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Reproductive History and Progression of Lower Urinary Tract Symptoms in Women: Results from a Population-Based Cohort Study

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Abstract

Objective—To examine whether reproductive history and related conditions are associated with the development and persistence of lower urinary tract symptoms (LUTS) other than urinary incontinence in a racially/ethnically diverse population-based sample of women.

Materials and Methods—The Boston Area Community Health Survey enrolled 3,201 women aged 30–79y of black, Hispanic, or white race/ethnicity. Baseline and 5-year follow-up interviews were completed by 2,534 women (conditional response rate 83.4%). The association between reproductive history factors and population-weighted estimates of LUTS progression and persistence was tested using multivariable logistic regression models.

Results—Between baseline and 5-year follow-up, 23.9% of women had LUTS progression. In age-adjusted models, women who had delivered 2 child births had higher odds of LUTS progression, but the association was completely accounted for by vaginal child delivery (e.g., 2 vaginal childbirths vs. none, multivariable-adjusted OR=2.21, 95% CI 1.46–3.35, $P<0.001$). No increased odds of LUTS progression was found for women with only 1 vaginal delivery or who only had C-section(s). Uterine prolapse was associated with higher odds of LUTS progression (multivariable-adjusted OR=3.05, 95% CI 1.43–6.50, $P=0.004$). Gestational diabetes was associated with approximately twice the odds of LUTS progression, but only among younger women (P -interaction=0.003).

Conclusions—In this cohort study, 2 vaginal child deliveries, uterine prolapse, and among younger women, gestational diabetes were robust predictors of LUTS progression. Clinicians

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should assess the presence of bothersome urinary frequency, urgency, and voiding symptoms among women who have had multiple vaginal childbirths or gestational diabetes.

Keywords

Urinary incontinence; Female; Lower urinary tract symptoms; Epidemiology; Urinary bladder, overactive

Introduction

Lower urinary tract symptoms (LUTS) include a variety of urinary storage and voiding problems, such as sensations of urgency, incomplete bladder emptying, weak stream, and frequent urination. Approximately one in five adult women report moderate-to-severe LUTS, often along with resulting substantial bother and interference with daily activities.¹ Although prevalence estimates are similar in men, LUTS in women more commonly involves overactive bladder and urinary storage problems, rather than voiding difficulties.^{2,3} The prevalence of storage and voiding LUTS (with or without urinary incontinence) in women is considerably higher than that of urinary incontinence alone, e.g., 18.6% vs. 10.4% in one population-based survey.^{1,4} Yet compared to the wealth of research on urinary incontinence,^{5–7} there is relatively little information on how women's reproductive and other health factors may contribute to LUTS risk. For example, research has established that vaginal child delivery is associated with increased urinary incontinence risk,^{8,9} but whether the association also pertains to development of other storage and voiding LUTS remains uncertain.¹⁰ Furthermore, it is plausible that the impact of certain reproductive factors (e.g., child delivery) diminishes over time,^{11,12} and longitudinal studies are needed to better understand the temporal nature and associations with persistence of LUTS.

The objective of this study is to provide a detailed evaluation of reproductive factors, such as child delivery method, gestational diabetes, and contraceptive use, in relation to the progression and persistence of LUTS in women. For this purpose, we use data from a population-based observational study with 5-year follow-up, the Boston Area Community Health (BACH) Survey, which allows us to examine these questions in racially/ethnically- and age-diverse sample of women.

Methods

Study Design and Population

The Boston Area Community Health (BACH) Survey is an observational cohort study designed to examine the epidemiology of urologic symptoms in a racially/ethnically diverse population-based random sample. Using a stratified 2-stage cluster design, BACH recruited 5,502 residents (2,301 men, 3,201 women) aged 30–79 years from three racial/ethnic groups in Boston, MA. Participants completed in-person interviews at baseline (occurring between 2002 and 2005) and approximately 5 years later (2006–2010). Completed follow-up interviews were obtained for 2,534 women from the 3,037 eligible for follow-up (not deceased, incarcerated, on active military duty, or medically incompetent), resulting in a conditional response rate of 83.4%. Further details on BACH's study design have been

published¹³. All participants provided written informed consent. The study was approved by the New England Research Institutes' Institutional Review Board.

