

The Epidemiology and Population–Based Studies of Women with Lower Urinary Tract Symptoms: A Systematic Review

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ABSTRACT

In this systematic review, we focused on epidemiology and population-based studies to identify recent real-world data of women with lower urinary tract symptoms. The PubMed, Scopus, and Cochrane databases were used for the literature search using the following keywords: epidemiology, population-based studies, women, female, lower urinary tract symptoms, and urinary incontinence. A total of 20 articles in the English language were found to be eligible for this review. The prevalence of LUTS in women was 11.8%-88.5%. The prevalence of storage symptoms was 23.6%-79%, voiding symptoms was 1.8%-51%, and post-micturition symptoms was 0.3%-46%. The prevalence of voiding and storage symptoms was 8.3%-26.6% and the prevalence of combined voiding, storage, and post-micturition symptoms was 6.6%-19.2%. Any incontinence was observed in 5.8%-45.8% of women. The majority of patients suffered from stress urinary incontinence with 1.9%-31.8%. The prevalence of urgency urinary incontinence and mixed-type urinary incontinence was 0.7%-24.4% and 2.1%-12%, respectively. Increased age, marital and work status, comorbidities, alcohol consumption, higher parity, vaginal delivery, instrumental delivery, prolonged labor, laceration, and post-menopausal status were found to be risk factors for lower urinary tract symptoms. The prevalence of lower urinary tract symptoms in women is increasing, especially with age. Since the worldwide prevalence of lower urinary tract symptoms remains unknown, multi-continental studies, especially in the developing world, with less heterogeneity and more standardized definitions, are needed to better evaluate real-world data in women with lower urinary tract symptoms.

Keywords: Epidemiology, female, lower urinary tract symptom, population-based studies

Introduction

Lower urinary tract symptoms (LUTS) in women are classified as storage symptoms, voiding symptoms, and symptoms after micturition. The most common storage symptoms are urinary frequency, urgency, incontinence, and nocturia, and the most common voiding symptoms are hesitancy, weak stream, splitting or spraying, intermittency, and straining. A feeling of incomplete emptying and post-micturition dribble are the most common post-micturition symptoms.^{1,2}

These symptoms affect patients' quality of life (QoL), and nearly a million women suffer from LUTS worldwide.³ In a multicenter study, the prevalence of "sometimes" LUTS in women was 76.3% and "often" LUTS in women was 52.5% based on the usage of International Continence Society

(ICS) definitions.⁴ Similarly, a recent internet-based survey showed that the prevalence of LUTS in women over 40 years was 66%.⁵

The definition of LUTS, the selection and exclusion criteria of patients, and heterogeneity are the most common difficulties for evaluating the real impact of LUTS. In this systematic review, we focused on epidemiology and population-based studies to identify recent real-world data for women with LUTS.

Materials and Methods

This study complied with the Preferred Reporting Items for Systematic Reviews and Meta-analyses statement for conducting systematic reviews and we also followed the "Synthesis Without Meta-analysis (SWiM) protocol" for this review.

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Eligibility Criteria

According to the PICO (Population, Interest and Context) tool, the population should include women over 18 years of age. The prevalence of LUTS in women is the main interest. The context of this review was the whole world. All population-based studies about LUTS were reviewed. Studies that questioned the prevalence of women (over 18 years old) with LUTS were included in this review. Studies that addressed patients under 18 years old, including only male patients, questioned the treatment effect of LUTS, and focused only on urinary incontinence (UI) were excluded from the final review.

Information Sources and Search Strategy

Systematic research was conducted between January and August 2021. The PubMed, Scopus, and Cochrane databases were used for the literature search using the following keywords: epidemiology, population-based studies, women, female, lower urinary tract symptoms, and UI. All filters were turned off while searching PubMed. Studies were reviewed and data were extracted by 2 authors (A.T. and Ö.B) independently. We did not use any automated tools.

Data Items and Study Risk of Bias Assessment

Primarily, the prevalence of LUTS in women was reviewed. The combined and separate prevalence of voiding, storage, and post-micturition symptoms was also reviewed. The studies that mentioned the prevalence of LUTS and incontinence were also reviewed. Study risk of bias and quality assessment were done using an “assessing risk of bias in prevalence studies” tool.⁶

Synthesis Methods

According to SWiM guidelines, summarizing effect estimates methods were used. Structured tables were used to evaluate the prevalence of LUTS, the combined and separate prevalence of voiding, storage and post-micturition symptoms, and incontinence.

Results

Search Results

A total of 3155 articles were selected. Both observational and population-based studies were included. Abstracts, posters,

editorials, and review articles were excluded. After which 738 articles with full text were reviewed and included in the final analysis. A total of 20 articles in the English language were found to be eligible for this review (Figure 1).

Study Risk of Bias and Quality Results

The assessment of quality and bias are shown in Table 1. According to this tool, all included studies had a low risk of bias.

