

A Population-based survey of lower urinary tract symptoms (LUTS) and symptom-specific bother: results from the Brazilian LUTS epidemiology study (BLUES)

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Abstract

Purpose To examine the prevalence of lower urinary tract symptoms (LUTS) and the bother they impose in a population-based sample of adults in Brazil.

Methods A cross-sectional population-based survey was conducted between September 2006 and January 2007 in the city of Salvador, Brazil. Cluster samples of representative households were randomly selected for interviews. A structured questionnaire was administered to men and women aged 30 years or older by trained interviewers. Participants were asked about the presence of individual LUTS using current International Continence Society (ICS) definitions and rated their symptom bother. Those with overactive bladder (OAB) also responded the

OAB-Validated 8 and the Patient Perception of Bladder Condition questionnaires.

Results Of 3,616 eligible subjects, 3,000 (83 %) participated (1,500 men and 1,500 women). OAB was present in 5.1 % of men and in 10 % of the women, while the prevalence of any LUTS was 81.5 and 84.1 %, respectively. The majority of subjects with OAB, 80 % of men and 78 % of women, reported some bother associated with their urgency symptoms. Overall, storage symptoms were more common than voiding or postmicturition symptoms. Women reported storage symptoms (76.4 %) more frequently than men (67.7 %), while the opposite was true for voiding (men 39.7 %, women 33.7 %) and postmicturition (men 30.9 %, women 12.8 %).

Conclusions This is the largest population-based survey of LUTS in Brazil, using the 2002 ICS definitions. LUTS prevalence was high and increased with age among both genders in Brazil, whereas the rates of OAB were somewhat lower than previously reported. The high prevalence of urinary symptoms and the bother commonly associated with them highlight their importance to overall well-being.

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Introduction

Interest in problems of bladder control, such as urinary leakage, overactive bladder (OAB), and other lower urinary tract symptoms (LUTS), has increased in recent years. This has been motivated by the relatively high prevalence of urinary symptoms among adults of both genders and the heightened awareness of their detrimental impact on

health-related quality of life [1]. Urinary problems have also become the focus of much ongoing research because of the gaps on current knowledge of the natural history, etiology, and pathophysiology of these conditions.

Several studies have attempted to estimate the prevalence of urinary problems, including storage, voiding, and postmicturition symptoms, but only a few evaluated these symptoms at the population level in both sexes [2–6]. Even in such studies, the reported prevalence estimates of LUTS subsets have varied widely, possibly due to differences in study population, symptoms assessment, data collection, and definitions used. In fact, many epidemiological surveys have used different criteria and definitions to evaluate participants, and relatively, few studies have assessed the prevalence of LUTS using International Continence Society (ICS) definitions [7].

In the context of symptoms-defined disorders, such as OAB or other LUTS, it is important to emphasize the importance of standardizing the definitions adopted, since this may greatly impact the prevalence estimates. Furthermore, the current ICS definitions for LUTS are qualitative and disregard severity or symptom bother, which may limit the interpretation of prevalence estimates and their importance to the subject and to the medical community. Hence, our aim in this study was to provide estimates for the prevalence rates of LUTS and the bother they impose in a population-based sample of men and women age 30 years old or more, using the current ICS (2002) definitions.

Methods

The Brazilian LUTS epidemiology study (BLUES) was a population-based, random sample household survey of men and women age 30 years or older in Salvador, the third largest city in Brazil, with a population of 2.9 million. The interviews were conducted in person from September/2006 to January/2007. All interviewers were trained and certified. The study protocol was approved by an ethical review board according to national regulations, and all participants provided written informed consent prior to entering the study.

Survey sampling

Cluster samples of households were drawn from census tracts representing all zones in Salvador. The interviewers went in person to households identified in the cluster sample. At each home, they determined whether an eligible subject lived in the household and administered the questionnaire. When an eligible subject was identified but not immediately available, a follow-up appointment was

scheduled. If the selected person was unwilling to participate, no substitution was made in that household. We included subjects aged 30 year old or more, with no cognitive impairment, and excluded those who currently had a urinary tract infection (UTI) or been diagnosed with UTI in the past month, and women who were currently pregnant or who had given birth within past 6 months.

