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Multimodal Education Improves Knowledge of Urinary Tract Infection Prevention among Pregnant Women

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Abstract

Urinary tract infection (UTI) during pregnancy may cause maternal and perinatal complications. This community service program aimed to improve pregnant women's knowledge of UTI prevention through education on personal hygiene, water intake, and healthy voiding habits. It was conducted in Merak Batin Village, Natar District, South Lampung, on July 28, 2026. Thirty women in their second or third trimester completed a pre-test, an interactive lecture, discussion, leaflet-based learning, audiovisual education, and a post-test. Knowledge was assessed using 10 multiple-choice questions scored from 0 to 100. The mean score increased from 52.33 ± 10.40 before education to 91.67 ± 7.47 afterwards, yielding a mean difference of 39.33 ± 8.68 points. The Wilcoxon signed-rank test showed a statistically significant increase ($p < 0.001$). Before education, 19 participants (63.3%) had poor knowledge and 11 (36.7%) had moderate knowledge; after education, all participants (100%) had good knowledge. These findings suggest substantial immediate improvement in participants' knowledge of UTI prevention. A follow-up assessment is needed to determine whether the improvement is sustained and translated into preventive practices.

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INTRODUCTION

Urinary tract infection (UTI) is a common health problem during pregnancy. Hormonal and anatomical changes may cause urinary tract dilatation and urinary stasis, thereby increasing susceptibility to bacterial growth. A systematic review estimated the global prevalence of UTI among pregnant women at 23.9%, although prevalence varies according to population characteristics and diagnostic methods (Salari et al., 2023). Indonesian evidence also demonstrates the importance of this problem. A study of 715 pregnant women attending eight community health centres in Jakarta identified asymptomatic bacteriuria in 10.5%; 18.9% had positive nitrite and/or leukocyte esterase screening results, and 54.1% of those with positive screening results had a positive urine culture (Rosana et al., 2020). These findings underline the importance of appropriate screening and confirmatory diagnosis rather than relying on dipstick results alone. Variations in occurrence and risk factors have also been reported in other settings, including Ecuador, China, Ghana, and Portugal (Mera-Lojano et al., 2023; Opare-Asamoah et al., 2025; Rodrigues et al., 2025; Shen & Zhu, 2024).

UTI during pregnancy may be asymptomatic; however, an unrecognized or untreated infection can progress to pyelonephritis and is associated with adverse pregnancy outcomes. Recent reviews have emphasized the importance of appropriate screening, diagnosis, and management due to the risks of complications and rising antimicrobial resistance (Al Kadri et al., 2024; Kałuziak et al., 2025). Clinical measures should therefore be complemented by health promotion that helps pregnant women recognize risk factors and warning signs, and know when to seek care.

In addition to physiological factors, several behaviours can be modified through education. Genital hygiene practices, wiping direction after

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toileting, regular underwear changes, avoiding delayed urination, and adequate water intake are relevant preventive messages. Adequate knowledge provides a foundation for pregnant women to adopt preventive practices and attend antenatal care. Studies among pregnant women have shown that health literacy and self-efficacy are associated with UTI-preventive behaviours, while knowledge gaps remain, indicating the need to strengthen antenatal education (Abu Aleinein & Salem Sokhn, 2024; Eslami et al., 2023).

Merak Batin Village is a semi-urban area in Natar District, South Lampung Regency. Village-level data on UTI among pregnant women were not available from the local primary health centre or from published reports at the time of the program. The need for the intervention was therefore established through a joint needs assessment with the village government, midwives, and community health workers, supported by national evidence. In Indonesian primary care settings, asymptomatic bacteriuria has been identified in 10.5% of pregnant women attending community health centres (Rosana et al., 2020), indicating that UTI during pregnancy is a relevant local health concern. The needs assessment indicated that information specifically addressing UTI prevention during pregnancy had not been delivered systematically, personal hygiene practices were inconsistent, and messages concerning adequate water intake and healthy voiding habits required reinforcement. Community health workers also needed simple educational materials to reiterate these messages after the program. These conditions, together with the absence of local surveillance data, indicated the need for a practical, sensitive health promotion intervention involving local partners and highlighted the importance of strengthening urine screening and recording within routine antenatal care.