Assessment of Reproductive Health History

Participants self-reported reproductive health related factors during in-person interviews. Medical conditions (e.g., uterine fibroids) were assessed by the question, "Have you ever been told by a health care provider that you have or had [*medical condition*]?" Infertility was defined as trying to conceive for 12 months or more.

Measurement of LUTS

During in-person interviews at baseline and follow-up, LUTS was assessed by the validated English or Spanish versions of the American Urological Symptom Index (AUASI).¹⁴ The AUASI was originally developed and validated for benign prostatic hyperplasia in men,¹⁴ but has been validated¹⁵ and repeatedly shown to capture LUTS in women.^{1,2,16,17}

Progression of LUTS was defined as increase from baseline 3+ points for slight progression/regression.¹⁸ In secondary analyses, we examined the outcome of moderate progression defined as 5+ points increase in AUASI,¹⁸ and persistent moderate-to-severe LUTS, defined as an AUASI score ≥ 8 at both baseline and follow-up. Urinary incontinence was defined as urine leakage occurring at least once per week. Interference with activities of daily living by urologic symptoms was assessed using the validated Epstein scale, in which higher scores indicate greater daily bother from urological symptoms.¹⁹

At both study visits, medication use in the last 4 weeks was collected by recording medication container labels and by self-report using prompts for indication. Medication labels and/or responses were coded using the Slone Drug Dictionary, which classifies medications using a modification of the American Hospital Formulary Service Pharmacologic-Therapeutic Classification System. Drug treatment for LUTS (including overactive bladder and urinary incontinence) was defined as current use of any of the following: oxybutynin chloride (Ditropan[®]), transdermal oxybutynin chloride (Ditropan Transdermal[®]), tolterodine tartrate (Detrol[®]), darifenacin hydrobromide (Enblex[®]); solifenacin succinate (Vesicare[®]); tamsulosin hydrochloride (Flomax[®]); fesoterodine fumarate (Toviaz[®]); propantheline bromide (Pro-Banthine[®]); hyoscyamine (Levsin[®]). Data on surgical and other treatment management, such as pelvic floor strengthening exercises and urination timing, were self-reported.

Statistical Analysis

In descriptive analyses, we examined the frequency of various reproductive and women's health factors at baseline and follow-up. To identify associations between these factors and LUTS progression, logistic regression was used to obtain odds ratios (OR) and 95% confidence intervals (CI). Initially, age-adjusted models tested each reproductive factor separately. Time since last child delivery was examined as an individual reproductive factor and was accounted for in the final multivariable models for other reproductive factors. Potential confounding factors were examined by creating multivariable models that included a variety of sociodemographic, lifestyle, and medical factors previously shown to be associated with LUTS in the scientific literature. For a parsimonious model, covariates that

remained at $P < 0.20$ in the mutually-adjusted covariate model were retained: baseline age, waist circumference, physical activity level, education level, marital status, depression symptoms, arthritis or rheumatism, and cardiac disease. To examine the influence of treatment (medication, surgery, exercises) for LUTS, we added these indicator variables in a separate step. In the final models, we further adjusted for reproductive factors that were associated with LUTS progression in preliminary model-building steps, including time since last delivery, uterine prolapse, and number of vaginal child deliveries. Using these multivariable models, we tested interactions between reproductive factors and age at baseline and the impact of additional adjustment for baseline AUASI score and urinary incontinence (defined as urine leakage occurring at least once per week).

To account for missing data (<1% of urological data), multiple imputation was performed in IVEware, generating 15 complete datasets, based on multivariate sequential regression.²⁰ To account for the multistage sampling design and obtain population-generalizable estimates, data observations were weighted inversely to their probability of selection at baseline, adjusted for non-response bias at follow-up, and then post-stratified to the Boston census population in 2000. Analyses were conducted in SAS v.9.3 (SAS Institute, Cary, NC) and SUDAAN v.11.0 (Research Triangle Park, NC).

Results

Table 1 presents descriptive characteristics of the study sample. The mean (SD) time between the baseline and follow-up assessments was 4.8 (0.6) years. Moderate-to-severe LUTS was present among 18.9% of women at baseline, and 56.6% of these women (10.8% of the total sample) had persistence of LUTS at follow-up. At follow-up, 23.9% of women had progression of LUTS since the baseline visit. Progression of LUTS was associated with greater increases in interference with activities of daily living over follow-up: 3.84 (95% CI: 2.99–4.59) mean increase in bother score among those with LUTS progression, compared to –0.40 (95% CI: –0.74, –0.07) mean decrease among those without LUTS progression. Progression of storage symptoms such as urgency (22.3%) was slightly more common than progression of voiding symptoms (17.4%) such as weak urinary stream or intermittency. Of those who had LUTS progression at follow-up, 24.0% also reported urinary incontinence. Urinary incontinence newly developed in 8.9% of women and was present in 13.4% of women at follow-up. Anticholinergic or antispasmodic medication use (1.8%) and regular pelvic floor exercises at baseline (3.9%) were uncommon.