Prevalence of Lower Urinary Tract Symptoms in Women

The prevalence of LUTS in women was 11.8%-88.5% based on a variety of definitions (Table 2).^{4,7-25} Based on definitions, type of questionnaire, and heterogeneity of the population, the prevalence of LUTS in women differed between studies. Most of the studies used the ICS definitions, but cut-off scores for the International Prostate Symptom Score (IPSS) and American Urological Association symptom index were also used. Different validated questionnaires were used, and some authors also used the “Designed Questionnaire” for the studies.^{16,18,25} The minimum age of the participants was 18 years. Of the 20 studies, 15 were from a single country, 3 were from 3 countries, and 2 of them were from more than 3 countries across 4 continents.

The Prevalence of Voiding, Storage, and Post-Micturition Symptoms

The prevalence of voiding and storage symptoms is given in Table 3. Twelve studies mentioned the prevalence of voiding, storage, and post-micturition symptoms.^{8,10,11,13,15,17,18,21-25} The prevalence of storage symptoms was 23.6%-79%, voiding symptoms was 1.8%-51%, and post-micturition symptoms was 0.3%-46%.

The Prevalence of Combined Voiding, Storage, and Post-Micturition Symptoms

The prevalence of combined voiding, storage, and post-micturition symptoms are given in Table 4.^{8,10,13,15,17,21,22} Only 7 studies mentioned combined voiding and storage symptoms. The prevalence of voiding and storage symptoms was 8.3%-26.6% and the combined voiding, storage, and post-micturition symptoms were 6.6%-19.2%.

The Prevalence of Urinary Incontinence

Urinary incontinence is reviewed in Table 5. Fifteen studies mentioned UI with variations in definition.^{4,9-11,13,14,17-25} The prevalence of any incontinence was 5.8%-45.8%. The majority of patients suffered from stress urinary incontinence (SUI) with 1.9%-31.8%. The prevalence of urgency urinary incontinence (UII) and mixed-type urinary incontinence (MUI) was 0.7%-24.4% and 2.1%-12%, respectively.

Main Points

- Lower urinary tract symptoms (LUTS) are quite common in women.
- The definition of LUTS, the selection and exclusion criteria of patients, and heterogeneity are the most common difficulties for evaluating the real impact of LUTS.
- Further studies evaluating LUTS in women are needed, especially in developing and least-developed countries.

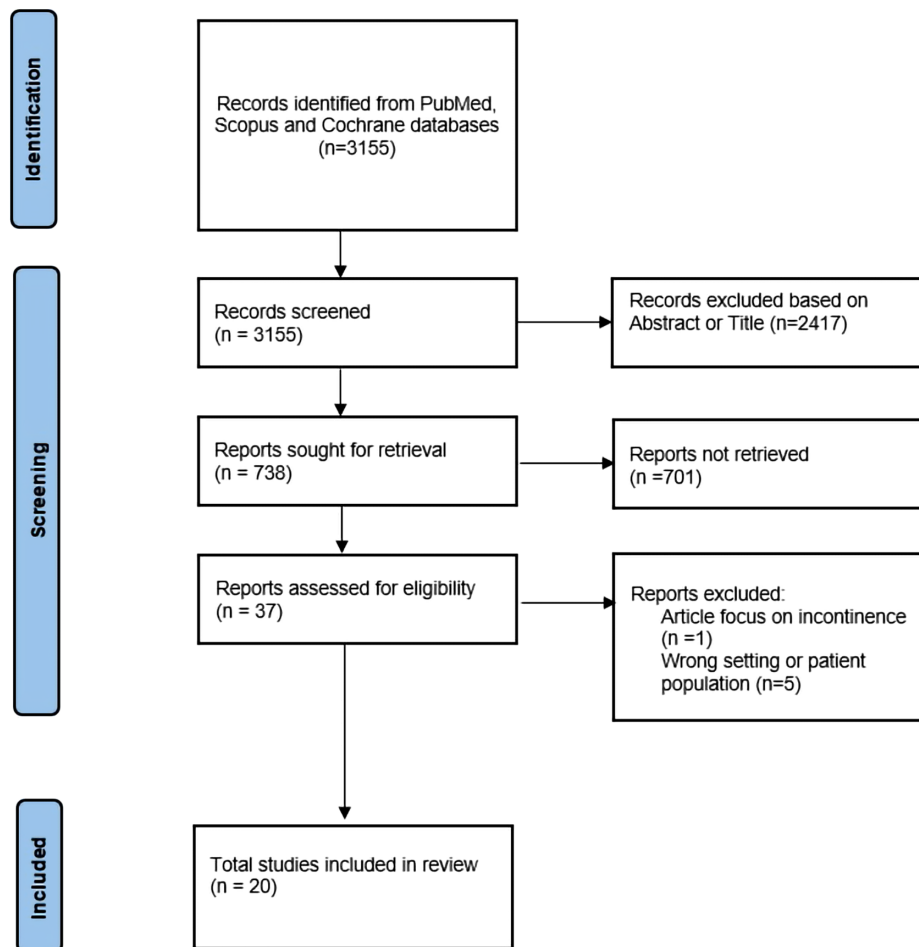


Figure 1. The flowchart of the search strategy for this review.