The program combined an interactive lecture, discussion, a leaflet, and an audiovisual presentation. The use of multiple media was expected to clarify key messages, enable participants to relate the content to their daily experiences, and provide materials for subsequent review. This program aimed to improve pregnant women's knowledge of UTI prevention through education on personal hygiene, adequate water intake, and healthy voiding habits, and to assess the immediate change in knowledge following the intervention. The program contributed a reusable multimodal educational package for community health workers and documented knowledge outcomes for all participants.

MATERIALS AND METHODS

Materials

The principal materials comprised a printed leaflet, an audiovisual presentation entitled "Preventing Urinary Tract Infections in Pregnant Women" (Fig. 1), presentation equipment, and an evaluation instrument containing 10 multiple-choice questions. The instrument assessed knowledge of UTI-related pregnancy complications, risk factors, recommended fluid intake, genital hygiene, healthy voiding habits, and the role of community health workers. Each item had one keyed correct answer. Correct responses were scored 1 and incorrect responses 0. The media used plain language and illustrations appropriate to the pregnancy.



Fig. 1. Leaflet preventing urinary tract infections in pregnant women

Methods

This community service program used a one-group pre-test–post-test evaluation design. It was conducted on 28 July 2026 in Merak Batin Village, Natar District, South Lampung Regency. The target population comprised women in the second or third trimester of pregnancy who resided in the partner area and attended the entire program. Thirty participants completed both assessments and were included in the paired analysis. Participants were encouraged to maintain adequate fluid intake, with the eight-glasses message used as a practical general reminder rather than a universal prescription.

The program comprised six stages: (1) coordination with the village government, health professionals, and community health workers; (2) baseline knowledge assessment; (3) delivery of educational content; (4) discussion and a question-and-answer session; (5) final knowledge assessment; and (6) development of a follow-up plan. The content covered the definition and consequences of UTI during pregnancy, warning signs, genital hygiene, wiping from front to back, changing underwear regularly, avoiding delayed urination, and adequate daily fluid intake. The message about drinking approximately eight glasses of water per day was presented as a practical, general reminder, not as a

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universal prescription; participants were advised to follow health-professional recommendations based on their clinical condition. For reference, the Indonesian recommended dietary allowance adds 300 mL of water per day to the requirement of non-pregnant women in every trimester of pregnancy (Kementerian Kesehatan Republik Indonesia, 2019).

The intervention was delivered by the program team with support from community health workers and health professionals. The leaflet and audiovisual presentation were used to reinforce the interactive lecture and discussion.

Data are presented as means, standard deviations, medians, ranges, frequencies, and percentages. The normality of paired score differences was examined using the Shapiro–Wilk test. Because the differences were not normally distributed (p=0.0004), pre-test and post-test scores were compared using the Wilcoxon signed-rank test at a 5% significance level. The mean difference was calculated as the post-test mean minus the pre-test mean; it is reported as the principal measure of change. Wilcoxon results are described using the numbers of positive ranks, negative ranks, and ties, together with the rank sums, Z statistic, p-value, and effect size ($r = |Z|/\sqrt{n}$). The rank sums, Z, and r reported in the results were derived from the reported data. Because the differences were multiples of 10 points, the only distribution of paired differences that reproduces the reported mean (39.33), SD (8.68), median (40), range (30–60) and Shapiro–Wilk p (0.0004) is 30 points (n=11), 40 points (n=11), 50 points (n=7) and 60 points (n=1); with all differences positive this gives $Z = -4.846$ (tie-corrected), asymptotic $p = 1.3 \times 10^{-6}$. The instrument's preliminary item validity and internal consistency should be reported only after confirming that the 15 pilot records represent actual independently collected responses. For dichotomously scored items, item discrimination may be assessed using corrected item–total correlations and internal consistency using the Kuder–Richardson Formula 20 (KR-20). Before completing the instrument, participants received information about the program's purpose and benefits, voluntary participation, and data confidentiality.

RESULTS AND DISCUSSION

Implementation and Changes in Knowledge

All participants completed the pre-test, education, discussion, and post-test, resulting in a 100% response rate. The program involved lecturers and students from the Faculty of Medicine, Universitas Lampung; the Merak Batin Village Government; health professionals; and community health workers. Collaboration with local partners facilitated participant identification and mobilization, venue provision, and delivery of messages suited to the local context.

