


Sociodemographic Profiles of Pregnant Woman with Urinary Tract Infection: A Systematic Review of Current Research

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ABSTRACT

Introduction: Untreated UTIs during pregnancy can lead to complications for both the mother and the fetus, highlighting the importance of appropriate management. Understanding the sociodemographic profiles of pregnant women with UTIs can aid in tailored interventions and care. **Methods**: This systematic review followed a protocol registered in the International Prospective Register of Systematic Reviews (PROSPERO ID: CRD42024507145). Cohort cross-sectional studies focusing on the sociodemographic profiles of pregnant women with UTI were systematically searched and selected from databases such as ScienceDirect, Cochrane, Scopus, and PubMed. Eligibility criteria included relevance to sociodemographic profiles, clear extraction and statistical analysis methods, and publication in English. Data extraction and study selection were conducted independently by six researchers, with any discrepancies resolved through discussion. **Results**: Three studies met the inclusion criteria and were included in the systematic review. The studies conducted in the United States, Cameroon, and Bangladesh, which included 46,398 pregnant women, revealed diverse sociodemographic factors associated with UTI risk among pregnant women. Factors such as low educational attainment, low household income, and racial/ethnic disparities were identified as significant contributors to UTI prevalence in the United States. In Cameroon, although a high UTI prevalence was observed, no significant risk factors were identified. In Bangladesh, maternal undernutrition, primiparity, and low paternal education were significant risk factors for UTIs among pregnant women. Antibiotic sensitivity was varied, indicating the complexity of UTI management. **Conclusion**: The systematic review emphasizes the importance of considering sociodemographic factors in understanding and addressing UTI risk among pregnant women. Socioeconomic status, cultural disparities, and health-related factors play significant roles in UTI prevalence and management. An intervention to target specific sociodemographic characteristics may be necessary to effectively prevent and manage UTIs in pregnant women across different geographical and socioeconomic contexts.

Keywords: Pregnant women, sociodemographic profiles, urinary tract infection.

ABSTRAK

Pendahuluan: Infeksi saluran kemih (ISK) yang tidak diobati selama kehamilan dapat menyebabkan komplikasi bagi ibu dan janin, memerlukan penanganan yang tepat. Memahami profil sosiodemografi wanita hamil dengan ISK dapat membantu menentukan intervensi dan perawatan yang tepat. **Metode**: Tinjauan sistematis ini mengikuti protokol yang terdaftar di *International Prospective Register of Systematic Reviews* (PROSPERO ID: CRD42024507145). Studi potong lintang kohort yang memfokuskan pada profil sosiodemografi wanita hamil dengan ISK dicari dan dipilih secara sistematis dari basis data ScienceDirect, Cochrane, Scopus, dan PubMed. Kriteria kelayakan mencakup relevansi dengan profil sosiodemografi, metode ekstraksi dan analisis statistik yang jelas, serta publikasi dalam bahasa Inggris. Ekstraksi data dan seleksi studi dilakukan secara independen oleh 6 peneliti, setiap ketidaksesuaian diselesaikan melalui diskusi. **Hasil**: Tiga studi memenuhi kriteria inklusi dan dimasukkan dalam tinjauan sistematis. Studi-studi tersebut, yang dilakukan di Amerika Serikat, Kamerun, dan Bangladesh, mencakup 46.398 wanita hamil, mengungkapkan faktor-faktor sosiodemografi yang beragam terkait dengan risiko ISK pada wanita hamil. Faktor-faktor seperti rendahnya pendidikan, pendapatan rumah tangga rendah, dan disparitas ras/etnis diidentifikasi sebagai kontributor signifikan terhadap prevalensi ISK di Amerika Serikat. Di Kamerun, meskipun prevalensi ISK tinggi, tidak ada faktor risiko yang signifikan. Sensitivitas antibiotik bervariasi, menunjukkan kompleksitas penanganan ISK dalam konteks tersebut. Di Bangladesh, kurangnya gizi ibu, primiparitas, dan pendidikan ayah yang rendah merupakan faktor risiko signifikan untuk ISK pada wanita hamil. **Simpulan**: Tinjauan sistematis menekankan pentingnya mempertimbangkan faktor sosiodemografi dalam memahami dan mengatasi risiko ISK pada wanita hamil. Status sosial ekonomi, disparitas budaya, dan faktor-faktor terkait kesehatan memainkan peran penting dalam prevalensi dan penanganan ISK. Intervensi yang menarget karakteristik sosiodemografi

