to infection dynamics. Horizontal gene transfer among bacteria can spread virulence factors and antibiotic resistance genes, complicating treatment strategies (Nóbrega et al., 2015). For example, the acquisition of plasmids encoding ESBLs enables *E. coli* and *Klebsiella* species to resist beta-lactam antibiotics, leading to more severe and persistent infections (Seid et al., 2023).

## 4. TYPES OF UTIS IN PREGNANCY

Pregnancy UTIs are divided as symptomatic and asymptomatic true bacteriuria (>100,000/ml). Cystitis and pyelonephritis are the two types of upper and lower tract infections that cause symptomatic bacteriuria (Widmer *et al.*, 2011)

### 4.1 Asymptomatic bacteriuria (ASB)

Asymptomatic bacteriuria (ASB) refers to the presence and proliferation of bacteria in the lower urinary tract without exhibiting the typical symptoms associated with urinary tract infection (UTI) (Azami *et al.*, 2019). ASB is defined as the presence of significant bacteria (i.e., the presence of  $\geq 10^5$  bacteria/mL of urine) in the absence of symptoms of UTI (Luu *et al.*, 2022). Asymptomatic bacteriuria in pregnancy is treated primarily to prevent progression to pyelonephritis, which carries special risks during pregnancy (Angelescu et al., 2016). The prevalence of asymptomatic bacteria during pregnancy is 2-10% (Moore *et al.*, 2018; Rashmi *et al.*, 2020). The prevalence of asymptomatic bacteriuria in pregnancy in Nigerian women have been variously quoted as between 10-40% (Awonuga *et al.*, 2011; Ajayi *et al.*, 2012). The risk of asymptomatic bacteriuria rises with increasing parity, lower socioeconomic status, increased age, sexual activity in pregnancy, low socioeconomic status, poor perineal hygiene, increasing parity, sickle cell trait or disease, diabetes, and previous history of urinary tract infection (Oli *et al.*, 2010; Oladeinde *et al.*, 2015). Untreated ASB during pregnancy can result in symptomatic UTI in 20-40% of women, putting both the mother and the unborn child at risk (Matuszkiewicz-Rowińska *et al.*, 2015). It frequently happens in the first trimester of pregnancy and may be related to prior UTIs, diabetes mellitus, multiparity, low socioeconomic level, and illiteracy. Low birth weight babies and intrauterine growth retardation are both more likely as a result. Preeclampsia, anemia, chorioamnionitis, and postpartum endometritis are also at higher risk. Fetal hazards include perinatal mortality, mental impairment, stillbirth, fetal growth restriction, and developmental delay. So, it is advised to perform urinalysis and keep an eye on quantity, colour, etc., of urine during pregnancy (Getaneh *et al.*, 2021). The most typical organism found in urine samples from women with ASB is *E. coli*. There are frequent correlations between enterobacterial species such *Streptococcus*, *Klebsiella* sp.

### 4.2 Acute cystitis

Acute cystitis is an infection of the bladder that frequently spreads to the urethra. About 1% of all pregnant mothers are affected. The presence of symptoms like dysuria, urgency, frequency, nocturia, haematuria, and suprapubic discomfort in afebrile women with no signs of systemic illness distinguishes it from ASB, which is defined as significant bacteriuria without associated bladder mucosal invasion. When a pregnant woman with symptoms has bacterial growth on a urine culture, the diagnosis is established by the presence of pyuria (>7 white blood cells/ml) and a quantitative count of 10<sup>5</sup> colony forming units (cfu)/ml or 10<sup>3</sup> cfu/ml. In 15–50% of patients, pyelonephritis, an upper urinary tract infection, complicates acute cystitis (Hooton *et al.*, 2010). Cystitis usually begins suddenly, often with urgency, burning, or painful emptying of little amounts of urine. Nocturia with suprapubic discomfort. Hematuria can happen and urine is murky. A low-grade fever could appear. When an infection occurs from a vesicoenteric or vesicovaginal perforation or from emphysematous cystitis, pneumaturia may happen.

