



REVIEW ARTICLE

Toileting Behaviours and Their Association with Lower Urinary Tract Symptoms in Women: A Scoping Review

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ABSTRACT

Lower urinary tract symptoms (LUTS) are common among women and have been associated with demographic, behavioural, environmental, and occupational factors. Toileting behaviours (TB) have emerged as potentially modifiable contributors to bladder health; however, the scope and characteristics of the existing evidence remain unclear. We conducted a scoping review to synthesize evidence on toileting behaviours and their associations with lower urinary tract symptoms among women. The review followed Joanna Briggs Institute methodology and was reported in accordance with Preferred Reporting Items for Systematic reviews and meta-Analysis Scoping Reviews guidelines. A comprehensive systematic literature search was conducted across four databases, including PubMed, Scopus, ScienceDirect, and Google Scholar to ensure inclusion of diverse studies published between 2006 and 2025. Eligible studies included qualitative, quantitative, and mixed-methods research examining toileting behaviours in relation to lower urinary tract symptoms among women aged ≥ 18 years. Data were extracted using a structured charting form and synthesized narratively, with methodological quality appraised descriptively using Joanna Briggs Institute tools. Thirty-two studies were identified, predominantly cross-sectional in design. Reported lower urinary tract symptoms prevalence ranged from 9.9% to 97.1%, reflecting heterogeneity in populations and measurement approaches. Unhealthy toileting behaviours including delayed voiding, convenience voiding, straining, and toilet avoidance were associated with greater symptom burden. Occupational and environmental constraints, particularly restricted toilet access and poor sanitation, were frequently described as influencing factors. Overall, the findings suggest consistent associations between toileting behaviours and lower urinary tract symptoms; however, longitudinal and interventional studies are needed to clarify causal pathways and inform prevention strategies.

Keywords: Lower urinary tract symptoms; Urinary incontinence; Toileting behaviours; Bladder health, Women

Introduction

Female lower urinary tract symptoms (LUTS) encompass a spectrum of storage, voiding, and post-micturition symptoms arising from dysfunction of the bladder, urethra, or their supporting structures. According to the International Continence Society (ICS), storage symptoms include urinary frequency, urgency, nocturia, and urinary incontinence (stress, urgency, or mixed), while voiding symptoms include hesitancy, slow stream, intermittency, straining, and terminal dribble; post-micturition symptoms include a feeling of incomplete emptying and post-micturition dribble.¹ In women, LUTS are particularly influenced by pelvic floor integrity, hormonal status, and aging, with pregnancy and vaginal delivery contributing to stress urinary incontinence through neuromuscular and connective tissue injury.² LUTS are highly prevalent among women worldwide, affecting approximately 45-76% of adult females, with prevalence increasing with advancing age. Storage symptoms particularly urgency, frequency, and nocturia are the most commonly reported, followed by voiding and post-micturition symptoms.^{3,4} Community-based surveys in Europe and North America report prevalence rates above 60% while studies from Africa and Asia show similarly high burdens, often exceeding 30%.^{5,6} Despite this high prevalence, LUTS remain underreported due to stigma and limited healthcare access, particularly in low- and middle-income countries.^{3,5,7} The female urethra is short and lacks the prostatic component present in men, making urinary incontinence (UI) more prevalent due to urethral hypermobility and intrinsic sphincter deficiency, particularly following pregnancy and vaginal childbirth.¹ In addition, hormonal fluctuations especially estrogen decline after menopause affect urethral mucosal coaptation, vascularity, and bladder sensory function, contributing to urgency, frequency, and recurrent urinary tract infections.⁸

Urinary incontinence is defined by the International Continence Society as the complaint of any involuntary leakage of urine and represents a common and distressing lower urinary tract disorder, particularly

among women.¹ UI is broadly classified based on symptomatology and underlying pathophysiology. **Stress urinary incontinence (SUI)** refers to leakage occurring with effort, exertion, sneezing, or coughing, typically due to urethral hypermobility or intrinsic sphincter deficiency. **Urgency urinary incontinence (UUI)** is leakage accompanied by or immediately preceded by urgency and is commonly associated with detrusor overactivity. **Mixed urinary incontinence (MUI)** involves features of both stress and urgency incontinence and is particularly prevalent in women. Other types include **overflow incontinence**, resulting from bladder outlet obstruction or impaired detrusor contractility leading to overdistension, and **continuous incontinence**, often related to anatomical abnormalities such as urinary fistulae. Functional incontinence, in which physical or cognitive impairment prevents timely toileting despite normal lower urinary tract function, is also recognized.¹ Many women experience multiple concurrent symptoms.