In models adjusted only for age, women reporting a higher number of live births or vaginal child deliveries, particularly ≥ 2 deliveries, had a statistically significantly higher odds of LUTS progression (Table 2). Adjustment for number of vaginal deliveries in the multivariable model eliminated the inverse association between C-section deliveries and LUTS progression and the positive association between number of live births and LUTS progression. Women who had ≥ 2 vaginal deliveries had twice the odds of LUTS progression ($P < 0.01$) compared to women never delivering vaginally. Experiencing only one vaginal delivery was not statistically significantly associated with increased odds of LUTS progression. There were no statistically significant associations between weight of child at delivery, hormonal birth control, menopausal status, or infertility and LUTS progression.

For most other factors, adjustment for sociodemographic, lifestyle, and medical characteristics did not appreciably alter associations (Table 2). For example, higher waist circumference at baseline had a robust association with higher odds of LUTS progression ($P<0.01$). One exception was uterine prolapse: uterine prolapse was associated with twice the odds of LUTS progression in age-adjusted models (OR=2.30, 95% CI 1.22–4.32, $P=0.01$) and approximately three times the odds in fully adjusted models (OR=3.05, 95% CI 1.43–6.50, $P=0.004$). However, the relatively small percentage of women (3.7%) reporting uterine prolapse decreases the stability of this estimate.

Further adjustment for urinary incontinence did not appreciably alter most associations (Table 2, last column), although the statistical significance was increased for the positive association between LUTS progression and having had both vaginal and C-section deliveries (particularly ≥ 2 C-section deliveries), compared to none. Further adjustment for baseline AUASI score did not alter findings (data not shown). In secondary analysis of LUTS progression defined as increase in 5+ points, results were similar, although confidence intervals were wider due to the smaller percentage of cases (14.7%) and exclusion of AUASI increases of 3–4 points (N=269) from the comparison group.

Gestational diabetes was associated with higher odds of LUTS progression, but only among younger women (P -interaction=0.003, Figure 1). Among women aged ≤ 45 y at baseline, those who had previously been diagnosed with gestational diabetes (N=58 of 948 women) had approximately twice the odds of LUTS progression (multivariable-adjusted OR=2.42, 95% CI 0.88–6.66, $P=0.08$) at follow-up. In contrast, there was a non-significant inverse association between gestational diabetes and LUTS progression among older women. No other interactions with age were observed. There were no associations between presence of type 1 or type 2 diabetes and LUTS progression, and results were unchanged with additional adjustment for non-gestational diabetes in the multivariable model (data not shown).

Among the 538 women with moderate-to-severe LUTS at baseline, those who had urinary tract infections, vaginal child deliveries (vs. C-section or no child deliveries), or had child birth within 5 years of baseline more commonly had persistent LUTS at follow-up, but results were not statistically significant (Table 3).

Comment

In this population-based observational cohort study of women, vaginal child delivery and uterine prolapse were strong predictors of worsening of LUTS non-specific to urinary incontinence over 5 years. Women who had more childbirths were more likely to experience LUTS progression, but this association was fully accounted for by vaginal child deliveries, rather than C-sections. Indeed, regardless of number of pregnancies, women who had only C-sections had no increased odds of LUTS progression, comparable to women who had never given birth. For vaginal childbirth, having had only one vaginal delivery had no apparent effect, but women with two or more vaginal deliveries had approximately twice the odds of LUTS progression compared to women never having given birth vaginally. Interestingly, few other reproductive characteristics were significant predictors of LUTS progression. For example, there were no associations for menopausal status or birth control

method. Also, among women with LUTS at baseline, none of these reproductive and other women's health history factors were statistically significantly predictive of LUTS persistence or remission at 5 year follow-up.