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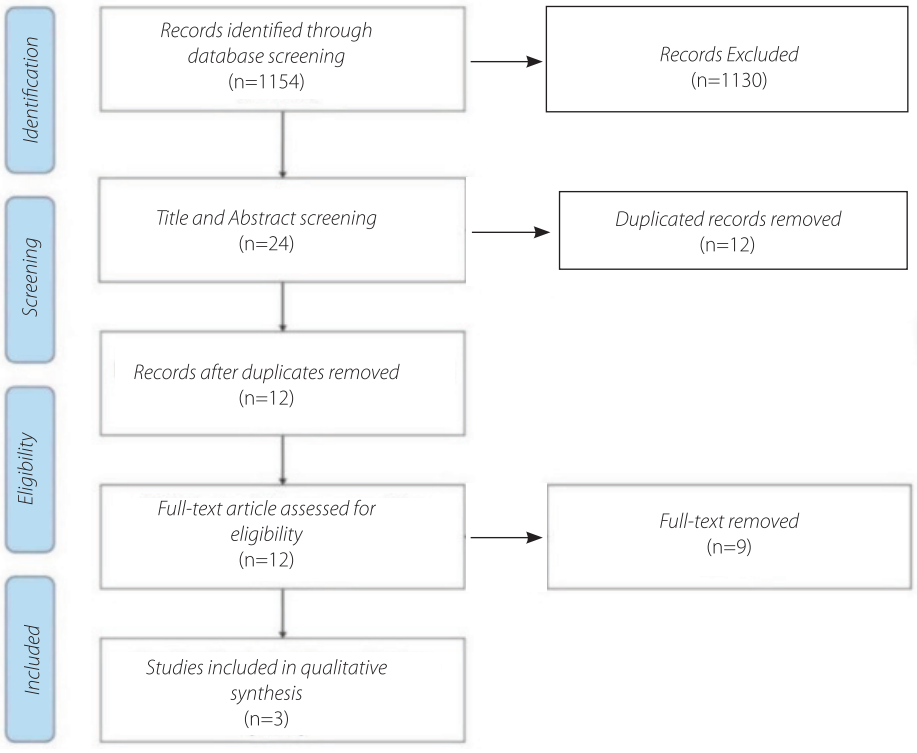
tertentu mungkin diperlukan untuk mencegah dan mengelola ISK secara efektif pada wanita hamil di berbagai konteks geografis dan sosioekonomi. **Fitriyadi Kusuma, Kemal Akbar Suryoadji, Adib Kamil Putra Kadarusman, Geraldus Sigap Gung Binathara, Salsa Billa As'syifa, Surahman Hakim. Profil Sosiodemografi Wanita Hamil dengan Infeksi Saluran Kemih: Tinjauan Sistematik atas Penelitian Terkini.**

Kata Kunci: Wanita hamil, profil sosiodemografi, infeksi saluran kemih.

INTRODUCTION

Urinary tract infection (UTI) is the most common infection in pregnant women. The incidence rate of urinary tract infection in pregnancy is up to 54%-65%.[1,2] Women are more susceptible to urinary tract infections due to changes in the immune system and urinary tract alterations during pregnancy. The ureter and renal calyces dilate as part of physiological changes in the urinary system brought on by progesterone-induced smooth muscle relaxation and ureteral compression from the gravid uterus. Marked ureteral dilatation, urinary frequency, and vesicoureteral reflux are changes that increase the risk of urinary tract infections.[3] Antibiotic therapy in pregnant women has many risks; on the other hand, UTI can give rise to complications if not immediately managed.[2] Maternal complications are pyelonephritis and hypertension/preeclampsia, and fetal complications were preterm labor and low birth weight. Pregnancy-related UTI risk factors include maternal characteristics (lower socioeconomic status, sexual activity, older age, multiparity, medical history factors before and during pregnancy) and geography.[4,5] Antibiotic therapy must be tailored to the patient's characteristics and the causative microbes.[2] The aim of this study is to conduct a systematic review of existing research on urinary tract infections in pregnant women, with a specific focus on the sociodemographic profiles of the patients. The study seeks to identify patterns of association between sociodemographic characteristics such as age, income, education, marital status, and geographical origin with the risk, diagnosis, management, and outcomes of urinary tract infections in pregnant women.