Toilet behaviour (TB) has emerged as an important, and potentially modifiable factor in the development and persistence of LUTS in women. Behaviours such as delayed voiding, habitual “just-in-case” voiding, straining to urinate, and avoidance of public toilet use can alter normal bladder filling and emptying dynamics. Chronic delayed voiding may lead to increased bladder capacity, urgency, and dysfunctional voiding patterns, while premature voiding may contribute to heightened bladder sensitivity and frequency symptoms.⁹ Inadequate or incomplete bladder emptying, whether due to straining or hurried voiding in unsanitary or restrictive environments, may predispose to urinary stasis, thereby increasing susceptibility to urinary tract infections (UTIs). Studies have demonstrated associations between unhealthy toileting behaviours and both LUTS severity and recurrent UTIs in women, suggesting that environmental and behavioural factors play a significant role alongside anatomical and physiological predisposition.⁹⁻¹¹ Recognizing the interaction between toileting behaviour, and LUTS underscores the need for bladder health education and supportive

sanitation environments as part of preventive strategies. Considering the inherent heterogeneity of study designs, populations, and measurement tools, a scoping review is appropriate to summarize the breadth of available evidence and reveal knowledge gaps. This scoping review synthesises evidence on toileting behaviours and their association with lower urinary tract symptoms among women. It describes the study characteristics, prevalence and patterns, factors influencing LUTS and toilet behaviours, lived experiences, and identifies knowledge gaps to guide future research and interventions.

Methodology

This scoping review was conducted in accordance with the methodological guidance of the Joanna Briggs Institute (2020)¹² and reported following the PRISMA Extension for Scoping Reviews (PRISMA-ScR) recommendations.¹³ The Population, Concept, and Context (PCC) framework was applied to formulate the research questions and to structure the study eligibility criteria.¹⁴

DATA SOURCES

The review systematically searched four electronic databases: PubMed (MEDLINE), ScienceDirect, Scopus, and Google Scholar to identify relevant grey literature.

ELIGIBILITY CRITERIA

The eligibility criteria were guided by the PCC (Population, Concept, and Context) framework to ensure systematic inclusion of studies relevant to the review's objectives. The population of interest was women aged 18 years and older with or without lower urinary tract symptoms (LUTS). Studies involving men were excluded. In addition, studies focusing on pregnant women were excluded because urinary symptoms during pregnancy are highly affected by physiological and hormonal variations which might confound the relationship between toileting behaviours and urinary incontinence observed in non-pregnant populations. Table 1 presents the inclusion and exclusion criteria.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population	Women of ≥ 18 years, with or without urinary incontinence or LUTS	Studies including men; studies focusing on pregnant women; mixed-sex studies
Concept	Toileting or voiding behaviours and their association with urinary incontinence or LUTS, including experiences, perceptions, and coping strategies	Studies unrelated to toileting behaviour or urinary incontinence/LUTS
Context	Studies conducted in any geographical or healthcare setting	None
Study Type	Qualitative, quantitative, and mixed-methods studies, and grey literature	Reviews, editorials, commentaries, opinion pieces without empirical data
Language	Studies published in English	Non-English publications
Publication Year	2006–2025	Studies published before 2006 and after 2025

SEARCH STRATEGY

A systematic search strategy was used to identify relevant literature examining the relationship between toileting behaviours (TB) and urinary incontinence (UI) or lower urinary tract symptoms (LUTS) among women. The search strategy was developed in line with the PRISMA-ScR guidelines and guided by the (PCC) framework. Search terms were developed using a combination of Medical Subject Headings (MeSH) (where applicable) and free-text keywords related to urinary incontinence, lower urinary tract symptoms, toileting or voiding behaviours, and women. Boolean operators (AND, OR) were used to combine search terms appropriately, while truncation and phrase searching were applied to enhance sensitivity and capture variations in terminology across studies.

The major Key search terms for this study included: "urinary incontinence," "lower urinary tract symptoms," "stress urinary incontinence," "urgency

urinary incontinence," "mixed urinary incontinence," "toileting behaviour," "voiding behaviour," "bladder habits," "bathroom habits," "delayed voiding," "women," and "female." The search was limited to studies published in English between 2006 and 2025. Reference lists of included studies were also screened to identify additional relevant literature.

LITERATURE SCREENING PROCESS

The study selection followed a two-stage screening process: (i) Title and Abstract Screening: Two reviewers independently screened titles and abstracts against the inclusion criteria (ii) Full-Text Review: After the abstract screening, eligible full texts were retrieved and screened for final inclusion. Disagreements between the reviewers during the screening were resolved through discussion and re-examination of the eligibility criteria until consensus was reached. Figure 1 presents the PRISMA-ScR flow diagram that documents the number of records identified, screened, and included/excluded at each stage.