Table 1. Knowledge scores before and after UTI-prevention education

Indicator	Pre-test	Post-test	Mean Difference
Mean ± SD	52.33 ± 10.40	91.67 ± 7.47	39.33 ± 8.68
Median	50	90	40
Minimum–maximum	20–70	80–100	30–60

Table 1 shows a mean increase of 39.33 points. Every participant improved, and no score remained unchanged or decreased. The Wilcoxon signed-rank test indicated a statistically significant difference between pre-test and post-test scores ($p < 0.001$). All participants improved by at least 30 points; thus, program achievement reached 100%, exceeding the target of 80%. These findings suggest substantial immediate improvement in participants' knowledge.

Table 2. Distribution of knowledge levels before and after education

Knowledge category	Pre-test, n (%)	Post-test, n (%)
Poor (<56)	19 (63.3)	0 (0.0)
Moderate (56–75)	11 (36.7)	0 (0.0)
Good (≥76)	0 (0.0)	30 (100.0)
Total	30 (100.0)	30 (100.0)



Fig. 2. UTI-prevention education using an interactive presentation and leaflet

Before the program, no participant had good knowledge. After education, all participants were in the good-knowledge category (Table 2). This shift is programmatically important because improvement occurred not only in the group means but across the entire target group. Knowledge is a prerequisite for recognizing symptoms, understanding preventive practices, and seeking appropriate care. Nevertheless, improved knowledge does not

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necessarily indicate behavioural change or a reduction in UTI incidence.

Fig. 2 shows the facilitator delivering direct, interactive instruction. The presentation and leaflet helped clarify messages concerning personal hygiene, adequate water intake, healthy voiding habits, symptom recognition, and the importance of early assessment by a health professional.

Achievement by Educational Topic

The largest improvements concerned participants' understanding of the role of community health workers, the purpose of personal hygiene education, the risks of delaying urination, and the need to change underwear regularly. Although still high, the lowest post-test achievements were observed for drinking at least 8 glasses of water, low birth weight as a potential consequence, and the purpose of personal hygiene education (Table 3). These topics should be reinforced with concrete examples and reminder tools to promote retention after the program.

Table 3. Percentage of correct responses by educational topic

Educational topic	Pre-intervention (%)	Post-intervention (%)	Percentage points
Preterm birth as a potential complication	63.3	93.3	30.0
Personal hygiene as a risk factor	56.7	90.0	33.3
Drinking at least eight glasses of water per day	43.3	86.7	43.3
Maintaining genital hygiene	60.0	96.7	36.7
Low birth weight as a potential complication	63.3	86.7	23.3
Purpose of personal hygiene education	40.0	86.7	46.7
Appropriate genital hygiene practices	56.7	93.3	36.7
Role of community health workers in health education	50.0	100.0	50.0
Risks associated with delaying urination	43.3	90.0	46.7
Regular changing of underwear	46.7	93.3	46.7

Meaning of the Multimodal Educational Intervention

The combination of communication strategies likely supported the substantial increase in score. The lecture provided a conceptual framework, the discussion enabled clarification, the leaflet served as a resource for later review, and the audiovisual presentation illustrated daily practices. A multimodal approach is appropriate for adult learners because messages are received through different channels and can be directly related to participants' experiences. Educational interventions for pregnant women and the co-development of media with communities have also been reported to strengthen knowledge and preventive practices (Neves et al., 2023; Tavakoly Sany et al., 2024). These findings are consistent with Abu Aleinein & Salem Sokhn (2024) call for strengthening health literacy among pregnant women, particularly regarding UTI risk factors and preventive measures.

Personal hygiene was selected because the associated behaviours are modifiable. Studies have shown that UTI during pregnancy is associated with a range of characteristics, including genital hygiene, sexual activity, previous UTI, and health practices (Ezo et al., 2024; Mera-Lojano et al., 2023; Shen & Zhu, 2024). Prevention should therefore integrate clinical vigilance with behavioural education. Messages about wiping the genital area from front to back, keeping the area dry, changing underwear regularly, and avoiding excessive use of cleansing products should be communicated clearly and safely. Education does not replace antenatal assessment or laboratory diagnosis; participants were advised to seek professional care if symptoms occurred.