A strength of this study is the large population-based sample, which provides generalizable results for women of three common racial/ethnic backgrounds and diverse ages. Race/ethnicity itself was not a significant predictor of LUTS progression in women. Age was a relevant confounder, and some associations differed by age. Specifically, having had gestational diabetes was associated with higher odds of LUTS progression only among younger women. It is possible that younger women were closer to childbearing ages, and there were residual effects of childbearing or childbirth, despite our adjustment for time since last delivery in the multivariable models. Data about gestational diabetes among older women were sparse, presumably because older women were either less likely to be aware of having had gestational diabetes, or less likely to have had it, as the prevalence of gestational diabetes was much lower twenty or more years ago, at the time of their pregnancies, and diagnostic criteria may have differed.^{21–23} Thus, secular and recall differences could account for the lack of precision in estimates for the association between gestational diabetes and LUTS progression in older ages. Although other research indicates that women with gestational diabetes are at increased risk of developing type 2 diabetes thereafter,^{21,24} type 1 or type 2 diabetes was not associated with LUTS progression in our study. One plausible mechanism linking gestational diabetes to LUTS is that women with gestational diabetes were more likely to gain weight,²⁴ which is associated with LUTS progression.²⁵ Indeed, waist circumference and body mass index were highly significant predictors of LUTS progression in the BACH study.²⁵ Additional studies are needed to determine whether gestational diabetes causes LUTS progression among women, and whether any such effects are temporary during the decade or so after the pregnancy ends.

The positive finding regarding vaginal vs. C-section childbirth is consistent with previous findings for urinary incontinence in this dataset and others.^{8,9,26,27} As with incontinence, problems with urinary urgency, frequency, and voiding difficulties may be more likely to worsen among women with multiple vaginal deliveries because of repeated injury to the muscles, nerves and connective tissue of the pelvic floor during childbirths.²⁸ Laboratory data show that female rats with multiple gestations develop bladder hypertrophy, instabilities, increased voiding pressure and residual volume, suggestive of increased sensitivity to adrenergic and cholinergic stimulation, compared to controls.²⁹ Furthermore, injuries to the pelvic floor, often related to childbirth, can cause pelvic organ prolapse.²⁸ Our data showed that even after mutually adjusting for vaginal childbirths and uterine prolapse, each of these factors was strongly associated with worsening LUTS over time.

Compared to other epidemiological investigations, a unique strength of this study is its detailed data on medications and other treatments for LUTS. This addresses the criticism of most previous longitudinal studies, in which the potential effects of treatment status were unknown. Of note, medications to treat LUTS had little impact on overall rates of LUTS progression or persistence and did not affect associations for other risk factors.

A limitation of this study is that the 5-year duration between baseline and follow-up may have missed phases of LUTS and periods of increased or diminished severity. Also, reproductive health history, including diagnosed conditions such as uterine prolapse, was based entirely on self-report. Although the study was well-powered to analyze LUTS progression, the analysis of persistence of LUTS had fewer women, which may be why no statistically significant predictors were observed. Persistence of LUTS is relevant because, for some women, symptoms improve over time without intervention, and it is plausible the impact of reproductive factors diminishes over time. For example, previous studies have found that LUTS present during pregnancy diminished at 3 or 12 months postpartum.^{10,11} However, the long-term effects of injury induced from childbirth may resurface again at later ages with greater LUTS progression.^{11,30}

Conclusion

In summary, this population-based study found that the most robust reproductive health related predictors of LUTS progression at 5 year follow-up in women were having had 2 vaginal child deliveries, uterine prolapse and, and among younger women, gestational diabetes. These data indicate that assessment of bothersome urinary storage and voiding symptoms in addition to urinary incontinence is important for women who have had multiple vaginal childbirths or gestational diabetes. Further research is needed to understand the time course of LUTS development and preventive strategies for women at risk of LUTS due to reproductive health history.

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Abbreviations used in this manuscript

AUASI	American Urological Symptom Index
BACH	Boston Area Community Health
CI	Confidence Interval
LUTS	Lower urinary tract symptoms

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Figure 1.
Association between Gestational Diabetes and LUTS Progression, by Age (Interaction
 $P=0.003$)^a

^a Odds ratio and 95% CI are presented on the log scale.