Risk Factors for Lower Urinary Tract Symptoms

Risk factors for LUTS in women are shown in Table 6. Increased age was found to be a definitive risk factor for LUTS.^{4,7-12,15,17,19,23-25} Marital and work status, comorbidities, alcohol consumption, body mass index (BMI), smoking status, neurological disease, educational status, higher parity, vaginal delivery, instrumental delivery, prolonged labor, laceration, post-menopausal status, and physical activity were also studied risk factors for LUTS.^{7,8,15,23,24}

The Most Bothersome Symptoms and Healthcare-Seeking Behaviors

The most bothersome or reported symptoms and healthcare-seeking behaviors are shown in Table 7. The coping methods used for bladder symptoms and the reasons for not seeking help were the symptoms were also summarized.

Discussion

We designed a systematic review of epidemiology and population studies in women with LUTS. Mostly, the authors used the

ICS definitions to evaluate LUTS. We found 20 eligible studies from the data of 20 countries across 4 continents. In this review, we found that 11.8%-88.5% of women experienced LUTS. The most common symptoms of LUTS were storage symptoms, with 23.6%-79% of women in 12 studies.

In this review, 15 of 20 selected articles were evaluated for UI. Any incontinence was observed in 5.8%-45.8% of women. The most common type of incontinence was SUI with 1.9%-31.8%. Similar to our review, a recent population-based study that investigated the prevalence of incontinence showed that the prevalence of any incontinence was 26.4% in women, but MUI was the most prevalent with 12.6%, followed by SUI and UUI.²⁶ In a recent systematic review, the prevalence of UI was found to be 25.7%, with SUI being 12.6%, UUI being 5.3%, and MUI being 9.1%.²⁷ Analysis of a health screening project which evaluated the incidence and remission of UI in women showed that baseline prevalence of UI was 32%, and after 6.5 years, it had increased to 43%. The annual incidence of UI was found to be 3.6%, which increased with age.²⁸ Heidler et al²⁹ also

Table 1. Quality Assessment for Prevalence Studies Included

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Summary
Boyle et al ⁷	L	L	L	H	L	L	L	L	H	L	L
Chapple et al ⁸	L	L	L	L	L	L	L	L	H	L	L
Coyne et al ⁴	L	L	L	H	L	L	L	L	H	H	L
Herschorn et al ⁹	L	L	L	H	L	L	L	L	H	L	L
Irwin et al ¹⁰	L	L	L	H	L	L	L	L	L	H	L
Kogan et al ¹¹	L	L	H	H	L	L	L	L	H	L	L
Kupelian et al ¹²	L	L	L	H	L	L	L	L	H	L	L
Lee et al ¹³	L	L	L	H	L	L	L	L	H	L	L
Liao et al ¹⁴	L	L	H	L	L	L	L	L	L	L	L
Liu et al ¹⁵	L	L	L	H	L	L	L	L	H	L	L
Møller et al ¹⁶	L	L	L	L	L	H	L	L	L	L	L
Moreira et al ¹⁷	L	L	L	L	L	L	L	L	H	L	L
Mourad et al ¹⁸	L	L	L	H	L	L	L	L	H	L	L
Osuga et al ¹⁹	L	L	H	L	L	L	H	L	L	L	L
Plata et al ²⁰	L	L	H	L	L	L	L	L	L	h	L
Przydacz et al ²¹	L	L	L	L	L	L	L	L	L	L	L
Soler et al ²²	L	L	L	H	L	L	L	L	L	L	L
Wang et al ²³	L	L	L	L	L	L	L	L	H	L	L
Zhang et al ²⁴	L	L	L	L	L	L	L	L	L	L	L
Zumrutbas et al ²⁵	L	L	L	H	L	L	L	L	H	L	L

L, low risk; M, moderate risk; H, high risk.

assessed LUTS in women and showed that the prevalence of LUTS increased from 35.9% to 47.1% in 6.5 years and that the annual incidence of LUTS was 5.3%.

Age was found to be the most common risk factor for LUTS. In this review, we showed that the likelihood of experiencing LUTS increases with age. In contrast to our review, van Breda HM et al³⁰ showed that the prevalence of LUTS was 94.3%, even in healthy nulligravida women of 18-30 years old. Urinary incontinence may occur even in the early years of life; 41% of female athletes (median age of 22) experienced at least 1 SUI. Nearly 25% of women under 40 also experienced UI during physical activities.³¹ In line with our results, Abufaraj et al³² showed that higher age was associated with a higher prevalence of any UI. The 5-year incidence of LUTS was found to be 13.9% in women. The authors showed that the incidence of LUTS increased with age.³³

Alcohol consumption was the main changeable risk factor for LUTS, while physical activity was solely not a risk factor for LUTS. A study that summarized the literature on LUTS in women (mainly focused on incontinence and overactive bladder) showed that age, smoking, pregnancy, asthma, obesity, dementia, vaginal delivery, constipation, diuretics, and drugs were risk factors for UI.³⁴ Parity, fetal birth weight, and episiotomy were also found to be risk factors for women with LUTS.³⁵ In a study from Turkey, recurrent urinary tract infection, chronic

illness, chronic constipation, and higher BMI were found to be the most common risk factors for women with LUTS.³⁶ Urinary symptoms were also found to be more common in women with pelvic organ prolapse.³⁷ Ethnicity was also another factor for UI. A cross-sectional survey of American Indian women from 1 tribe showed that the study group had similar rates of mixed incontinence, but stress and urge incontinence rates were lower than previous reports.³⁸