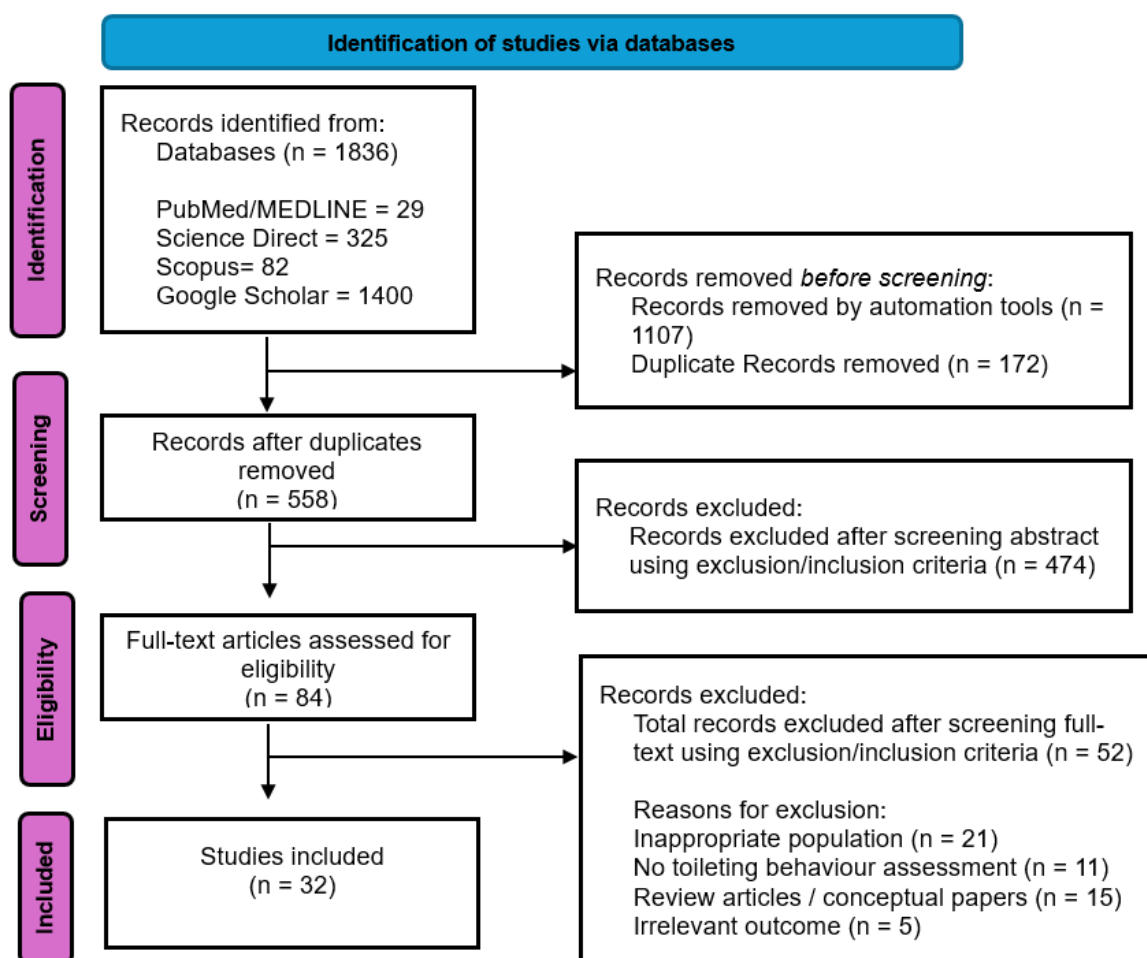


Figure 1: Preferred Reporting Items for Systematic reviews and meta-Analysis – Scoping Reviews (PRISMA-ScR) flow diagram showing study selection process

DATA CHARTING PROCESS

A structured data charting form was used to collect information on included studies. The form was pilot-tested and refined to improve its clarity in capturing relevant information. The charted data items for each study included the author(s), study design, the characteristics of the population or sample, and critical findings.

DATA ANALYSIS

A narrative synthesis was conducted to summarize and describe the geographical distribution of the available evidence. This data analysis method aligns with established approaches to a scoping reviews.¹³ Findings were narrated in a descriptive and thematic manner covering the prevalence of LUTS, measurement tools, TB patterns, factors influencing LUTS, and women's experiences and perceptions. To appraise each of the eligible studies, appropriate Joanna Briggs Institute (JBI) checklists (2020) were used according to study design.¹²

Results

STUDY SELECTION

The search retrieved a total of 1,836 records from the selected databases. Duplicates were removed, and screening of titles and abstracts was carried out based on the predetermined inclusion and exclusion criteria, to identify potentially relevant articles for full-text review. After a full-text review of 85 articles, 32 studies were found to be eligible and included in this scoping review. The included studies were published between 2007 and 2025, **representing nearly two decades** research on the TB and LUTS among women. This body of evidence consists mostly of quantitative cross-sectional studies and a few qualitative studies.