Table 1

Characteristics of 2,534 women in the BACH follow-up survey

	Mean (SE) or %
Age ^a , mean (SE) years	50.7 (0.3)
Age ^a category, %	
<40 y	24.0
40–49 y	26.1
50–59 y	25.4
60–69 y	17.1
70+ y	7.4
Race/ethnicity ^a , %	
Black	33.2
Hispanic	33.5
White	33.3
Physical Activity, %	
Low	27.0
Medium	54.5
High	18.5
Married, %	44.9
Waist circumference, mean (SE) cm	93.1 (0.3)
Cardiac disease, %	7.4
Diabetes, %	8.9
Arthritis or rheumatism, %	29.3
Depression symptoms, %	19.0

^aUnweighted to reflect actual percentage of participants rather than survey weights.

Reproductive History Factors and Associations with LUTS Progression at 5-Yr Follow-Up in 2,534 Women in the Boston Area Community Health Survey

Table 2

	N (%) ^a	Age-Adjusted	Association with LUTS Progression			
			Multivariable Model A ^b	Multivariable Model A with adjustment for urinary incontinence ^c	P-value	P-value
		OR (95% CI)	P-value	OR (95% CI)	P-value	P-value
Polycystic ovarian syndrome	50 (2.37)	0.61 (0.20, 1.86)	0.4	0.82 (0.30, 2.22)	0.7	0.7
Uterine fibroids	485 (19.0)	0.84 (0.57, 1.25)	0.4	0.81 (0.54, 1.23)	0.3	0.4
Uterine prolapse	81 (3.7)	2.30 (1.22, 4.32)	0.01	3.05 (1.43, 6.50)	0.004	0.009
Urinary tract infection	962 (45.6)	0.87 (0.64, 1.19)	0.4	0.98 (0.71, 1.35)	0.9	0.9
Hormonal birth control						
Current	189 (9.0)	0.62 (0.34, 1.10)	0.10	0.67 (0.37, 1.20)	0.2	0.1
Past	1367 (55.4)	0.80 (0.57, 1.14)	0.2	0.82 (0.58, 1.17)	0.3	0.2
Never	978 (35.6)	1.0 (ref)		1.0 (ref)		
Menopausal/Hormone status						
Premenopausal	573 (24.3)	1.0 (ref)		1.0 (ref)		
Peri-menopause	532 (23.9)	1.04 (0.63, 1.72)	0.9	0.98 (0.61, 1.58)	0.9	0.7
Postmenopausal	673 (22.0)	1.46 (0.75, 2.82)	0.3	1.25 (0.66, 2.38)	0.5	0.5
Undetermined	67 (2.5)	1.15 (0.47, 2.80)	0.8	1.07 (0.43, 2.68)	0.9	0.9
Surgical menopause	477 (16.3)	1.15 (0.58, 2.28)	0.7	1.00 (0.48, 2.07)	0.9	0.9
Hormones	212 (11.1)	1.23 (0.67, 2.24)	0.5	1.32 (0.72, 2.42)	0.4	0.4
Hysterectomy	467 (15.9)	0.85 (0.51, 1.40)	0.5	0.81 (0.47, 1.39)	0.4	0.4
Oophorectomy	389 (14.3)	1.10 (0.68, 1.79)	0.7	1.13 (0.68, 1.87)	0.6	0.7
Infertility	231 (11.4)	0.95 (0.59, 1.54)	0.8	1.11 (0.69, 1.80)	0.7	0.8
Number of live births						
0	468 (27.6)	1.0 (ref)		1.0 (ref)		
1	383 (16.3)	1.12 (0.63, 1.99)	0.7	0.63 (0.29, 1.34)	0.2	0.4
2	587 (24.7)	1.75 (1.11, 2.76)	0.02	0.70 (0.32, 1.56)	0.4	0.6
3+	1097 (31.4)	1.87 (1.20, 2.91)	0.006	0.84 (0.38, 1.84)	0.7	0.9
Number of C-section deliveries						