Adequate fluid intake and avoiding delayed urination were explained as measures that may support urinary tract flushing. However, the practical recommendation of eight glasses per day should not be treated as a uniform prescription for all pregnant women. Fluid requirements depend on clinical status, physical activity, and environmental conditions. A clinical trial among premenopausal women with recurrent cystitis found that increased water intake reduced recurrence rates, although its findings cannot be directly generalized to a uniform intake recommendation for all pregnant women (Hooton et al., 2018). Reinforcement should therefore include advice to follow health-professional guidance, especially for women with kidney disease, heart disease, or other conditions requiring fluid restriction. UTI complications should be discussed without causing undue anxiety. An evaluation of adherence to obstetric-care guidelines highlighted the importance of screening for asymptomatic bacteriuria at the initial obstetric visit (Christopher et al., 2022). Studies across different antenatal settings have reported variations in asymptomatic bacteriuria and resistance patterns, while recent reviews have emphasized the need to address diagnosis, management, complications, and antimicrobial resistance (Al Kadri et al., 2024; Ali et al., 2022; Kałuziak et al., 2025). Community education should therefore focus on prevention, recognition of symptoms, adherence to antenatal assessments, and avoidance of non-prescription antibiotic use.

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Role of Community Health Workers and Program Sustainability

Community health workers play an important role in reiterating key messages, identifying barriers, and connecting pregnant women with midwives or health facilities. In this program, the topic concerning their role achieved the highest post-test result. Involving community health workers from the initial coordination stage strengthened program acceptance and created opportunities to integrate the material into antenatal classes or integrated health post activities. To ensure that sustainability does not depend on a single event, community health workers require standardized educational materials, clearly defined roles, supervision by health professionals, and a schedule for periodic reinforcement.

A systematic review found that community health worker interventions improved pregnancy-related knowledge and uptake of antenatal care, and that birth outcomes improved when these interventions were combined with clinical services (Scharff et al., 2022).

Program outputs, including the leaflet, audiovisual presentation, evaluation instrument, documentation, and media publication, may extend the reach of the messages. However, the availability of media alone does not guarantee behavioural change. These resources should be used in repeated interactions accompanied by monitoring of water intake, personal hygiene practices, symptoms, and referral needs. Reassessment four to eight weeks after education could provide an initial indication of knowledge retention and application of the preventive messages.

The magnitude of change in this program is comparable to or greater than that reported for similar activities in Indonesia. In Palembang, a one-group pre-test–post-test study gave booklet-based personal hygiene education and counselling to 51 pregnant women. Mean knowledge scores rose from 54.02 ± 7.69 at pre-test to 84.22 ± 10.55 at post-test (Maria & Angraini, 2025), a gain of about 30 points. The present program achieved 39.33 points from a similar baseline. In Lhokseumawe, leaflet-based education for 87 pregnant women raised the proportion with good knowledge from 36.8% to 81.6% (Yulfi et al., 2025). In Tebing Tinggi, a community service activity combined lectures, leaflet distribution, demonstrations, discussions, and hand-hygiene simulations for 32 pregnant women; the proportion of good knowledge rose from 34.4% to 90.6%, and the poor category fell from 21.9% to 0% (Abdullah & Duhita, 2023). In the current program, the proportion of those with good knowledge rose from 0% to 100%. The larger shifts in the present program and in the other multicomponent activity support the view that combining verbal, printed, and audiovisual channels with interactive discussion strengthens immediate understanding. However, these comparisons should be interpreted cautiously. The studies used different instruments, cut-off points, and sample sizes, and none included a control group or long-term follow-up. The high post-test scores in the present program may also partly reflect a ceiling effect of the 10-item instrument and measurement immediately after the session (Maria & Angraini, 2025).

Controlled studies suggest what may be needed beyond immediate knowledge gains. In Iran, 110 pregnant women were randomly assigned to a control or an intervention group; the intervention group received six 2-hour training sessions based on self-efficacy theory and health literacy skills. The intervention had a significant effect on UTI-preventive behaviours, including clothing habits, nutrition, urination, hygiene, and sexual behaviours, compared with the control group over a 3-month follow-up (Tavakoly Sany et al., 2024). The Palembang study also reported that UTI cases fell from 11 (21.6%) at pre-test to 2 (3.9%) at post-test (Maria & Angraini, 2025). Because that study had no control group, this finding should be considered preliminary. Together, these findings indicate that a single session can rapidly improve knowledge, whereas behavioural and clinical effects are more likely when education is repeated, theory-based, and followed up over time. This supports the sustainability approach described below, in which community health workers deliver periodic reinforcement.