CHARACTERISTICS OF INCLUDED STUDIES

Geographic Distribution

The 32 included studies were conducted mainly in high and middle-income countries, with majority the United States^{9,15-20} and Asia [China,²¹⁻²⁴ Turkey,²⁵⁻²⁸ Iran,²⁹ Taiwan,³⁰ and the United Arab Emirates].³¹ Only

one study was conducted in Europe [Sweden]³² and one in Africa [Nigeria].³³ The eligible articles show some geographic diversity, with limited representation from low-income or sub-Saharan African settings.

Study Designs and Sample Size

The majority of the included studies used quantitative cross-sectional designs. Several large population-based surveys were identified, including Berry et al. (2025) (n=2,327), Rao et al. (2024) (n=13,191), Reynolds et al. (2020) (n=6,004), Reynolds et al. (2019) (n=3,062), Daily et al. (2019) (n=6,562), and Kowalik et al. (2019)(n=6,695).^{15,17,19,24,34,35} These studies employed validated instruments. In addition, three qualitative studies investigated perceptions, coping mechanisms, and sociocultural factors related to TB and bladder health among women.³⁶⁻³⁸ Commonly reported limitations of the quantitative studies included the cross-sectional design, self-reported data, and convenience sampling.

PREVALENCE AND PATTERNS OF LOWER URINARY TRACT SYMPTOMS

Across the reviewed studies, the reported overall prevalence of LUTS among women varied widely, ranging from 9.9% to 97.1%. UI prevalence also demonstrated substantial heterogeneity, with proportions between 16.4% and 81.9%. Urgency urinary incontinence (UUI) emerged as the most reported type in studies that reported UI classification. Studies that examined symptom patterns generally described mixed presentations of storage symptoms, with urgency and frequency frequently co-occurring with incontinence.

Furthermore, the prevalence of LUTS varied across study populations. Among community-dwelling women, LUTS prevalence ranged from 10.2% to 50.0%.^{16,25} Higher estimates were observed in occupational cohorts, with civil servants demonstrating the greatest burden (97.1%)⁷ and ranging from 46.0% to 94.2% among healthcare workers.^{7,21,23,39,40} Among teachers, LUTS prevalence ranged from 9.9% to 44.5%, while the prevalence of UI within this group was reported at 23.1%.³⁰ Although overall LUTS prevalence was not reported among university

student populations, UI was assessed and showed comparatively lower estimates ranging from 23.6% to 63.0%, with SUI more prevalent (25.4-28.8%) than UUI (16.4%).^{22,27,41} Age-stratified analyses indicated that LUTS and UI were reported across a broad age spectrum with several studies indicating increasing symptom occurrence in older age groups.^{7,18,30} However, reporting for symptom severity was inconsistent, and where assessed, severity was variably specified using different measurement tools and thresholds.

PATTERNS OF TOILET/BLADDER/VOIDING BEHAVIOURS

Several unhealthy toileting behaviours such as delaying the desire to void, voiding with little or no desire, straining and using a hovering position to void were reported to be associated with the development and deterioration of LUTS. Some reported that women often or consistently delayed voiding at work and sometimes waited hours to urinate,^{15,16,21–23,31,33,39,40,42,43} though some also reported premature voiding.^{16,19,21,28,33,43} Meanwhile, for some, it was the concerns about the cleanness of public toilets, making them avoid using public toilets.^{7,15,21,29,33,35,39} Regarding the voiding position, some women prefer to crouch or hover over the toilet to empty their bladders even when at home.^{19,23,25,33–35,43} For some, the toilet habit of cleaning from back to front in 39.8% university students was associated with LUTS.²⁷

MEASUREMENT TOOLS

Assessment of Lower Urinary Tract Symptoms

The reviewed studies used several tools to assess lower urinary tract symptoms among participants. The most used tool among the studies was the International Consultation on Incontinence Questionnaire-Female Lower Urinary Tract Symptoms (ICIQ-FLUTS), a validated questionnaire which was used by 14 studies.^{15,19,21,22,24–26,29,31,32,34,35,41,44} It comprises 12 questions, with subscales for four different domains: filling (score range 0 to 16), voiding (score range 0 to 12), urinary incontinence (score range 0 to 20), and OAB (score range 0 to 16). When the score is

higher, it indicates that the symptoms are more severe. Apart from using the ICIQ-FLUTS in its plain form, some studies used the modified version; Li et al. (2024) and Low et al. (2025) used the short Form Chinese version of the ICIQ-FLUTS.^{38,45} O'Connell et al. (2023), Brock et al 2024 and Palmer et al. (2019) used the Short Forms for Urinary Incontinence (ICIQ-SF-UI) and Overactive Bladder (ICIQ-SF-OAB).^{18,36,42} In total, 20 of the selected 32 studies used the ICIQ-FLUTS in its original version or modified or short forms. Whereas some studies used other tools in combination with the ICIQ-FLUTS, Mohammed et al. 2025 used the Lower Urinary Tract Symptoms Quality of Life (ICIQ-LUTSqol),³¹ Kowalik et al. (2019) used the Patient Perception of Bladder Condition (PPBC) to assess the participants' impression of their bladder health.³⁴

The Bristol Female Lower Urinary Tract Symptoms-Short Form (BFLUTS-SF) was used by Yakıt et al 2025,²⁷ whereas Perlow et al 2023 used the full version.³⁹ The remaining studies either did not use validated instruments, or they newly designed their tools for the assessment of LUTS.