Data collection

We used a structured questionnaire, which included questions about socio-demographic factors, general health, drug prescriptions, and medical conditions. The study instrument had also questions about the presence of urinary symptoms, as defined by the ICS, 2002 [7] (see Appendix). In addition, the questionnaire included symptom items from the International Prostate Symptoms Score (IPSS) [8]. All subjects reporting urinary symptom(s) were asked to describe the bother associated with the symptom(s) using a scale ranging from 0 meaning “not bothered at all” to 10 meaning “greatly bothered.” Participants with OAB symptoms also answered condition-specific questions about symptom bother using the Overactive Bladder-Validated 8 (OAB-V8) [9] and the Patient Perception of Bladder Condition (PPBC) item [10]. The OAB-V8 had already been validated linguistically to Brazilian Portuguese [11]. The PPBC linguistic validation involved the creation of a harmonized translation by two independent translators and the review of these materials by a survey research expert.

Case definitions

We used the 2002 ICS definitions for frequency, nocturia, urgency, urinary incontinence (UI), urgency urinary incontinence (UUI), stress urinary incontinence (SUI), mixed urinary incontinence (MUI), intermittency, slow stream, straining, terminal dribble, postmicturition dribble, and incomplete emptying (see appendix) [7]. Unless otherwise noted, the 2002 ICS definition of nocturia (≥ 1 episodes/night) is reported. For comparison, when noted, we also report nocturia defined as ≥ 2 micturitions per night. Subjects who reported both UUI and SUI symptoms were classified as having MUI. Those who reported UI without symptoms of UUI or SUI were categorized as having other UI.

Statistical analyses

Characteristics of the study population, prevalence of OAB, and other urinary tract symptoms are presented as numbers and/or percentages of participants with 95 % confidence intervals (CIs) and stratified by gender and age

group (≤ 39 year; 40–59 year; ≥ 60 year). Chi-square analyses were performed to test for significant differences between the proportions from categorical variables. All the statistical analyses were performed using Stata Statistical Software (College Station, TX: Stata Corp LP).

Results

A total of 3,616 individuals were approached for the study, in order to enroll a sample of 3,000. Thus, the response rate was 83 % (81 % in men and 85 % in women). Selected characteristics of the survey participants are presented in Table 1. The age distribution of men and women was similar; approximately 60 % of subjects were 30–49 years old. Most participants reported mixed race/ethnic origin, 61 % of men and 53 % of women, similarly to the proportion seen in the Brazilian population (43 %) [12]. However, the percentage of white ethnicity (12.5–16.6 %) was lower than in the Brazilian population (47 %), whereas the frequency of black ethnicity was higher (25.4–28.7 vs. 7.6 %) [12]. The majority was married and there were more widowed and divorced among women. Forty-one percent of women and 30 % of men reported their overall health as being fair or poor, and the most common medical condition reported was hypertension. In general, the distribution of age and other selected characteristics in our sample was similar to that in the urban Brazilian population (data not shown).

The frequency of urinary tract symptoms in the population surveyed is shown in Table 2. The prevalence of any LUTS was high in both men (81.5 %) and women (84.1 %) and increased with advancing age. Overall, storage symptoms were more common than voiding or postmicturition symptoms. Women reported storage symptoms more frequently than men (76.4 vs. 67.7 %, $p < 0.0001$), while the opposite was true for voiding (men 39.7 %, women, 33.7 %, $p < 0.001$) and postmicturition (men 30.9 %, women 12.8 %, $p < 0.001$). Nocturia was the most common storage symptom in men (64.4 %) and women (71.2 %). However, the prevalence decreased by nearly half to 33.3 and 36.5 % in men and women, respectively, when nocturia was defined as ≥ 2 micturitions per night instead of one or more. The next most often reported storage symptoms were frequency (15.4 % men, 23.7 % women) and urgency (5.1 % men, 10.0 % women). Urinary incontinence (UI) was reported by 2.3 % of men and 5.8 % of women, prevalence of UI increased nearly nine times in men and more than doubled in women as they aged.