All symptoms of LUT were found to be bothersome, but the most visiting issue for women with LUTS was IPSS severity. Loss of bladder control had a higher impact on QoL. Limited fluid intake and wearing absorbent products are the most common coping methods for living with LUTS. Being seen as part of aging and embarrassment from the symptoms are the most common reasons for unwillingness to seek healthcare for the loss of bladder control. Losada et al³¹ showed that over 88% of women experienced a negative impact on their concentration, physical activity and confidence, as well as an inability to finish their work, due to their urinary symptoms. Sumarsono et al²⁶ also found that mental and physical QoL were lower in women with UI compared to women without UI. They mentioned that patients with UI had higher anxiety and depression scores. 43.9% of women with UI visited healthcare professionals for their urinary symptoms. A study by Waetjen et al³⁹ found that more frequent, more bothersome, and worsening urinary symptoms with a longer symptom

Table 2. The Prevalence of Women with Lower Urinary Tract Symptoms

Author	Year	Study Method	Number of Women participants	Number of any LUTS	Prevalence (%)	Age	Validated Questionnaire	Definition of LUTS	Country
Boyle et al ⁷	2003	A population-based, cross-sectional survey	3760	709	18.8	40-79	IPSS	Moderate to severe LUTS (IPSS>7)	Netherlands, France, UK, Korea
Chapple et al ⁸	2017	Cross-sectional, population-representative, Internet-based	4209	2511	59.7	≥40	IPSS and PPBC	ICS definitions	China, Taiwan and South Korea
Coyne et al ⁴	2009	Cross-sectional, population-representative survey	15 861	12102	76.3	≥40	SF-12, PPBC, HADS IPSS, OAB-q SF	ICS definitions	USA, the UK and Sweden
Herschorn et al ⁹	2007	Population-based telephone cross-sectional survey	509	294-212	56.8	≥18	CATI	ICS definitions	Canada
Irwin et al ¹⁰	2006	Population-based, cross-sectional telephone survey	12 093	8054	66.6	≥18	CATI Questionnaire, IPSS	ICS definitions	Sweden, Germany, Italy, Canada, and the United Kingdom
Kogan et al ¹¹	2014	Population-based, cross-sectional survey	1614	1356	84	≥18	CATI	ICS definitions	Russia, Czech Republic, and Turkey
Kupelian et al ¹²	2006	Population-based, random sample, epidemiologic survey	3205	596	18.6	30-79	AUA-SI, SF-12	AUA-SI score of 8 or above	United States
Lee et al ¹³	2011	Population-based, cross-sectional telephone survey	1112	767	68.9	≥18	CATI Questionnaire, IPSS	ICS definitions	Korea
Liao et al ¹⁴	2009	Cross-sectional, questionnaire survey.	907	590	65	21-59	TNBS, SF-36	ICS definitions	Taiwan
Liu et al ¹⁵	2019	Internet-based, self-administered survey	1063	604	56.8	≥40	IPPS, OAB	ICS definitions	Taiwan
Møller et al ¹⁶	2000	Mail-based questionnaire	2854	794	27.8	≥40	BF-LUTS and Designed Questionnaire	ICS definitions	Denmark

(Continued)

Table 2. The Prevalence of Women with Lower Urinary Tract Symptoms (Continued)

Author	Year	Study Method	Number of		Prevalence (%)	Age	Validated Questionnaire	Definition of LUTS	Country
			Women participants	any LUTS					
Moreira et al ¹⁷	2013	Cross-sectional, population-based survey	1500	1262	84.1	≥30	OAB-V8 and PPBC item	ICS definitions	Brazil
Mourad et al ¹⁸	2018	Population-based, cross-sectional survey	1853	1631	88	≥18	Designed Questionnaire	ICS definitions	Egypt
Osuga et al ¹⁹	2013	Cross-sectional analyses	1218	144	11.8	≥40	IPSS and ICIQ-SF	IPSS ≥8	Japan
Plata et al ²⁰	2018	Cross-sectional, population-based	530	493	88.5	≥18	IPSS and ICIQ-OAB	IUGA/ICS definitions	Colombia
Przydacz et al ²¹	2020	Population-based, cross-sectional analysis	3393	2465-1817	72.6	≥40	CATI Questionnaire, IPSS, OAB-V8	ICS Definitions	Poland
Soler et al ²²	2017	Computer-assisted telephone survey	2751	2262-1624	82.2	≥40	IPSS and OAB-V8	ICS Definitions	Brazil
Wang et al ²³	2015	Population-based, cross-sectional survey	1472	900	61.1	≥18	ICIQ-FLUTS LF	ICS definitions	China
Zhang et al ²⁴	2015	Population-based, cross-sectional survey	18 992	10540	55.5	≥20	BF-LUTS and ICIQ-FLUTS	ICS definitions	China
Zumrutbas et al ²⁵	2014	Cross-sectional, population-based survey	919	672	73.5	≥18	Designed Questionnaire, ICIQ-SF	ICS definitions	Turkey