Assessment of Toilet Behaviour

The majority of the studies in this review (22 out of 32 studies) used the validated Toileting Behaviours-Women's Elimination Behaviours scale (TB-WEB) for the assessment of toilet behaviour among the study participants. Toprak et al. (2023) used a tool designed and validated by the authors while other studies used non-validated instruments.²⁵ The TB-WEB questionnaire consists of 18 questions with five possible Likert scale responses to each question. The questions are grouped into 5 categories: place preference (4 items, range 4-20), convenience voiding (5 items, range 5-25), delayed voiding (3 items, range 3-15), straining to void (4 items, range 4-20), and position preference (2 items, range 2-10). A higher score represents unhealthier TB.

Table 2: Measurement Tools Used Across Included Studies

Measurement Tool	Number of Studies (n)
Toileting Behaviour–Women’s Elimination Behaviours Scale (TB-WEB)	22
International Consultation on Incontinence Questionnaire – Female lower urinary tract symptoms (ICIQ-FLUTS)	20
International Consultation on Incontinence Questionnaire short form (ICIQ-SF)	3
International Consultation on Incontinence Questionnaire - Overactive bladder short form ((ICIQ-OAB)	3
<i>Lower Urinary Tract Dysfunction Research Network Symptom Index (LURN SI-10)</i>	2
Bristol Female lower urinary tract symptoms original & short form (BFLUTS / BFLUTS-SF)	2
Lower Urinary Tract Symptoms Tool (LUTS tool)	1
Urinary Symptoms Scale (USS)	1
Patient Perception of Bladder Condition (PPBC)	1
Taiwan Nurse Bladder Survey (adapted items)	1
Non-validated / self-designed questionnaires	4
Qualitative thematic interviews (no instrument)	3

ASSOCIATION BETWEEN TOILET BEHAVIOURS AND LOWER URINARY TRACT SYMPTOMS

Toilet behaviour & Lower Urinary Tract Symptoms

Most of the studies reported some association between the TB of participants and their experience of LUTS. Majority demonstrated that unhealthy TB may be associated with a higher risk of lower urinary symptoms.^{17,20,26,27,34,39,42,43} Angelini et al. (2020) found that delayed voiding behaviour and premature voiding may increase the risk of LUTS.⁴³ This agrees with the findings from other studies.^{16,21–23,25,29,31,32,39,40,42} Wan et al. (2017) explored the impact of position and voiding location on the risk of LUTS and concluded that there is no significant association between the position or place of voiding and LUTS.²¹

Some authors were specific about the impact of TB on the frequency and intensity of urinary incontinence. Brock et al. (2024) showed that urinary incontinence

was more common among some specific professions.⁴² Reynolds et al. (2019) found that limited restroom was associated with higher risk of urinary incontinence and LUTS generally.¹⁵ O’Connell et al. (2023) reported that the impact of TB on urinary incontinence was indirect, usually mediated by urinary cues.¹⁸ This is the mechanism by which early and delayed voiding may be associated with urinary incontinence, shown by Palmer et al. (2019) and Perlow et al. (2023).^{36,39} Angelini et al. (2020) concluded that high TB scores may be associated with urinary incontinence.⁴³ Similarly, Fehintola et al. (2025) reported that women with poor TB were significantly more likely to experience urinary incontinence while Palmer et al 2018 documented that women who waited too long to urinate at work had greater odds of urinary urgency than women who did not.^{9,33} Daily et al. 2019 found that convenience voiding was significantly associated with symptoms of overactive bladder.¹⁹

Age-stratified association

Few of the reviewed studies explored the role of age in the association of LUTS with unhealthy TB. Berry et al. (2025) reported that unhealthy TB were associated with LUTS across all age groups with higher odds of developing LUTS among younger (age 18 -25years) women.¹⁷ Karaaslam et al. (2024) showed that the association between LUTS and unhealthy TB was only significant among young people and was not significant among older women.²⁶ Palmer et al. (2018) showed with a logistic regression that increasing age may be associated with increasing risk of urinary urgency.⁹

FACTORS INFLUENCING UNHEALTHY TOILET BEHAVIOUR

A total of sixteen studies identified the factors that are associated with unhealthy TB across five categories: sociodemographic, medical, environmental, workplace, and lifestyle. In four studies, younger aged women were reported to be more likely to limit their toilet use.^{16,17,26,35} Overweight, urinary incontinence, urinary tract infection, and irritable bowel syndrome were the reported medical conditions associated with unhealthy TB in five studies.^{15,21,31,35,42} In three studies, findings suggested a bidirectional relationship between TB and LUTS.^{15,31,40}