The prevalence of OAB was 5.1 % (95 % CI, 4.0–6.3 %) for men and 10.0 % (95 % CI, 8.5–11.6 %) for women (Table 2). Although it was reported more often

Table 1 Characteristics of 3,000 subjects interviewed, Salvador, Brazil, 2006–2007

	Men <i>n</i> = 1,500	Women <i>n</i> = 1,500
<i>Age group (years)</i>		
30–39	32.4 %	26.8
40–49	29.9	28.8
50–59	19.5	23.6
60–69	11.4	11.7
≥ 70	6.8	9.1
<i>Race</i>		
White	12.5	16.6
Black	25.4	28.7
Mixed	61.0	53.4
Other	1.3	1.1
<i>Current marital status</i>		
Single, never married	18.5	24.3
Married	61.0	40.0
Living with partner (not married)	13.0	11.3
Divorced/Separated	5.9	12.1
Widowed	1.6	12.3
<i>Education</i>		
Primary school or less	35.6	37.2
Secondary/high school	48.9	49.9
At least some college	15.5	12.9
<i>Current employment status</i>		
Employed	66.6	43.9
Retired	20.1	15.8
Unemployed	13.2	12.1
Student	0.1	0.5
Full-time homemaker	0	27.7
<i>Body mass index (Weight(kg)/height(m)²)</i>		
Underweight (≤ 18.5)	2.3	3.9
Normal weight (18.6 – 24.9)	43.5	45.7
Overweight (25 – 29.9)	40.0	31.2
Obese (30.0 – 39.9)	13.8	17.9
Morbidly Obese (≥ 40)	0.4	1.3
<i>Self-assessment of general health</i>		
Excellent	13.1	9.1
Very good	10.8	9.2
Good	46.0	40.5
Fair	26.5	37.1
Poor	3.6	4.1
<i>Medical conditions</i>		
Hypertension	22.9	32.1
Diabetes	7.2	7.0
Heart disease	3.3	7.5
Depression	2.3	6.5
<i>Smoked any type of tobacco</i>		
Never	56.9	68.3
Current	17.8	11.3
Past	25.3	20.4

among women, after the age of 60 years the rates of OAB were comparable in both genders. Overall, 78 % of the men (4.0/5.1 %) and 82 % of the women (8.2/10.0 %) with OAB reported they experienced some bother associated with their urgency symptoms (Fig. 1). Nearly half of the women with bothersome OAB also reported UI (3.8/8.2 %). Most women with OAB and incontinence experienced MUI (3.1/3.8 %) (Fig. 1). Among men with bothersome OAB symptoms, one quarter (1.0/4.0 %) also reported UI, most of them due to urgency incontinence alone (0.9/1.0 %) (Fig. 1). Urinary frequency was reported by 46 % of men and 57 % of women with OAB, whereas the corresponding figures in subjects without OAB were 14 and 20 %.

Terminal dribble was the most commonly reported voiding symptom (29.3 % men, 13.0 % women), and straining was the least common symptom in men (7.1 %). Postmicturition dribble was reported more frequently by men (20.9 %) than women (12.8 %). In general, storage and voiding symptoms were the two groups that occurred together most often in men (30.0 %) and women (26.6 %), while all three types of LUTS occurred simultaneously in as much as 15.7 % of men and 6.7 % of women (Table 2).

The extent to which the study participants were bothered by each urinary symptom experienced is summarized in Fig. 2. Overall, women were more bothered by their urinary symptoms than men. Urgency was the most bothersome symptom, 75 % of women and 70 % of men reported some degree of bother associated with this symptom (Fig. 2). Additionally, 74 % of females and 69 % of males with OAB symptoms had PPBC-positive responses (their bladder condition caused them minor, moderate, severe, or many severe problems), and the OAB-V8 symptom bother score was >15 in 85 and 71 % of women and men, respectively. In contrast, more than half of the women and three quarters of the men with nocturia reported not been bothered at all by this symptom.