Evaluation Limitations

This evaluation had several limitations. The post-test was administered immediately after the education and therefore reflected short-term knowledge. The absence of a comparison group meant that the effects of repeated testing, participant attention, and other factors could not be excluded. The instrument contained only 10 questions and had not undergone comprehensive psychometric testing. The evaluation also did not include observational assessment of personal hygiene practices, longitudinal measurement of water intake, community health workers' ability to provide education independently, urinalysis findings, or UTI incidence. Accordingly, the results should not be interpreted as evidence of clinical effectiveness or a definitive causal relationship.

CONCLUSION

Education on personal hygiene, water intake, and healthy voiding habits delivered through an interactive lecture, discussion, a leaflet, and an audiovisual presentation improved immediate

knowledge among 30 pregnant women in Merak Batin Village. The mean score increased from 52.33 to 91.67; all participants showed good knowledge and improved by at least 30 points; and the difference in scores was statistically significant ($p<0.001$). The village government, community health workers, and health professionals are encouraged to integrate the content into antenatal classes, periodically repeat the education, and conduct an evaluation 4 to 8 weeks after the program. Future programs should assess knowledge retention, preventive practices, community health worker competencies, and clinical indicators using validated instruments and more rigorous evaluation designs.

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REFERENCES

Abdullah, V. I., & Duhita, F. (2023). Edukasi Dan Deteksi Dini Infeksi Saluran Kemih Pada Ibu Hamil. *JMM (Jurnal Masyarakat Mandiri)*, *7*(3), 2653. https://doi.org/10.31764/jmm.v7i3.14949

Abu Aleinein, I., & Salem Sokhn, E. (2024). Knowledge and prevalence of urinary tract infection among pregnant women in Lebanon. *Heliyon*, *10*(17), e37277. https://doi.org/10.1016/j.heliyon.2024.e37277

Al Kadri, H. M., El-Metwally, A. A., Al Sudairy, A. A., Al-Dahash, R. A., Al Khateeb, B. F., & Al Johani, S. M. (2024). Antimicrobial resistance among pregnant women with urinary tract infections is on rise: Findings from meta-analysis of observational studies. *Journal of Infection and Public Health*, *17*(7), 102467. https://doi.org/10.1016/j.jiph.2024.05.055

Ali, S. M., Salih, H. S., & Saadoon, N. Y. (2022). Exploring Women's Challenge to Pap Smear Attendance and Colposcopy Referral: A Qualitative Study. *Malaysian Journal of Medicine and Health Sciences*, *18*(4), 150–155. https://medic.upm.edu.my/upload/dokumen/20220718153225 21_MJMHS_0917.pdf

Christopher, D., Markese, A., Tonick, S., Carpenter, L., & Harrison, M. S. (2022). Evaluating adherence to American College of Obstetricians and Gynecologists guidelines at the first obstetric visit. *Women's Health*, *18*. https://doi.org/10.1177/17455057221122590

Eslami, V., Sany, S. B. T., Tehrani, H., Ghavami, V., & Peyman, N. (2023). Examining health literacy and self-efficacy levels and their association with preventive behaviors of urinary tract infection in Iranian pregnant women: across sectional study. *BMC Women's Health*, *23*(1), 258. https://doi.org/10.1186/s12905-023-02359-3

Ezo, E., Binora, H., Solomon, F., Zekiwos, A., Mezgebu, T., Admasu, S., & Birhanu, B. (2024). Risk Factors and Prevalence of Urinary Tract Infection among Pregnant Women Attending Antenatal Care at Wachemo University Comprehensive Specialized Hospital. *SAGE Open Nursing*, *10*. https://doi.org/10.1177/23779608241264172

Kałuziak, P., Parys, J., Mikosińska, A., Kaźmierczak, M., Jajczak, M., Mossakowski, M., Witek, A., Litwin, M., & Jesionek, S. (2025). Review of Urinary Tract Infections in Pregnancy: Risks, Complications and Management. *Quality in Sport*, *37*, 57277. https://doi.org/10.12775/QS.2025.37.57277

Kementerian Kesehatan Republik Indonesia. (2019). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2019 tentang Angka Kecukupan Gizi yang Dianjurkan untuk Masyarakat Indonesia*. Kementerian Kesehatan RI. https://jdih.kemkes.go.id/documents/peraturan-menteri-kesehatan-nomor-28-tahun-2019