Environmental factors were the most frequently reported category (28.1%), including poor toilet cleanliness, limited availability, and inadequate sanitation.^{7,15,17,33,35,37,39,40,43} Negative perceptions and avoidance of public toilets were associated with higher unhealthy TB^{15,35,37,40,43} with workplace-related factors such as restrictive toilet access, high workload, time pressure, restrictive work schedules reported across various occupations such as college students, teachers, civil servants, and healthcare professionals in seven studies.^{7,15,29,30,37,42,43} Limiting toilet use at work and school was associated with LUTS.^{15,43} Lifestyle factors, including alcohol intake, fluid modification, smoking, and sexual activity, were reported in seven studies,^{7,15,31,39,41,42} with pre-emptive voiding and intentional fluid restriction commonly described as self-management strategies.³⁷

One study additionally identified the need for toileting assistance as a contributing factor to unhealthy toilet behaviour.¹⁷

WOMEN'S EXPERIENCES AND PERCEPTIONS: STIGMA, EMBARRASSMENT, COPING STRATEGIES, IMPACT ON DAILY LIFE, AND BLADDER HEALTH KNOWLEDGE

Stigma, embarrassment, adaptive coping strategies, and differences in the levels of bladder health knowledge influenced the experience of TB and UI. These experiential dimensions affected the help-seeking, day-to-day functioning, and long-term bladder habits.

Stigma, Embarrassment, and Concealment

The included studies' evidence demonstrates that stigma and embarrassment were influential in shaping the experiences of LUTS. A large number of the studies characterized UI as a stigmatized and private condition. Reynolds et al. (2020) reported that bladder issues are framed as a "secret" topic that should not discuss in public and even among close social networks, thus strengthening silence and symptom normalization.³⁵ Women often considered leaking to be a sign of old age, physical failure, or lack of cleanliness, and this served as a source of embarrassment. In Kowalik et al. (2019) and Brock et al. (2024), women reported concealing their condition because of the fear of being judged and humiliated by society, especially at the workplace and in public.^{34,42} A workplace-based study by Kok et al. (2021) further highlighted stigma-driven behavioural modification.⁷ In this study, women reported limiting fluid intake, withholding voiding, or avoiding certain settings in order to avoid visible leakage or even requiring the use of a public restroom. These avoidance patterns were commonly packaged as necessary to maintain professionalism and social acceptability as opposed to health-promoting behaviours. Wyman et al (2023) also decried emotional distress, low self-confidence, and excessive hypervigilance over toilet availability, which shows the psychosocial impact of UI.³⁷

Coping Strategies and Impact on Daily Life

The extent of coping behaviour varied between adaptive self-management and possibly harmful TB. Brady et al. (2025) reported pre-emptive or "just-in-case" voiding to reduce the risk of accidents, even in the absence of urge, as well as mapping toilet locations when leaving home.²⁰ While these strategies enhanced perceived control, they may reinforce dysfunctional bladder habits over time. In addition, the effect on everyday life was complex. Reynolds et al. (2020) and Brock et al. (2024) reported activity restriction, including avoiding exercise, traveling, and socializing, especially when the presence of clean and private toilets is not certain.^{35,42} Kok et al. (2021) also reported interrupted work schedules because of fewer bathroom breaks or poor toilets, which led to increased voiding delays and worsening of the symptoms.⁷

Misconceptions About Bladder Health

According to the available evidence in the included studies, misconceptions were common, and they had an impact on the decisions of TB. Xu et al. (2016) found that women had misconceptions concerning normal urinary frequency and urinary leakage, with some believing that UI is a normal outcome of giving birth or old age instead of a disease that can be treated.²³ Such beliefs were also linked to the late help-seeking and symptom-normalization. Mohammed et al. (2025) also reported limited understanding about fluid intake and practices of bladder training, with some women deliberately restricting fluid consumption with the assumption that it would help to prevent leakage, despite potential adverse effects.³¹ These misconceptions often coexisted with experiential knowledge derived from peers or family rather than formal health education.

Bladder Health Knowledge and Information Gaps

Existing evidence (2007 – 2025) shows the state of bladder health knowledge and identifies notable gaps. The findings of Karaaslan et al. (2024) show that while some women are aware of pelvic floor muscle exercises and general hydration advice, many of them did not understand optimal voiding intervals, appropriate toileting posture, and early symptom

recognition and management.²⁶ Knowledge was often acquired reactively, following symptom onset, rather than as part of preventive health behaviour. There were also more extended contextual influences. Low et al. (2025) discovered that women commonly conceptualized bladder health as simply a lack of symptoms and indicated that little was being discussed in the community or during routine screening with regard to bladder performance.³⁸ Similarly, Wyman et al. (2023) noted the influence of the cultural expectations, environmental limitations, and informal sources of information on shaping self-care practices.³⁷ Importantly, Karaaslan et al. (2024) emphasise that despite the link between unhealthy TB and LUTS, higher pelvic floor health knowledge did not always translate into healthier toileting practices.²⁶ This highlights the gap between awareness and behaviour.