Discussion

To our knowledge, this is the largest population-based survey to estimate prevalence rates and associated bother of OAB and other LUTS in Brazil, and the first to evaluate these symptoms in both genders using the 2002 ICS definitions. The prevalence of any LUTS in our survey was similarly high in men and women aged 30 years or more and increased with age.

Our results are consistent with previous estimates of LUTS in men [3, 13], which showed an increase in urinary symptoms prevalence with age. However, the prevalence of LUTS in our survey is higher than in some studies that have estimated the prevalence of LUTS, as defined by a

score of at least 8 on the IPSS [2, 14]. Probably because in these studies, a subject could report experiencing an individual LUTS without reaching the score to be classified as having “moderate to severe” LUTS. Additionally, we measured the presence of individual urinary symptoms; thus, participants were asked about more symptoms than are assessed by the IPSS.

The clinical importance of nocturia for individuals who have only one episode per night still needs to be determined, as the relatively high prevalence of nocturia in our study was nearly halved when nocturia was defined as ≥ 2 micturitions per night. Furthermore, in our data, most men (74 %) and women (58 %) with nocturia reported this symptom caused them no bother at all. Thus, suggesting that experiencing one micturition per night is a part of the normal clinical spectrum. Similarly, a large population-based survey in six European countries, the EPIC study, also reported that less than 20 % of men with nocturia were bothered by this symptom [4].

OAB rates reported by women (10.0 %) and men (5.1 %) in the present survey were lower than most estimates from previous studies [3, 4, 15–17], but the gender difference in OAB prevalence has also been described in other surveys [15–17]. Irwin et al. [4], using the 2002 ICS definition, found rates similar to ours for women (12.8 %) and higher for men (10.8 %). Another study in Finland, however, reported lower prevalence rates of OAB (6.5 % men, 9.3 % women) and argued that OAB prevalence might have been overestimated in previous studies [6]. The published prevalence of OAB has varied widely across studies. Most estimates range from 10 to 20 % [1, 4, 17, 18], while some studies have reported prevalence as high as 30–53 % [19, 20], and others have showed estimates as low as 2 % [21] and 8 % [22]. Although these variations may be true, they may also be due to methodological dissimilarities. Despite the large number of studies on the prevalence of OAB, many were not population-based [16, 19–21], and some have not used the current ICS 2002 definition of OAB [15, 17, 18, 22, 23] or reported any exclusion criteria [4, 22, 24]. Furthermore, authors have failed to report response rates [17, 25] or to achieve good response rates [4, 15, 24]. Data derived from surveys where response rates were either low or not reported may be subject to selection bias and overestimate the true prevalence of urinary symptoms, even when using population-based sampling. Yet, only one previous study has used non-response analysis to adjust for selection bias [6].

The prevalence rates of UI reported by participants in our study are at the low end of the ranges published in a meta-analysis of UI studies (4.5–44 %) [26]. Since we have not excluded participants who undergone surgical treatment for UI, this may account for the low prevalence reported here. Likewise OAB, the reported prevalence of

Table 2 Prevalence (%; 95 %CI) of LUTS by age and gender, Salvador, Brazil, 2006–2007