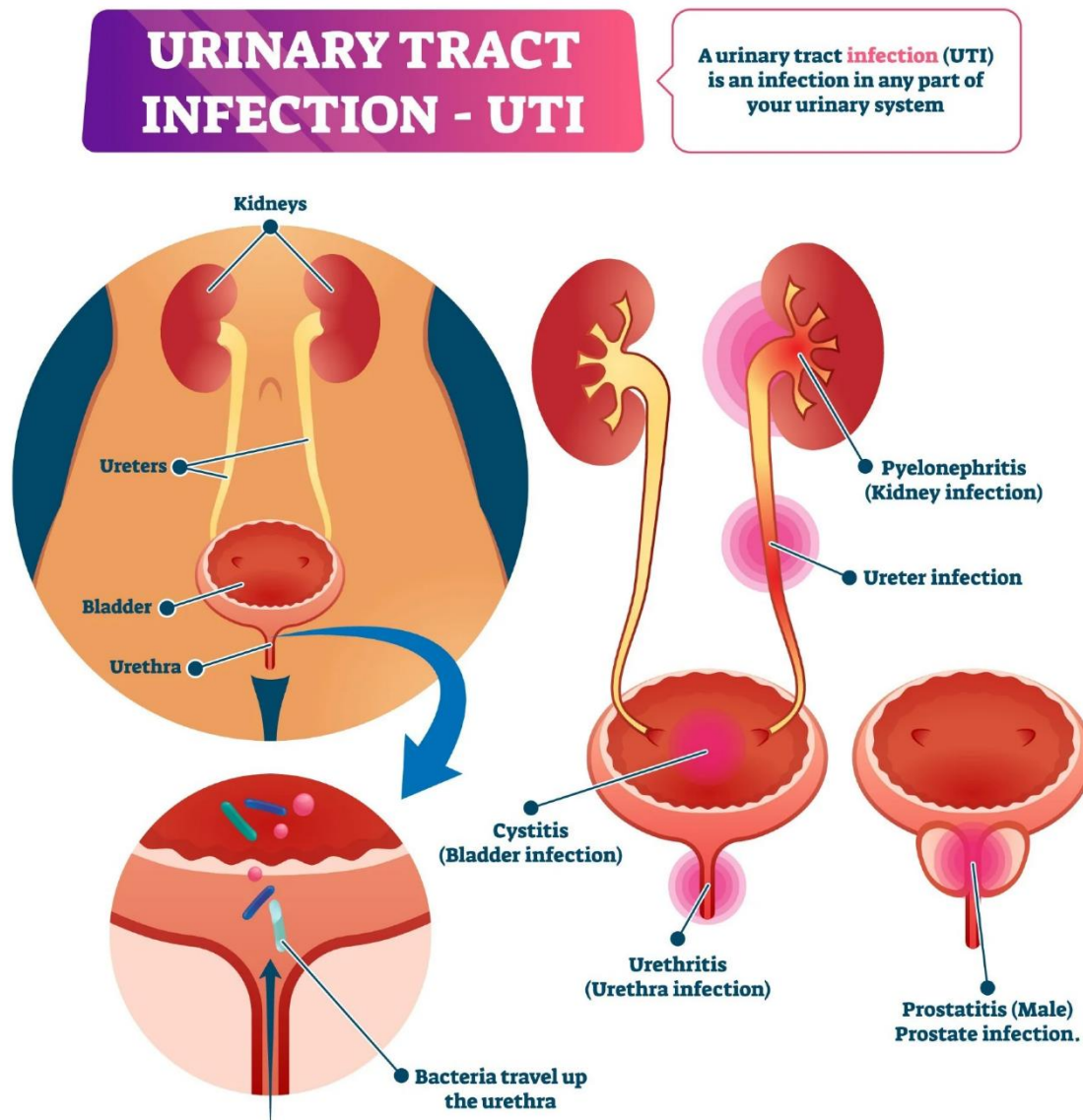


Figure 2:

### 4.3 Pyelonephritis

Pyelonephritis is an infection of the kidneys and upper urinary system. It is a serious pregnancy complication that can cause serious morbidity for both the mother and the fetus. Pyelonephritis in pregnancy can lead to preterm labor, anemia, septicemia, respiratory insufficiency, and rarely, maternal death (Wing *et al.*, 2014). It is a disease that is suspected when a midstream MSSU culture identifies at least 100,000 bacteria/ml of a single uropathogen with concomitant inflammation of the renal parenchyma, calices, and pelvis in the presence of systemic illness (Mittal *et al.*, 2005). Pyelonephritis is most common in the second and third trimesters. Pyuria is typically prevalent in pyelonephritis-affected women, and its absence may indicate a different diagnosis or total obstruction. Immunosuppression, already existing diabetes, a history of sickle cell anaemia, a neurogenic bladder, frequent or chronic UTIs before pregnancy, tobacco use, age <20 years and being late for prenatal care are additional risk factors for complex UTI in pregnancy. Dysuria, fever, shivering, flank pain, constant abdomen unease, nausea, vomiting, and lethargy are symptoms of acute pyelonephritis (Santos *et al.*, 2002).



## 5. OUTCOMES OF UTIS IN PREGNANCY

Untreated urinary tract infections (UTIs) during pregnancy can lead to significant maternal and fetal complications. Maternal outcomes include an increased risk of pyelonephritis, sepsis, anemia, and acute respiratory distress syndrome (ARDS) (American College of Obstetricians and Gynecologists, 2023). Fetal risks encompass preterm birth, low birth weight, and perinatal mortality (NICE, 2019). Early detection and appropriate antibiotic treatment are crucial to mitigate these adverse outcomes.

Pregnant individuals are more susceptible to UTIs due to physiological changes such as ureteral dilation and increased bladder volume, which promote urinary stasis and bacterial growth (NICE, 2019). Asymptomatic bacteriuria (ASB), the presence of bacteria in the urine without symptoms, occurs in approximately 2–10% of pregnancies (American College of Obstetricians and Gynecologists, 2023). If left untreated, about 20–40% of ASB cases progress to pyelonephritis, a severe kidney infection (NICE, 2019). Pyelonephritis during pregnancy is associated with complications such as preterm labor and ARDS (American College of Obstetricians and Gynecologists, 2023).

Fetal complications from untreated UTIs include intrauterine growth restriction (IUGR), leading to low birth weight and increased perinatal mortality (NICE, 2019). Preterm birth resulting from maternal UTI can lead to neonatal complications like respiratory distress syndrome and sepsis (NICE, 2019). Therefore, routine screening for ASB is recommended during pregnancy to prevent these adverse outcomes (American College of Obstetricians and Gynecologists, 2023).

Antibiotic treatment for UTIs in pregnancy must be carefully selected to ensure efficacy and fetal safety. First-line antibiotics include nitrofurantoin and amoxicillin-clavulanate, typically administered for 5–7 days (NICE, 2019). However, certain antibiotics, such as fluoroquinolones and tetracyclines, are contraindicated due to potential teratogenic effects (NICE, 2019). Adherence to prescribed antibiotic regimens is essential to prevent recurrence and complications.

## 6. PREVENTION AND MANAGEMENT STRATEGIES

Urinary tract infections (UTIs) during pregnancy can lead to significant maternal and fetal complications if not properly managed. Implementing effective prevention and management strategies is crucial to mitigate these risks.

Routine screening for UTIs, particularly asymptomatic bacteriuria, is recommended between 12 and 16 weeks of gestation. The U.S. Preventive Services Task Force advises a one-time urine culture during this period to detect asymptomatic bacteriuria, which, if untreated, can progress to symptomatic UTIs and adverse pregnancy outcomes (Owens et al., 2019). Urine culture remains the gold standard for diagnosis, offering high sensitivity and specificity in identifying uropathogens.