LUTS, lower urinary tract symptoms; BF-LUTS, Bristol Female Lower Urinary Tract Symptoms questionnaire; ICIQ-FLUTS, Incontinence Questionnaire Female Lower Urinary Tract Symptoms; OAB V8, Overactive Bladder- Validated 8; PPBC, the patient perception of bladder condition; IPSS, The International Prostate Symptom Score; ICIQ-FLUTS LF, International Consultation on Incontinence Questionnaire Female Lower Urinary Tract Symptoms Long Form; ICIQ-OAB, Incontinence Questionnaire Overactive Bladder; CATI, Computer-assisted Telephone Interview; SF-12, Short Form Survey 12; HADS, Hospital Anxiety and Depression Scale; OAB-q SF, Overactive Bladder Questionnaire Short Form; AUA-SI, American Urological Association Symptom Index; TNBS, Taiwan Nurse Bladder Survey.

Table 3. The Prevalence of Voiding and Storage Symptoms

Author	Number of Participants with SS	SS Prevalence (%)	Number of Participants with VS	VS Prevalence (%)	Number of Participants with PM	PM Prevalence (%)
Chapple et al ⁸	1003	23.8	77	1.8	67	1.6
Irwin et al ^{10**}	7130	59.2	2443	19.5	1695	14.2
Kogan et al ¹¹	1227	76	598	37	372	23
Lee et al ¹³	717	64.4	289	25.9	155	13.9
Liu et al ¹⁵	251	23.6	25	2.3	27	2.5
Moreira et al ¹⁷	1146	76.4	505	33.7	192	12.8
Mourad et al ^{18**}	1464	79	946	51	853	46
Przydacz et al ²¹	1334	39.3	102	3	21	0.6
Soler et al ²²	1002	36.4	122	4.4	9	0.3
Wang et al ^{23**}	891	60.5	130	8.8	93	6.3
Zhang et al ²⁴	10 245	53.9	2444	12.8	-	-
Zumrutbas et al ²⁵	586	64.1	341	37.8	262	28.7

SS, storage symptoms; VS, voiding symptoms; PM, post-micturition symptoms.

**Definitions based on any symptom with nocturia >1.

duration were the most common factors for seeking treatment in women with UI. Long-term voluntary drug-taking and talking to other individuals about incontinence were also other predictive factors of help-seeking.⁴⁰

Although sexual dysfunction was not a topic for this review, UI has a significant impact on sexual function. Lim et al⁴¹ showed that patients with SUI and their partners had problems with sexual functioning. They also showed that patients with SUI had a lower QoL score compared to patients without SUI. Salonia et al⁴² found that 46% of women with UI and LUTS had female sexual dysfunction (FSD). The most common findings in FSD were hypoactive sexual desire, arousal disorder, orgasmic deficiency, and dyspareunia or genital pain.⁴²

The main limitation of this study is that it is not a meta-analysis. Our inability to perform meta-analysis and heterogeneity was the most significant issue in producing a robust result. The inclusion of patients from different geographies and different age groups, the evaluation of the entire population including men

and women, and most importantly, the lack of use of a standardized definition for LUTS were observed as the main causes of heterogeneity. We did not mainly focus on UI so we did not include studies that evaluated types of UI with specific questionnaires like medical, epidemiologic, and social aspects of aging. The evaluation of only 20 countries may mean that adequate representation is lacking in the results, and the prevalence of LUTS in developing and undeveloped countries is still unknown.

Conclusion

The prevalence of LUTS in women is increasing, especially with age. Several factors are affecting the prevalence of LUTS, including the fact that only a small proportion of individuals with LUTS seek healthcare. Therefore, prevention and providing necessary treatments are important for women's health. Since the worldwide prevalence of LUTS remains unknown, multi-continental studies, especially in the developing world, with less heterogeneity and more standardized definitions, are needed to better evaluate real-world data in women with LUTS.

Table 4. The prevalence of combined voiding, store and post-micturition symptoms

Author	Number V+S	Prevalence of V+S (%)	Number V+PM	Prevalence of V+PM (%)	Number S+PM	Prevalence of S+PM (%)	Number V+S+PM	Prevalence of V+S+PM (%)
Chapple et al ⁸	393	9.3	42	1	121	2.9	808	19.2
Irwin et al ¹⁰	1855	14.9	931	7.7	1348	11.3	797	6.6
Lee et al ¹³	251	22.5	-	-	-	-	87	7.8
Liu et al ¹⁵	89	8.3	20	1.8	42	3.9	154	14.4
Przydacz et al ²¹	492	14.5	19	0.5	109	3.2	391	11.5
Moreira et al ¹⁷	399	26.6	117	7.8	167	11.1	96	6.7
Soler et al ²²	518	18.8	18	0.6	141	5.1	457	16.6

V, voiding symptom; S, storage symptoms; PM, post-micturition symptoms.