	Men							
	≤39 years		40–59 years		≥60 years		Total	
	(n = 487)		(n = 740)		(n = 273)		(n = 1,500)	
<i>Storage symptoms</i>								
Any storage symptoms (nocturia ≥ 1 time/night)	62.0	(57.5–66.3)	66.2	(62.7–69.6)	81.7	(76.6–86.1)	67.7	(65.2–70.0)
Any storage symptoms (nocturia ≥ 2 time/night)	33.5	(29.3–37.9)	37.8	(34.3–41.4)	60.8	(54.7–66.6)	40.6	(38.1–46.1)
<i>Nocturia</i>								
≥1 time/night	58.9	(54.4–63.3)	62.4	(58.8–65.9)	79.5	(74.2–84.1)	64.4	(61.9–66.8)
≥2 time/night	24.8	(21.1–28.9)	30.9	(27.6–34.4)	54.9	(48.8–60.9)	33.3	(30.9–35.8)
Frequency	14.0	(11.0–17.4)	14.5	(12.0–17.2)	20.7	(5.9–9.9)	15.4	(13.6–17.3)
Urgency	2.7	(1.4–4.5)	4.6	(3.2–6.4)	10.6	(7.2–14.9)	5.1	(4.0–6.3)
<i>Urinary Incontinency</i>								
Any UI	0.8	(0.3–2.2)	1.5	(0.8–2.7)	7.0	(4.4–10.8)	2.3	(1.6–3.2)
UUI	0.4	(0.1–1.6)	0.7	(0.2–1.7)	2.2	(0.9–5.0)	0.9	(0.5–1.5)
SUI	0.2	(0.0–1.3)	0.4	(0.1–1.3)	3.7	(1.9–6.8)	0.9	(0.5–1.6)
MUI	0.0	(0.0–1.0)	0.1	(0.0–0.9)	0.0	(0.0–1.7)	0.1	(0.0–0.4)
Other UI	0.2	(0.0–1.3)	0.3	(0.0–1.8)	1.1	(0.3–3.4)	0.4	(0.2–0.9)
<i>Voiding symptoms</i>								
Any voiding symptoms	40.0	(35.6–44.5)	36.6	(33.1–40.2)	47.6	(41.6–53.7)	39.7	(37.2–42.3)
Intermittency	7.2	(5.6–9.8)	10.0	(7.9–12.4)	14.7	(10.7–19.4)	9.9	(8.5–11.6)
Slow stream	7.0	(4.9–9.6)	12.2	(9.9–14.7)	24.2	(19.2–29.7)	12.7	(11.0–14.5)
Straining	7.0	(4.9–9.6)	6.5	(4.8–8.5)	9.2	(6.1–13.2)	7.1	(5.9–8.5)
Terminal dribble	33.4	(29.1–37.6)	26.1	(22.9–29.4)	30.5	(25.0–36.2)	29.3	(26.9–31.6)
<i>Postmicturition symptoms</i>								
Any Postmicturition symptoms	32.4	(28.3–36.8)	31.1	(22.8–34.5)	27.8	(22.6–33.6)	30.9	(28.6–33.3)
Incomplete emptying	17.3	(13.9–20.9)	14.1	(11.6–19.8)	15.4	(11.3–20.2)	15.4	(13.5–17.2)
Postmicturition dribble	21.4	(17.8–25.3)	21.9	(18.9–25.0)	17.3	(12.9–22.2)	20.9	(18.8–23.0)
<i>Any LUTS</i>								
Nocturia ≥ 1 time/night	77.8	(73.8–81.4)	80.8	(77.7–83.5)	89.7	(85.4–93.0)	81.5	(79.4–83.4)
Storage and Voiding	29.0	(25.0–33.2)	26.6	(23.5–30.0)	41.0	(35.2–47.1)	30.0	(27.7–32.4)
Storage and Postmicturition	24.4	(20.7–28.5)	21.5	(18.6–24.7)	25.3	(20.3–30.9)	23.1	(21.0–25.4)
Voiding and Postmicturition	19.3	(15.9–23.1)	19.3	(16.6–22.4)	19.8	(15.3–25.1)	19.4	(17.4–21.5)
Storage and Voiding and Postmicturition (All three)	16.0	(12.9–19.6)	14.3	(11.9–17.1)	18.7	(14.3–23.9)	15.7	(13.9–17.6)
Nocturia ≥ 2 time/night	65.5	(61.1–69.7)	64.6	(61.0–68.0)	77.3	(71.8–82.0)	67.2	(64.7–69.6)
Storage and Voiding	17.0	(13.9–20.7)	17.2	(14.6–20.1)	33.3	(27.8–39.3)	20.1	(18.1–22.2)
Storage and Postmicturition	14.8	(11.8–18.3)	13.5	(11.2–16.2)	20.9	(16.3–26.3)	15.3	(13.5–17.2)
Voiding and Postmicturition	19.3	(15.9–23.1)	19.3	(16.6–22.4)	19.8	(15.3–25.1)	19.4	(17.4–21.5)
Storage and Voiding and Postmicturition (All three)	10.7	(8.1–13.8)	9.1	(7.1–11.4)	15.0	(11.1–19.9)	10.7	(9.2–12.4)
<i>Women</i>								
	≤39 years		40–59 years		≥60 years		Total	
	(n = 402)		(n = 785)		(n = 313)		(n = 1,500)	
<i>Storage symptoms</i>								
Any storage symptoms (nocturia ≥ 1 time/night)	71.6	(67.0–76.0)	75.3	(72.1–78.2)	85.3	(80.9–89.0)	76.4	(74.2–78.5)
Any storage symptoms (nocturia ≥ 2 time/night)	43.0	(33.1–48.0)	47.1	(43.6–50.7)	62.3	(56.7–67.7)	49.2	(46.6–51.8)
<i>Nocturia</i>								
≥1 time/night	66.4	(61.6–71.0)	70.1	(66.7–73.2)	80.2	(75.3–81.5)	71.2	(68.8–73.5)
≥2 time/night	30.1	(25.6–34.8)	34.5	(31.2–38.0)	49.8	(44.2–55.5)	36.5	(34.1–39.0)
Frequency	21.6	(17.7–26.0)	23.7	(20.7–26.8)	26.5	(21.7–31.8)	23.7	(21.6–25.9)