Maria, L., & Angraini, D. S. (2025). Pengaruh Edukasi Personal Hygiene Terhadap Pengetahuan dan Kejadian Infeksi Saluran Kemih pada Ibu Hamil di Wilayah Puskesmas Sekip Palembang. *Jurnal Kesehatan Tambusai*, *6*(3), 12284–12296. https://journal.universitaspahlawan.ac.id/index.php/jkt/article/view/48804/

Mera-Lojano, L. D., Mejía-Contreras, L. A., Cajas-Velásquez, S. M., & Guarderas-Muñoz, S. J. (2023). Prevalence and risk factors of urinary tract infection in pregnant women. *Revista Medica Del Instituto Mexicano Del Seguro Social*, *61*(5), 590–596. https://pubmed.ncbi.nlm.nih.gov/37768892/

Neves, P. V. T., Rodrigues, I. L. A., Pereira, A. A., Andrade, E. G. R. de, Nogueira, L. M. V., Maia, R. P., & Moraes, C. M. da S. (2023). Educational Technology On Urinary Tract Infection For Riverine Pregnant Women: Shared Construction. *Cogitare Enfermagem*, *28*. https://doi.org/10.1590/ce.v28i0.91241

Opare-Asamoah, K., Vicar, E. K., Sosu, J. X., Nyarko, E., Mustapha, S. Z., Mumuni, K. A., Aboagye, N. K. Y., Majeed, S. F., Asakeboba, P. A., Yakong, V. N., Antwi, K. F., & Dongdem, J. T. (2025). Prevalence of urinary tract infections and antibiotic susceptibility patterns of bacterial isolates in first-time ANC attendees at a secondary health facility in Ghana: a cross-sectional study. *BMC Pregnancy and Childbirth*, *25*(1), 483. https://doi.org/10.1186/s12884-025-07614-z

Rodrigues, F., Coelho, P., Mateus, S., Eideh, H., Gonçalves, T., Caseiro, A., & Castelo Branco, M. (2025). Rising Trends of Urinary Infections Among Pregnant Women: Insights from a Portuguese Hospital (2018–2022). *Bacteria*, *4*(1), 10. https://doi.org/10.3390/bacteria4010010

Rosana, Y., Ocviyanti, D., Halim, M., Harlinda, F. Y., Amran, R., Akbar, W., Billy, M., & Akhmad, S. R. P. (2020). Urinary Tract Infections among Indonesian Pregnant Women and Its Susceptibility Pattern. *Infectious Diseases in Obstetrics and Gynecology*, *2020*, 1–7. https://doi.org/10.1155/2020/9681632

Salari, N., Khoshbakht, Y., Hemmati, M., Khodayari, Y., Khaleghi, A. A., Jafari, F., Shohaimi, S., & Mohammadi, M. (2023). Global prevalence of urinary tract infection in pregnant mothers: a systematic review and meta-analysis. *Public Health*, *224*, 58–65. https://doi.org/10.1016/j.puhe.2023.08.016

Scharff, D., Enard, K. R., Tao, D., Strand, G., Yakubu, R., & Cope, V. (2022). Community Health Worker Impact on

DOI: https://dx.doi.org/10.30656/jpmwp.v10i2.12529

Knowledge, Antenatal Care, And Birth Outcomes: A Systematic Review. *Maternal and Child Health Journal*, 26(1), 79–101. https://doi.org/10.1007/s10995-021-03299-w

Shen, W., & Zhu, L. (2024). Analysis of Risk Factors for Urinary Tract Infections in Pregnant Women: A Retrospective Study. *Archivos Españoles de Urología*, *77*(5), 525. https://doi.org/10.56434/j.arch.esp.urol.20247705.72

Tavakoly Sany, S. B., Eslami, V., Lael-Monfared, E., Ghavami, V., & Peyman, N. (2024). Effect of an educational intervention based on self-efficacy theory and health literacy skills on preventive behaviors of urinary tract infection in pregnant women: A quasi-experimental study. *PLOS ONE*, *19*(8), e0306558. https://doi.org/10.1371/journal.pone.0306558

Yulfi, H., Panggabean, M., Darlan, D. M., Siregar, I. S., & Rozi, M. F. (2025). Community-based intervention in mosquito control strategy: A systematic review. *Narra J*, *5*(1), e1015. https://doi.org/10.52225/narra.v5i1.1015