Table 5. The Prevalence of Urinary Incontinence Based on Several Definitions

Author	Definitions of UI	Incontinence (N)	Prevalence Incontinence (%)	SUI (n)	Prevalence SUI (%)	UII (n)	Prevalence UII (%)	MUI (n)	Prevalence MUI (%)	Other UI (n)	Prevalence Other UI (%)
Coyne et al ⁴	Any incontinence, previous 4 weeks	-	-	5004	31.8	3869	24.4	-	-	1833	9.8
Herschorn et al ⁹	Any incontinence	-	-	132	25.5	48	9.3				
Irwin et al ¹⁰	Any incontinence	1675	13.1	721	6.4	208	1.5	317	2.4	329	2.8
Kogan et al ¹¹	Any incontinence	363	20	113	7	67	4	99	6	33	2
Lee et al ¹³	Any incontinence	316	28.4	230	20.7	40	3.6	46	4.1	-	-
Liao et al ¹⁴	During past 12 months, any incontinence	83	9.1	26	2.8	15	1.6	42	4.6	-	-
Moreira et al ¹⁷	Any incontinence	87	5.8	27	1.9	11	0.7	47	3.1	-	-
Mourad et al ¹⁸	Any incontinence	501	27	112	6	112	6	224	12	56	3
Osuga et al ¹⁹	Voluntary loss of urine at least twice or more a week.	80	6.6	66	5.4	40	3.3	26	2.1	-	-
Plata et al ²⁰	Past 4 weeks, any incontinence	255	45.8	76	13.7	120	21.5	59	10.6	-	-
Przydacz et al ²¹	Any incontinence	1242	36.6	415	12.2	316	9.3	348	10.3	163	4.8
Soler et al ²²	Symptoms occurring less than half the time or more	1255	45.6	562	20.4	409	14.9	-	-	411	15.3
Wang et al ²³	Past 4 weeks, any incontinence	562	38.1	265	18.0	57	3.8	47	3.2	193	13.1
Zhang et al ²⁴	Past 4 weeks, any incontinence	6052	31.9	3592	18.9	488	2.6	1789	9.4	-	-
Zumrutbas et al ²⁵	Any incontinence	354	38.7	194	21.2	75	8.2	82	9	24	2.6

SUI, stress urinary incontinence; UII, urgency urinary incontinence; MUI, mixed urinary incontinence; other UI, any other urinary incontinence (leak for no reasons, nocturnal enuresis, leak during sexual activity), n, number of patients.

Table 6. Risk Factors for Lower Urinary Tract Symptoms (LUTS) in Women

Risk factors for LUTS	Not a risk factor for LUTS
Age ^{4,7-12,15,17,19,23-25}	Smoking status ^{7,15}
Marital and work status ⁸	Educational status ⁸
Comorbidities ^{*8,15,23,24}	Higher BMI ¹⁵
Alcohol consumption ^{23,24}	Neurological disease ¹⁵
Higher BMI ^{23,24}	Physical activity ⁷
Smoking status ^{23,24}	
Neurological disease ⁸	
Educational status ²³	
Higher parity, vaginal delivery ^{23,24}	
Instrumental delivery, prolonged labor, laceration, and post-menopausal status ^{23,24}	

*Comorbidities: diabetes mellitus, heart disease, hypertension, and hyperlipidemia.
LUTS, lower urinary tract symptoms; BMI, body mass index.

Table 7. The Most Bothersome Symptoms and Healthcare-Seeking Behaviors

The most bothersome or reported symptoms for LUTS: ^{4,8,10,11,13,15,17,21-24}	Storage symptoms Nocturia Frequency Urgency Stress urinary incontinence Urge urinary incontinence Mixed urinary incontinence Voiding, storage, and post-micturition symptoms Leaking for no reason Nocturnal enuresis Post-micturition dribble
The most visiting issue for women with LUTS: ⁸	IPSS severity
The symptoms with greater impact on patients' QoL: ¹¹	Loss of bladder control Overall bladder symptoms
The coping methods used for bladder symptoms: ^{11,18,19}	Limiting fluid intake Using wearable products Herbal therapies Drugs
The reasons for not seeking help were: ¹¹	The symptoms not being severe enough The symptoms being attributed to the natural consequence of aging The symptoms were viewed as shameful The patient could self-treat their symptoms.

LUTS, lower urinary tract symptoms; QoL, quality of life; IPSS, The International Prostate Symptom Score.

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Informed Consent: N/A.