Table 2 continued

	Women							
	≤39 years		40–59 years		≥60 years		Total	
	(n = 402)		(n = 785)		(n = 313)		(n = 1,500)	
Urgency	5.5	(3.5–8.2)	11.7	(8.4–12.8)	11.5	(8.2–15.6)	10.0	(8.5–11.6)
Urinary Incontinency								
Any UI	3.0	(1.6–5.3)	6.6	(5.0–8.6)	7.0	(4.6–10.6)	5.8	(4.6–7.1)
UII	0.8	(0.2–2.4)	0.4	(0.1–1.2)	1.3	(0.4–3.5)	0.7	(0.3–1.3)
SUI	1.2	(0.5–3.0)	2.3	(1.4–3.7)	1.9	(0.8–4.3)	1.9	(1.3–2.8)
MUI	1.0	(0.3–2.7)	3.9	(2.7–5.6)	3.5	(1.9–6.4)	3.1	(2.3–4.1)
Other UI	0.0	(0.0–1.0)	0.0	(0.0–0.6)	0.3	(0.0–2.0)	0.1	(0.0–0.4)
<i>Voiding symptoms</i>								
Any voiding symptoms	36.3	(31.6–41.2)	35.0	(31.7–38.9)	26.8	(22.0–32.1)	33.7	(31.3–36.1)
Intermittency	10.9	(7.7–14.6)	11.6	(8.3–12.8)	14.9	(10.8–18.2)	12.2	(10.9–14.3)
Slow stream	10.1	(7.0–13.7)	11.8	(8.5–12.9)	13.8	(9.8–17.1)	11.8	(10.1–13.6)
Straining	4.6	(2.9–7.3)	4.7	(3.5–6.3)	5.7	(3.5–8.9)	4.9	(4.2–6.5)
Terminal dribble	13.7	(10.4–17.2)	13.4	(11.2–16.0)	11.0	(7.8–14.9)	13.0	(11.2–14.7)
<i>Postmicturition symptoms</i>								
Any Postmicturition symptoms	13.2	(10.0–16.9)	13.6	(11.3–16.2)	10.2	(7.1–14.1)	12.8	(11.1–14.6)
Incomplete emptying	–	–	–	–	–	–	–	–
Postmicturition dribble	13.2	(10.0–16.9)	13.6	(11.3–16.2)	10.2	(7.1–14.1)	12.8	(11.1–14.6)
<i>Any LUTS</i>								
Nocturia ≥ 1 time/night	80.6	(76.3–84.3)	84.3	(81.5–86.8)	88.2	(83.9–91.4)	84.1	(82.2–85.9)
Storage and Voiding	27.6	(23.4–32.3)	27.1	(24.1–30.4)	24.0	(19.4–29.2)	26.6	(24.4–28.9)
Storage and Postmicturition	11.7	(8.8–15.3)	11.2	(9.1–13.7)	9.9	(6.9–13.9)	11.1	(9.5–12.8)
Voiding and Postmicturition	8.2	(5.8–11.4)	8.7	(6.8–10.9)	5.1	(3.0–8.3)	7.8	(6.1–9.3)
Storage and Voiding and Postmicturition (All three)	7.0	(4.8–10.0)	7.4	(5.7–9.5)	4.8	(2.8–7.9)	6.7	(5.5–8.1)
Nocturia ≥ 2 time/night	62.7	(57.7–67.4)	66.4	(62.9–69.6)	73.2	(67.8–77.9)	66.8	(64.3–69.2)
Storage and Voiding	18.4	(14.8–22.6)	18.1	(15.5–21.0)	16.6	(12.8–21.3)	17.9	(16.0–19.9)
Storage and Postmicturition	7.7	(5.4–10.9)	8.8	(6.9–11.0)	8.0	(5.3–11.7)	8.3	(7.0–9.9)
Voiding and Postmicturition	8.2	(5.8–11.4)	8.7	(6.8–10.9)	5.1	(3.0–8.3)	7.8	(6.1–9.3)
Storage and Voiding and Postmicturition (All three)	4.5	(2.8–7.1)	6.1	(4.6–8.1)	3.5	(1.9–6.4)	5.1	(4.1–6.4)