Discussion

The review identified and synthesised evidence on the prevalence, patterns, factors influencing lower urinary tract symptoms and toileting behaviours, as well as the lived experience of women aged ≥ 18 years across diverse populations and settings from 2007 to 2025. The overall prevalence of LUTS show variations across studies. It was found that unhealthy TB such as delayed voiding, convenience voiding, straining, cleaning from back to front, and toilet avoidance were consistently associated with a higher burden of LUTS. It was also observed that occupational and environmental constraints play a significant role in shaping toileting practices and symptom risk. There were notable gaps identified in severity reporting and longitudinal research.

Across the studies reviewed, LUTS prevalence ranged from 9.9% to 97.1%, while UI prevalence ranged from 16.4% to 81.9%.^{7,18,21,22,27–30,39,41,42} These variations likely reflect differences in population demographics, study methodology, and use of different measurement tools with studies relying on self-reported symptoms without validated thresholds overestimating or underestimating the true burden. Unhealthy TB were associated with LUTS and participants' sociodemographic characteristics. Several studies

reported increasing LUTS prevalence with advancing age which is consistent with established epidemiological trends.^{16,18,22,46,47} This increase may be related to age-related physiological changes including involuntary bladder contractions, reduced bladder capacity, diminished urethral closure pressure, and increased postvoid residual urine volume.⁴⁸ TB-WEB total score was also higher in older women compared to younger women.²⁶ However, unhealthy TB were reported among young women with studies reporting delay voiding, avoid public toilets and have position preference for voiding.^{16,17,26,35} Additionally, in a qualitative study, younger participants described social circumstance where the capacity for holding urine was a prized attribute: “When I drink with friends, we all kinda try to see how long we can go without peeing.”⁴⁹ Underlying social processes have been found to shape women’s assumptions and practices related to bladder health and function.³⁸

The women included in the reviewed were primarily community-dwelling, healthcare workers, university students, teachers, and civil servants. The prevalence of LUTS was higher among the civil servants⁷ and the healthcare workers with UUI and SUI commonly reported.^{7,11,21,24,29,39,40,50} The high prevalence could be attributed to behavioural or environmental pressures as well as workplace conditions, workload and busy schedule, which can contribute to undesirable bladder health condition.^{51–53} Generally, the women irrespective of their characteristics, exhibited several types of TB. We identified early/premature, delayed voiding, straining, voiding position (crouching, hovering, squatting), and incorrect direction of wiping after toilet use. All these contributed to the occurrence of LUTS. Of all these behaviours, delayed voiding was the predominant behaviour exhibited in the studies and among healthcare workers.^{21,23,39,40} This observation is not unexpected due to their busy workload, concerns about the toilet appearance and cleanliness, availability, and accessibility causing them to become accustomed to unhealthy TB. This makes them to adapt new toileting behaviours as a compensatory method and thus they are likely to develop LUTS.³⁴ Some of

these unhealthy TB especially frequent delayed voiding may lead to some clinical conditions like progressive bladder overdistension, altered detrusor signalling, and impaired bladder sensation over time.^{54,55} Conversely, frequent convenience voiding in the absence of urge may condition the bladder to signal prematurely, potentially contributing to urgency and frequency symptoms. Straining during voiding may increase pelvic floor dysfunction and disrupt coordinated bladder emptying.^{55,56}

Medical conditions such as OAB, being overweight/obese, and irritable bowel syndrome further linked TB with LUT dysfunction. Women experiencing early urinary symptoms may adopt compensatory behaviours, including delayed voiding or fluid restriction, which may unintentionally intensify bladder dysfunction over time.^{15,39} Continued engagement in unhealthy voiding patterns may contribute to the development or progression of LUTS through altered sensory signaling and pelvic floor discoordination. However, the predominance of cross-sectional designs in the included studies limits firm conclusions regarding temporality and causality.