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References

1. Takahashi S, Takei M, Nishizawa O, et al. Clinical guideline for female lower urinary tract symptoms. *Low Urin Tract Symptoms*. 2016;8(1):5-29. [\[CrossRef\]](#)

2. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J*. 2010;21(1):5-26. [\[CrossRef\]](#)
3. Mou T, Brown O, Simon M, Dong X, Kenton K, Bretschneider CE. Lower urinary tract symptoms in older Chinese American women: prevalence and risk factors. *Int Urogynecol J*. 2021;32(3):703-708. [\[CrossRef\]](#)
4. Coyne KS, Sexton CC, Thompson CL, et al. The prevalence of lower urinary tract symptoms (LUTS) in the USA, the UK and Sweden: results from the Epidemiology of LUTS (EpiLUTS) study. *BJU Int*. 2009;104(3):352-360. [\[CrossRef\]](#)
5. Yoo TK, Lee KS, Sumarsono B, et al. The prevalence of lower urinary tract symptoms in population aged 40 years or over, in South Korea. *Investig Clin Urol*. 2018;59(3):166-176. [\[CrossRef\]](#)
6. Hoy D, Brooks P, Woolf A, et al. Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. *J Clin Epidemiol*. 2012;65(9):934-939. [\[CrossRef\]](#)
7. Boyle P, Robertson C, Mazzetta C, et al. The prevalence of lower urinary tract symptoms in men and women in four centres. The UrEpik study. *BJU Int*. 2003;92(4):409-414. [\[CrossRef\]](#)
8. Chapple C, Castro-Diaz D, Chuang YC, et al. Prevalence of lower urinary tract symptoms in China, Taiwan, and South Korea: results from a cross-sectional, population-based study. *Adv Ther*. 2017;34(8):1953-1965. [\[CrossRef\]](#)
9. Herschorn S, Gajewski J, Schulz J, Corcos J. A population-based study of urinary symptoms and incontinence: the Canadian Urinary Bladder Survey. *BJU Int*. 2008;101(1):52-58. [\[CrossRef\]](#)
10. Irwin DE, Milsom I, Hunskaar S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. *Eur Urol*. 2006;50(6):1306-1305. [\[CrossRef\]](#)
11. Kogan MI, Zachoval R, Ozyurt C, Schäfer T, Christensen N. Epidemiology and impact of urinary incontinence, overactive bladder, and other lower urinary tract symptoms: results of the EPIC survey in Russia, Czech Republic, and Turkey. *Curr Med Res Opin*. 2014;30(10):2119-2130. [\[CrossRef\]](#)
12. Kupelian V, Wei JT, O'Leary MP, et al. Prevalence of lower urinary tract symptoms and effect on quality of life in a racially and ethnically diverse random sample: the Boston Area Community Health (BACH) survey. *Arch Intern Med*. 2006;166(21):2381-2387. [\[CrossRef\]](#)
13. Lee YS, Lee KS, Jung JH, et al. Prevalence of overactive bladder, urinary incontinence, and lower urinary tract symptoms: results of Korean EPIC study. *World J Urol*. 2011;29(2):185-190. [\[CrossRef\]](#)
14. Liao YM, Yang CY, Kao CC, et al. Prevalence and impact on quality of life of lower urinary tract symptoms among a sample of employed women in Taipei: a questionnaire survey. *Int J Nurs Stud*. 2009;46(5):633-644. [\[CrossRef\]](#)
15. Liu SP, Chuang YC, Sumarsono B, Chang HC. The prevalence and bother of lower urinary tract symptoms in men and women aged 40 years or over in Taiwan. *J Formos Med Assoc*. 2019;118(1 Pt 1):170-178. [\[CrossRef\]](#)
16. Møller LA, Lose G, Jørgensen T. The prevalence and bothersomeness of lower urinary tract symptoms in women 40-60 years of age. *Acta Obstet Gynecol Scand*. 2000;79(4):298-305. [\[CrossRef\]](#)
17. Moreira ED, Jr, Neves RC, Neto AF, et al. A population-based survey of lower urinary tract symptoms (LUTS) and symptom-specific bother: results from the Brazilian LUTS epidemiology study (BLUES). *World J Urol*. 2013;31(6):1451-1458. [\[CrossRef\]](#)
18. Mourad S, Shokeir A, Ayoub N, et al. Prevalence and impact of lower urinary tract symptoms: results of the epic survey in Egypt. *Neurourol Urodyn*. 2019;38(2):637-643. [\[CrossRef\]](#)
19. Osuga Y, Okamura K, Ando F, Shimokata H. Prevalence of lower urinary tract symptoms in middle-aged and elderly Japanese. *Geriatr Gerontol Int*. 2013;13(4):1010-1017. [\[CrossRef\]](#)
20. Plata M, Bravo-Balado A, Robledo D, et al. Prevalence of lower urinary tract symptoms and overactive bladder in men and women over 18 years old: the Colombian overactive bladder and lower urinary tract symptoms (COBaLT) study. *Neurourol Urodyn*. 2019;38(1):200-207. [\[CrossRef\]](#)
21. Przydacz M, Golabek T, Dudek P, Lipinski M, Chłosta P. Prevalence and bother of lower urinary tract symptoms and overactive bladder in Poland, an Eastern European Study. *Sci Rep*. 2020;10(1):19819. [\[CrossRef\]](#)
22. Soler R, Gomes CM, Averbek MA, Koyama M. The prevalence of lower urinary tract symptoms (LUTS) in Brazil: results from the epidemiology of LUTS (Brazil LUTS) study. *Neurourol Urodyn*. 2018;37(4):1356-1364. [\[CrossRef\]](#)
23. Wang Y, Hu H, Xu K, Wang X, Na Y, Kang X. Prevalence, risk factors and the bother of lower urinary tract symptoms in China: a population-based survey. *Int Urogynecol J*. 2015;26(6):911-919. [\[CrossRef\]](#)
24. Zhang L, Zhu L, Xu T, et al. A population-based survey of the prevalence, potential risk factors, and symptom-specific bother of lower urinary tract symptoms in adult Chinese women. *Eur Urol*. 2015;68(1):97-112. [\[CrossRef\]](#)
25. Zumurbas AE, Bozkurt AI, Tas E, et al. Prevalence of lower urinary tract symptoms, overactive bladder and urinary incontinence in Western Turkey: results of a population-based survey. *Int J Urol*. 2014;21(10):1027-1033. [\[CrossRef\]](#)
26. Sumarsono B, Jong JJ, Wang JY, et al. The prevalence of urinary incontinence in men and women aged 40 years or over in China, Taiwan and South Korea: a cross-sectional, prevalence-based study. *Low Urin Tract Symptoms*. 2020;12(3):223-234. [\[CrossRef\]](#)
27. Mostafaei H, Sadeghi-Bazargani H, Hajebrabimi S, et al. Prevalence of female urinary incontinence in the developing world: a systematic review and meta-analysis-A report from the developing world committee of the International Continence Society and Iranian Research Center for evidence based medicine. *Neurourol Urodyn*. 2020;39(4):1063-1086. [\[CrossRef\]](#)
28. Wehrberger C, Temml C, Ponholzer A, Madersbacher S. Incidence and remission of female urinary incontinence over 6.5 years: analysis of a health screening project. *Eur Urol*. 2006;50(2):327-332. [\[CrossRef\]](#)
29. Heidler S, Deveza C, Temml C, et al. The natural history of lower urinary tract symptoms in females: analysis of a health screening project. *Eur Urol*. 2007;52(6):1744-1750. [\[CrossRef\]](#)
30. van Breda HM, Bosch JL, de Kort LM. Hidden prevalence of lower urinary tract symptoms in healthy nulligravid young women. *Int Urogynecol J*. 2015;26(11):1637-1643. [\[CrossRef\]](#)
31. Losada L, Amundsen CL, Ashton-Miller J, et al. Expert panel recommendations on lower urinary tract health of women across their