LUTS lower urinary tract symptoms, UI Urinary incontinence, UII urgency urinary incontinence, SUI stress urinary incontinence, MUI mixed urinary incontinence

UI has varied widely in previous studies due to methodological differences in definition of UI, study populations, and survey methods. Our results confirm those of earlier studies regarding the effect of age on UI prevalence [26, 27]. We also found a relatively high proportion of OAB cases presenting UI, consistent with previously reported data [4, 6].

In the 2002 ICS attempt to standardize the definitions for LUTS, the symptoms are defined as complaints without any severity assessment [7]. Thus, these definitions are qualitative and disregard severity or symptom bother, making them somehow difficult to apply. In addition to the prevalence rates of OAB and other LUTS, we have provided data on the self-reported bother imposed by them. These information are useful to correctly interpret the

clinical relevance of symptoms-defined disorders (such as OAB) and may prevent classifying symptoms with mild or no bother as pathological.

Strengths and limitations

The distinctive strengths of this study are the large representative, population-based sample of both males and females, and the high response rate. This allowed us to accurately determine the prevalence and associated bother of OAB and other LUTS. The use of current definitions of urinary symptoms, based strictly on criteria enunciated by the 2002 ICS, also allowed for adequate comparisons of results with other studies. In addition, we used validated instruments to assess frequency and bother of urinary

Fig. 1 Prevalence (%) in the general population of UI subtypes among participants with OAB by gender, Salvador, Brazil, 2006–2007. (OAB overactive bladder, MUI mixed urinary incontinence, SUI stress urinary incontinence, UUI urgency urinary incontinence)