Lifestyle factors such as fluid intake alteration, smoking, alcohol intake, and sexual activity were associated with toileting practices, although the direction and magnitude of these relationships were not consistently reported across studies. Women experiencing early symptoms may adopt maladaptive coping strategies such as fluid restriction or pre-emptive voiding that involuntarily prolong symptom cycles.⁵² This behavioural feedback circle suggests the need for early bladder health education and behavioural interventions that address both prevention and symptom management. Environmental barriers also emerged as a dominant theme across studies. Poor toilet cleanliness, inadequate privacy, long queues, and limited facility availability were repeatedly associated with toilet avoidance and delayed voiding. Negative perceptions of public restrooms particularly the concerns about hygiene were strong behavioural drivers. These findings support the growing recognition that bladder health is shaped not only by individual

physiology but also by built environment and occupational policy contexts.^{57,58}

IMPLICATIONS OF THE FINDINGS

Overall, these findings highlight the multifaceted, multifactorial nature of bladder health in women and TB as a possibly modifiable contributor to LUTS. Coping behaviours reported in the included studies ranged from adaptive (pelvic floor muscle exercises, toilet mapping) to possibly damaging (excessive fluid restriction, chronic delayed voiding) behaviours. The unhealthy TB could temporarily mask symptoms but may lead to long-term urological morbidity.

LUTS may negatively impact work conditions by contributing to physical discomfort, frequent interruptions during work tasks, and reduced occupational performance. To prevent this, interventions targeting workplace toilet access and sanitation set-up may have meaningful downstream effects on bladder health from a public health perspective. It is essential for employers to be aware of this health problem, educational programs for LUTS should be organized and the working women should be encouraged to go to the health providers to seek treatment when the symptoms occurred irrespective of any psychosocial burden being experienced. In most cases, the women affected by LUTS in the studies reviewed describe the symptoms as private, shameful, or socially unacceptable. Occupational health policies that regulate and encourage consistent voiding breaks could be adapted as a cost effective and high-impact preventive strategy.

Additionally, an important insight from this review is the observed gap between knowledge and behaviour. Even when women were aware of pelvic floor exercises or general bladder health advice, this knowledge did not consistently translate into healthier toileting practices. This finding underscores the need for behavioural interventions that move beyond information provision toward addressing environmental constraints, workplace culture, and habit formation processes.

RESEARCH GAPS AND DIRECTION FOR FUTURE STUDIES

This review identified several important gaps in the current literature. The reporting of symptom severity was inconsistent and highly heterogeneous. While some of the reviewed studies used validated instruments such as the ICIQ-FLUTS or ICIQ-SF others relied on non-standardised measures or did not report severity of LUTS. This inconsistency limits cross-study comparability and underscores the need for consensus on core outcome sets in bladder health research.

Interestingly, evidence from this review is mainly cross-sectional. Longitudinal and interventional studies are needed to clarify temporal relationships and causality between TB and LUTS development and the factors associated with unhealthy TB. Prospective cohort studies would help determine whether unhealthy TB precede symptom onset or arise primarily as coping responses. Studies from low- and middle-income countries were poorly represented in this review especially studies from Africa. Studies from this environment is necessary because of the nature of our sanitation infrastructure and occupational conditions which differs and to ensure global applicability. Also, despite the conceptual link between hygiene behaviours and infection risk, there is need for future studies to fill the knowledge gap between UTI and TB.

STRENGTHS AND LIMITATIONS

This review provides one of the most comprehensive syntheses to date focusing specifically on the behavioural determinants of LUTS in women. The population reviewed were unique in that they cut across several occupations, educational sector consisting of teachers and university students, and also including community-dwelling women with no underlying comorbidities. Lastly, the incorporation of psychosocial and environmental perspectives further strengthens the conceptual input of this review. However, this review is not without some limitations. Almost all the included studies were cross-sectional design, limiting causal inference.

Considerable heterogeneity in outcome definitions, measurement tools, and population characteristics prohibited quantitative pooling. Both the LUTS and TB were self-reported which may introduce recall bias. Also, the geographic concentration in high-income countries may limit generalisability. Inconsistent reporting of symptom severity and UTI outcomes constrained deeper synthesis in these domains. Finally, as a scoping review, this study did not conduct meta-analysis or formal evaluation of evidence certainty; therefore, the results represent breadth of evidence, and not quantitative effects estimation.

IMPLICATIONS FOR PRACTICE AND FUTURE RESEARCH

The findings of this review have important clinical and public health implications. It is suggested that bladder health education should be integrated into women's health promotion across the lifespan, with emphasis on healthy voiding habits, appropriate fluid intake, and early symptom recognition. Future research should prioritise longitudinal designs, standardised severity metrics, and intervention studies targeting modifiable toileting behaviours. Greater attention to UTI-related outcomes and inclusion of underrepresented geographic regions are also needed. Importantly, interventions must address not only knowledge deficits but also environmental and cultural barriers that sustain unhealthy voiding practices.

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address not only knowledge deficits but also environmental and cultural barriers that sustain unhealthy voiding practices.

Conclusion

This scoping review demonstrates that unhealthy TB are associated with LUTS among women across a wide range of populations. The significant variability in prevalence emphasizes the influence of contextual, occupational, and behavioural factors on bladder health. Addressing modifiable toileting practices together with improving workplace and environmental conditions represent a promising avenue for prevention and early intervention. Strengthening the methodological rigour and geographic diversity of future research will be essential to advancing this field.

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