- life span. *J Womens Health (Larchmt)*. 2016;25(11):1086-1096. [\[CrossRef\]](#)
32. Abufaraj M, Xu T, Cao C, et al. Prevalence and trends in urinary incontinence among women in the United States, 2005-2018. *Am J Obstet Gynecol*. 2021;225(2):166.e1-166.e12. [\[CrossRef\]](#)
 33. Maserejian NN, Chen S, Chiu GR, et al. Incidence of lower urinary tract symptoms in a population-based study of men and women. *Urology*. 2013;82(3):560-564. [\[CrossRef\]](#)
 34. Milsom I. Lower urinary tract symptoms in women. *Curr Opin Urol*. 2009;19(4):337-341. [\[CrossRef\]](#)
 35. Zhang W, Song Y, He X, et al. Prevalence and risk factors of lower urinary tract symptoms in Fuzhou Chinese women. *Eur Urol*. 2005;48(2):309-313. [\[CrossRef\]](#)
 36. Sever N, Oskay U. An investigation of lower urinary tract symptoms in women aged 40 and over. *Low Urin Tract Symptoms*. 2017;9(1):21-26. [\[CrossRef\]](#)
 37. Lowder JL, Frankman EA, Ghetti C, et al. Lower urinary tract symptoms in women with pelvic organ prolapse. *Int Urogynecol J*. 2010;21(6):665-672. [\[CrossRef\]](#)
 38. Fiegen MM, Benson KD, Hanson JD, Prasek J, Hansen KA, VanEerden P. The prevalence of urinary incontinence in American Indian women from a South Dakota tribe. *Int Urogynecol J*. 2012;23(4):473-479. [\[CrossRef\]](#)
 39. Waetjen LE, Xing G, Johnson WO, Melnikow J, Gold EB, Study of Women's Health Across the Nation (SWAN). Factors associated with seeking treatment for urinary incontinence during the menopausal transition. *Obstet Gynecol*. 2015;125(5):1071-1079. [\[CrossRef\]](#)
 40. O'Donnell M, Lose G, Sykes D, Voss S, Hunskaar S. Help-seeking behaviour and associated factors among women with urinary incontinence in France, Germany, Spain and the United Kingdom. *Eur Urol*. 2005;47(3):385-392. [\[CrossRef\]](#)
 41. Lim R, Liong ML, Leong WS, Khan NA, Yuen KH. Effect of stress urinary incontinence on the sexual function of couples and the quality of life of patients. *J Urol*. 2016;196(1):153-158. [\[CrossRef\]](#)
 42. Salonia A, Zanni G, Nappi RE, et al. Sexual dysfunction is common in women with lower urinary tract symptoms and urinary incontinence: results of a cross-sectional study. *Eur Urol*. 2004;45(5):642-648. [\[CrossRef\]](#)