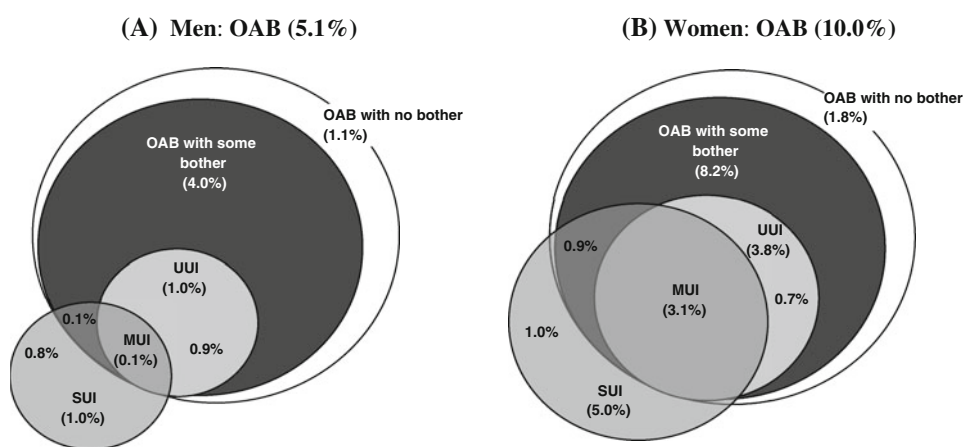
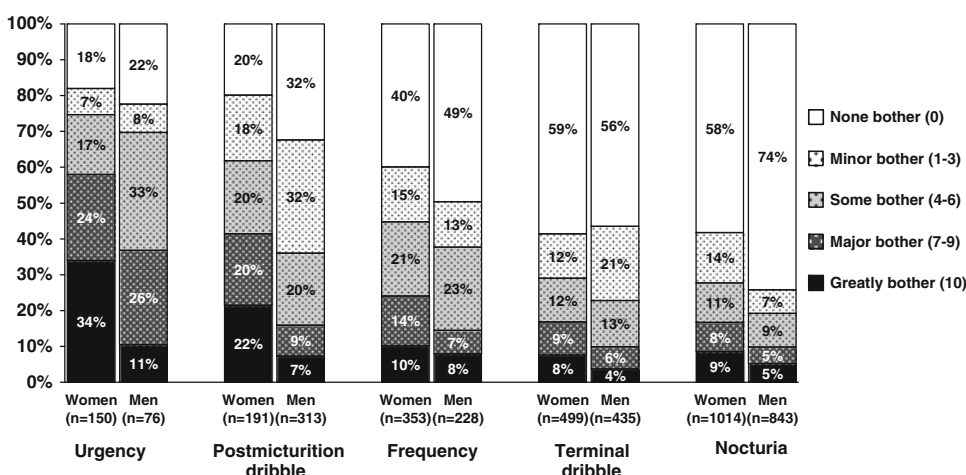


Fig. 2 Self-rated bother related to selected urinary symptoms, Salvador, Brazil, 2006–2007 (using a scale ranging from 0 meaning “not bothered at all” to 10 meaning “greatly bothered”)



symptoms and accomplished a high completeness of questionnaires responses.

The findings in our study have to be interpreted in the context of its limitations. One limitation concerns the use of self-reports to measure LUTS, although this approach is more prone to inaccuracy compared to physician standard diagnosis, BLUES was designed as an epidemiological survey of urologic symptoms, not as a study of urologic diseases. Another limitation is that the mode of data collection may have affected our results; since it has been suggested that mode of questionnaire administration may influence the reporting of urinary symptoms [28–30]. Therefore, this should be taken into consideration when comparing our data, collected via in-person interview, to data from other studies collected via mail, internet, or telephone interviews.

Conclusions

LUTS are highly prevalent in adults in Brazil and its prevalence increases with age. Our results suggest that OAB prevalence has been overestimated in many earlier

studies. Despite the somewhat lower rates of OAB, urgency was the most bothersome urinary symptom in both genders. The high prevalence of urinary symptoms and the bother commonly imposed by them highlight their importance to overall well-being. Further analyses of data collected prospectively in the BLUES study will investigate risk factors, help-seeking behaviors, and impact of OAB and other LUTS on health-related quality of life, providing much needed information on the incidence and natural history of urinary symptoms.

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Conflict of interest Edson Moreira is a scientific consultant to Pfizer and Merck. Dale Glasser was an employee of Pfizer Inc at the time the study was conducted. All the other co-authors have no conflict of interest.

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