Initiating empirical antibiotic therapy should be informed by local antimicrobial resistance patterns to ensure efficacy and minimize the development of resistance. First-line antibiotics typically include beta-lactams such as amoxicillin-clavulanate and certain cephalosporins, which are generally considered safe during pregnancy (Gupta et al., 2023). Nitrofurantoin may be used but is often avoided during the first trimester due to potential associations with congenital anomalies (Bookstaver et al., 2015). Fluoroquinolones are generally contraindicated because of risks to fetal bone and cartilage development (Matok et al., 2009). Treatment duration usually spans 5 to 7 days to effectively eradicate the infection while limiting fetal exposure to antibiotics.

- **Hydration and Regular Urination:** Encouraging adequate fluid intake helps dilute urine and promotes regular urination, which aids in flushing bacteria from the urinary tract, thereby reducing infection risk (Ghouri et al., 2018).
- **Personal Hygiene:** Educating pregnant women on proper perineal hygiene, such as wiping from front to back after urination or defecation, can prevent the introduction of bacteria into the urinary tract (Kalinderi et al., 2018). Additionally, advising the use of absorbent cotton undergarments and avoiding irritants like certain feminine hygiene products can further decrease UTI risk (Dimetry et al., 2007).
- **Education on Risk Factors and Symptoms:** Providing comprehensive education about UTI risk factors, such as sexual activity and delayed urination, and recognizing symptoms like dysuria and increased urinary frequency, empowers women to seek timely medical attention (Amiri et al., 2015). Healthcare providers should emphasize the importance of not delaying urination, as habitual postponement can contribute to bacterial growth and infection (Yaliwal et al., 2020).

Incorporating these strategies into routine prenatal care is essential for reducing UTI-related complications. Healthcare providers should emphasize the importance of screening, educate patients on preventive measures, and ensure timely management of identified infections. By adopting a comprehensive approach, the incidence of UTIs and their associated adverse outcomes can be minimized, promoting better maternal and fetal health.

## 7. CONCLUSION

Urinary tract infections (UTIs) during pregnancy remain a significant global health challenge, with far-reaching implications for both maternal and fetal well-being. The physiological, hormonal, and anatomical changes associated with pregnancy predispose women to UTIs, while behavioral, socioeconomic, and medical factors further exacerbate the risk. If untreated, UTIs can result in severe complications, including pyelonephritis, preeclampsia, preterm labor, intrauterine growth restriction, low birth weight, and even perinatal death. These outcomes highlight the importance of early detection, effective management, and comprehensive prevention strategies.

Screening for asymptomatic bacteriuria during pregnancy, particularly between 12 and 16 weeks, is a cornerstone of prevention. Urine culture remains the gold standard for diagnosis, enabling accurate pathogen identification and tailored antibiotic treatment. Empirical antibiotic therapy should be guided by local antimicrobial resistance patterns to ensure efficacy while minimizing the risk of antibiotic resistance. The integration of safe and effective antibiotics, such as amoxicillin-clavulanate and cephalosporins, into treatment regimens is critical to safeguarding maternal and fetal health.

Prevention efforts must prioritize education on proper hygiene, hydration, and timely urination. Behavioral counseling during prenatal care visits can empower pregnant women to adopt practices that reduce infection risk. Addressing socioeconomic disparities and enhancing access to healthcare are essential to ensuring equitable outcomes.

To mitigate UTI-related complications, a multidisciplinary approach incorporating regular screening, evidence-based treatment, and robust public health initiatives is necessary. Healthcare providers play a pivotal role in fostering awareness, delivering timely interventions, and promoting adherence to preventive measures. By implementing these strategies within the framework of comprehensive prenatal care, it is possible to significantly reduce the burden of UTIs during pregnancy, ensuring healthier outcomes for mothers and their newborns.

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