Association with LUTS Progression						
	N (%) ^a	Age-Adjusted		Multivariable Model A ^b		Multivariable Model A with adjustment for urinary incontinence ^c
		OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)
0	2049 (84.3)	1.0 (ref)		1.0 (ref)		1.0 (ref)
1	259 (9.4)	0.74 (0.45, 1.22)	0.2	0.78 (0.47, 1.28)	0.3	0.82 (0.50, 1.35)
2	124 (3.6)	1.55 (0.73, 3.31)	0.3	1.78 (0.90, 3.53)	0.10	2.13 (1.06, 4.26)
3+	103 (2.7)	0.44 (0.21, 0.96)	0.04	0.54 (0.22, 1.32)	0.2	0.65 (0.29, 1.46)
Number of vaginal deliveries						
0	738 (37.1)	1.0 (ref)		1.0 (ref)		1.0 (ref)
1	387 (15.8)	1.36 (0.79, 2.36)	0.3	1.43 (0.82, 2.51)	0.2	1.43 (0.83, 2.45)
2	497 (20.4)	2.25 (1.48, 3.43)	<0.001	2.21 (1.46, 3.35)	<0.001	2.25 (1.47, 3.43)
3+	912 (26.8)	2.01 (1.33, 3.02)	<0.001	1.86 (1.21, 2.87)	0.005	1.89 (1.22, 2.94)
Child delivery type(s)						
Vaginal and c-section	220 (6.7)	1.89 (0.97, 3.70)	0.063	1.69 (0.88, 3.25)	0.11	2.13 (1.06, 4.30)
Vaginal only	1576 (56.3)	1.81 (1.21, 2.69)	0.004	1.68 (1.10, 2.57)	0.02	1.78 (1.07, 2.96)
C-section only	265 (9.0)	0.83 (0.46, 1.50)	0.5	0.70 (0.38, 1.28)	0.2	0.83 (0.45, 1.54)
Neither	473 (28.1)	1.0 (ref)		1.0 (ref)		1.0 (ref)
Delivered child weight ≥4000 g	456 (24.1)	0.98 (0.66, 1.45)	0.9	0.92 (0.61, 1.37)	0.7	0.85 (0.56, 1.30)
Years since last live birth ^d						
No births	776 (39.7)	0.63 (0.44, 0.91)	0.01	1.32 (0.77, 2.25)	0.3	1.21 (0.71, 2.07)
0-4 y	149 (6.6)	1.41 (0.75, 2.68)	0.3	1.70 (0.91, 3.17)	0.09	1.82 (0.98, 3.39)
5-10 y	249 (9.4)	0.97 (0.52, 1.80)	0.9	1.01 (0.56, 1.81)	0.9	1.08 (0.60, 1.93)
≥10 y	1243 (36.8)	1.0 (ref)		1.0 (ref)		1.0 (ref)
Waist circumference, cm	2,534 (100)	1.01 (1.00, 1.02)	0.007	1.01 (1.00, 1.03)	0.009	1.01 (1.00, 1.03)

^aNumber presented is unweighted (actual or imputed) value, whereas percentage is calculated using survey weights.

^bFrom multivariable models adjusting for baseline age, waist circumference, physical activity, education level, marital status, depression symptoms, use of anticholinergic and antispasmodic medication, pelvic floor exercises, history of arthritis or rheumatism, cardiac disease, uterine prolapse and (for all models except child delivery by type) number of vaginal child deliveries. An indicator variable for new birth between baseline and follow-up was used in analysis of years since last live birth.

^cFrom multivariable models adjusting for all the variables listed above in Model A with additional adjustment for urinary incontinence at follow-up.

^d Additionally adjusted for indicator for women reporting new childbirth between baseline and follow-up. Multiple imputation of data on live births and years since last birth resulted in discrepancy in no births across these two variables.

Table 3

Persistence of LUTS at 5-year follow-up among 538 women with moderate-to-severe LUTS at baseline, by reproductive health history factors^a

	% Persistent LUTS
Polycystic ovarian syndrome	
Yes	36.5
No	57.1
Uterine fibroids	
Yes	51.5
No	58.6
Uterine prolapse	
Yes	40.5
No	57.4
Urinary tract infection ^b	
Yes	62.9
No	47.8
Hormonal birth control	
Current	40.6
Past	59.8
Never	54.5
Hysterectomy	
Yes	53.5
No	57.6
Oophorectomy	
Yes	51.5
No	58.0
Infertility	
Yes	42.6
No	58.3
Number of vaginal deliveries	
0	47.8
1	57.4
2	62.4
3+	59.0
Child delivery by type(s)	
Vaginal and C-section	51.2
Vaginal only	62.8
C-section only	42.2
Neither	47.9
Years since last live birth	
No births	52.8

	% Persistent LUTS
0-4 y	81.6
5-10 y	48.9
>=10 y	59.4

^a None of the characteristics listed were statistically significantly associated with LUTS persistence in chi-square tests ($P>0.05$ for all).

^b Chi-square test $P=0.052$