Scheme. Article search and selection.

METHODS

Protocol and Registration

We registered a protocol and it was entered into the International prospective register of systematic reviews (PROSPERO) on February 7, 2024, with the registration number CRD42024507145.

Study Design

Our research employs a systematic review approach on cohort cross-sectional studies. The clinical investigation in this study centers on the sociodemographic profiles of pregnant women with urinary tract infections. Cohort studies were deliberately chosen for their superior level of evidence in prognostic research, aligning with the standards of systematic reviews within this study.

Eligibility Criteria

The criteria for inclusion in this study were: (a) Cohort study, (b) Relevant to the sociodemographic profiles of pregnant women with urinary tract infections, (c) Having at least one control group and one exposure group, and (d) Employing a clear extraction and statistical analysis method. The criteria for exclusion were: (a) Unavailability of full text and (b) Use of languages other than English.

Search Strategy

Systematic reviews were conducted with the source databases Science Direct, Cochrane, Scopus, and PubMed with the keywords "(urinary tract infections) AND (pregnancy) AND (risk)."

Study Selection and Data Extraction

Six researchers independently reviewed titles and abstracts, excluding irrelevant studies. Following this screening, authors (FK, KAS, AKPK, GSGB, SC, SH) individually assessed each entry based on inclusion and exclusion criteria, providing responses of 'Yes,' 'No,' or 'Maybe.' Any discrepancies were resolved through discussion and mutual agreement.


The final retrieved studies were checked for duplicates and systematically evaluated according to inclusion and exclusion criteria. The five researchers independently assessed subject characteristics (pregnant women), study focus (urinary tract infections), study outcomes (sociodemographic), and other relevant information.

Study selection was carried out based on inclusion criteria such as the sample being a pregnant woman, the availability of full-text articles, exclusion criteria such as articles other than English and Indonesian, and articles published before 2018. Article search and selection of study can be seen in **Scheme.**

RESULTS

In this systematic review, the final results that met the inclusion criteria were 3 studies.[6-8] Details of the search results can be seen in **Table 1.** This systematic review encompasses three studies; diverse populations and research designs were analyzed to study the prevalence and risk factors associated with urinary tract infections (UTIs) among pregnant women. The first study by Johnson, *et al*, (2017), conducted in the United States, highlighted a significant association between UTI prevalence and socioeconomic factors such as low educational attainment, low household income, and specific race/ethnicity. Meanwhile, the cross-sectional study by Ngong, *et al*, (2021) in Cameroon shed light on a relatively high UTI prevalence without identifying significant risk factors, emphasizing the need for further investigation in that context. Lastly, the community-based cohort study by Lee, *et al*, (2020) in Bangladesh identified maternal undernutrition, primiparity, and low paternal education as significant risk factors for UTIs in that population. Overall, these findings contribute to a more comprehensive understanding of UTI epidemiology and its associated factors among pregnant women across different geographical and socioeconomic contexts.

This systematic review also included an assessment of the risk of bias using the Newcastle-Ottawa Quality Assessment Form,[9] the risk of bias assessment can be seen in **Table 2.** All three studies, conducted by Johnson, *et al*, (2017),[6] Ngong, *et al*, (2021),[7] and Lee, *et al*, (2020),[8] were rated as low risk across all domains evaluated. This indicates a high level of methodological rigor and strengthens the reliability of the findings reported in the included studies.

DISCUSSION

In this study, significant variations in sociodemographic factors associated with UTI risk have been observed. The results from the three studies included in this review reveal fairly consistent patterns, albeit with some variations depending on the study's location. The first study conducted in the United States indicates that factors such as low educational attainment, low household income, and racial/ethnic differences are strongly associated with an increased prevalence of UTI in pregnant women. This underscores the importance of socioeconomic aspects and cultural disparities in elevating the risk of UTI in pregnant women.[6] The second study, carried out in Cameroon, identified a high prevalence of UTI in pregnant women (approximately 31%), although no significant risk factors could be identified. However, antibiotic sensitivity varied, indicating the complexity of managing UTIs in this population.[7] The last study conducted in Bangladesh highlights the risk factors associated with UTIs, such as maternal undernutrition, primiparity, and low paternal education. This emphasizes the significance of health and social aspects in increasing the risk of UTIs in pregnant women, particularly in countries with limited healthcare resources.[8]

Table 1. Search result.

Authors and Year	Research Design	Location (Country)	Study Population (Number)	Results (OR, p-value)
Johnson, *et al,* (2017).[6]	Population-based study	United States	41,869 pregnant women	Higher UTI prevalence was associated even more strongly with: • **Low educational attainment** (PR 2.06, 95% CI: 1.77, 2.40 for some high school versus graduate school) • **Low household income** (PR 1.64, 95% CI: 1.46, 1.84 for <$10,000 versus ≥$50,000) • **Race/ethnicity** (PR 1.45, 95% CI: 1.13, 1.80 for American Indian or Alaska Native versus White women).
Ngong, *et al,* (2021).[7]	Cross-sectional study	Cameroon	287 pregnant women	31% prevalence of UTI. No significant risk factors found. Antibiotic sensitivity varied.
Lee, *et al,* (2020).[8]	Community-based cohort study	Bangladesh	4,242 pregnant women	Risk factors for UTI in this population included: • **Maternal undernutrition** (mid-upper arm circumference <23 cm: aOR = 1.29, 95% CI: 1.03–1.61) • **Primiparity** (aOR = 1.45, 95% CI: 1.15–1.84) • **Low paternal education** (no education: aOR = 1.56, 95% CI: 1.09–2.22).

Abbreviation: PR: prevalence rate; UTI: urinary tract infection; aOR: adjusted odds ratio; CI: confidence interval.

Young female garment workers have an elevated risk of UTI.[9] These results imply that younger women from poorer socioeconomic backgrounds typically have increased UTI risks. UTIs may be the cause of self-reported financial concern. However, no studies have yet investigated the definitive relationship between a range of sociodemographic factors and urinary tract infections in women.[9]

Overall, the findings of these studies highlight the importance of considering sociodemographic factors in understanding the prevalence and risk factors associated with urinary tract infections in pregnant women. It is clear that socioeconomic status, educational attainment, race/ethnicity, and other social determinants play a significant role in increasing the risk of UTIs during pregnancy. These factors can impact a woman's access to healthcare, her living conditions, and her ability to adopt preventive measures against UTIs. Understanding these sociodemographic patterns can guide healthcare providers in designing targeted interventions and strategies to reduce the burden of UTIs in pregnant women, especially in vulnerable populations.[8,10-12]

Furthermore, the variation in UTI risk factors observed across different geographical contexts underscores the need for tailored approaches to address the issue. The complex interplay between healthcare infrastructure, cultural practices, and social determinants necessitates a nuanced understanding of the local context when designing interventions to prevent and manage UTIs in pregnant women. It is crucial for healthcare providers to consider these factors when developing guidelines and protocols for the diagnosis and treatment of UTIs in pregnant women. The findings regarding antibiotic sensitivity and the impact of undernutrition on UTI risk further emphasize the multifaceted nature of this issue. Pregnant women who are undernourished may be more susceptible to infections due to compromised immune function, highlighting the importance of addressing nutritional factors in addition to medical interventions. Additionally, variations in antibiotic sensitivity underscore the need for tailored treatment approaches based on local resistance patterns and individual patient characteristics.[13]

Table 2. Risk of bias using Newcastle-Ottawa quality assessment form.

Studies	Representativeness of the Exposed Cohort	Selection of the Non-exposed Cohort	Ascertainment of Exposure	Demonstration that Outcome of Interest was not Present at Start of Study	Comparability of Cohorts	Assessment of Outcome	Follow- up of Cohorts	Adequacy of Follow-up of Cohorts	Study Quality
Johnson, *et al*, 2017.[6]	*	*	*	*	*	*	*	*	Low risk
Ngong, *et al*, 2021.[7]	*	*	*	*	*	*	*	*	Low risk
Anne CC Lee, *et al*, 2020.[8]	*	*	*	*	*	*	*	*	Low risk

*Definitely yes

The management of urinary tract infections (UTIs) during pregnancy, as outlined by the ACOG (American College of Obstetricians and Gynecologists' Committee) consensus recommendations,[13] encompasses three key conditions, including asymptomatic bacteriuria, acute cystitis, and pyelonephritis. In the case of asymptomatic bacteriuria, clinicians are advised to screen for this condition with a urine culture once during early prenatal care. Treatment involves prescribing targeted antibiotics for a duration of 5-7 days if the culture results indicate colony counts of 100,000 CFU/mL or higher.[14] However, there is insufficient evidence to recommend repeat screening during pregnancy after an initial negative culture result.[15] For acute cystitis, diagnosis involves evaluating patients with symptoms and conducting a urine culture, with UTI suspected based on symptom presentation and confirmed by culture results showing 100,000 CFU/mL or more. Treatment consists of a 5-7-day course of targeted antibiotics, with caution against using amoxicillin or ampicillin due to high resistance rates in Escherichia coli. Following treatment, clinicians may consider repeating urine cultures 1-2 weeks later or if symptoms recur, although management guidance thereafter is lacking.[16-18] In cases of pyelonephritis, suspicion arises with a fever of 38.0° C or higher, supported by urine studies suggesting UTI and additional symptoms of upper genitourinary tract infection. Initial management should occur in the inpatient setting, with empiric antibiotic therapy adjusted based on culture and sensitivity results. Treatment should continue until clinical improvement, totaling 14 days of antibiotic therapy, with consideration of suppressive therapy for the remainder of the pregnancy following treatment, similar to recurrent UTIs, although definitive guidance is lacking in this area as well.[17-20]

The risk of bias analysis using the Newcastle-Ottawa Quality Assessment Form[9] showed that all three studies conducted by Johnson, *et al*, (2017),[6] Innocentia Nji Ngong, *et al*, (2021),[7] and Lee, *et al*, (2020)[8] were rated as low risk across all evaluated domains (**Table 2**). This indicates a high level of methodological rigor in these studies. The low risk assessment in each domain suggests that these studies have strong design, adequate control of risk factors, and representative sample selection. This strengthens the reliability of the reported findings in these studies included in the systematic review. The conclusions drawn from this systematic review can be considered robust and dependable in clinical and policy implementation contexts.

Prevalence of UTIs in pregnant women is a significant public health concern that requires a comprehensive understanding of the sociodemographic factors influencing this condition. By examining the sociodemographic profiles of pregnant women with UTIs, healthcare providers can better tailor interventions to address the specific needs of vulnerable populations and reduce the burden of this common infection. Future research should continue to explore


the complex interactions between social determinants, healthcare access, and UTI risk in pregnant women to inform evidence-based strategies for prevention, diagnosis, and treatment. Ultimately, a holistic approach that considers the diverse needs of pregnant women across different contexts is essential for effectively addressing the prevalence of UTIs and improving maternal and fetal health outcomes.

CONCLUSION

This systematic review underscores the significance of considering sociodemographic factors in understanding and addressing urinary tract infection (UTI) risk among pregnant women. The included studies revealed diverse sociodemographic profiles associated with UTI prevalence across different geographical contexts. Factors such as low educational attainment, low household income, racial/ethnic disparities, maternal undernutrition, primiparity, and low paternal education emerged as significant contributors to UTI risk in pregnant women. Despite variations in risk factors across studies, a consistent pattern highlights the importance of socioeconomic status, cultural disparities, and health-related factors in UTI prevalence and management. The assessment of bias showed that all included studies demonstrated a low risk across evaluated domains, enhancing the reliability of the reported findings.

Recommendations

Healthcare providers should develop tailored interventions that address specific sociodemographic characteristics associated with urinary tract infection (UTI) risk in pregnant women. These interventions should aim to mitigate the impact of socioeconomic disparities, cultural factors, and health-related determinants on UTI prevalence and outcomes. By addressing these factors, healthcare providers can effectively reduce the burden of UTIs among pregnant women and improve maternal and fetal health outcomes.

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