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Prevalence of urinary incontinence and associated factors, its impact on quality of life among pregnant women attending antenatal care at Asella teaching and referral hospital

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Abstract

Background Urinary incontinence (UI) is defined as any involuntary leakage of urine. UI during pregnancy is a common health problem worldwide with prevalence ranging from 11.4 to 84.5%. In Ethiopia there has been limited research conducted on UI among pregnant women. The purpose of this study was to investigate the prevalence of UI, factors associated with UI and the impact on quality of life in pregnant women.

Method Cross-sectional study was conducted from December 1, 2022 to April 30, 2023. A total of 279 pregnant women attending Antenatal care were included. Data was entered into Epi-data version 3.1 and then exported to SPSS version 26 for cleaning and analysis. Chi-square test and logistic regression were done to look for factors associated with UI. We used 95% confidence interval of crude and adjusted odds ratios for analysis. Those variables with *P*-value < 0.05 were declared to be statistically significant.

Result Overall prevalence of UI was 18.6% ($n=52$). Prevalence of each type of UI during pregnancy was 9.3% for Stress UI, 5% for Urge UI and 4.3% for mixed UI. Of all participants having UI, 2(3.8%) were having UI prior to pregnancy, while 3(5.8%), 16(30.7%) and 31(59.6) have encountered during first, second and third trimester respectively. Three fourth of the participants 38(73.1%) doesn't seek treatment for their UI. Presence of history of UI [AOR = 38.1, 95%CI: (7.95, 182.75)], previous history of instrumental delivery [AOR = 7.4, 95%CI: (3.05, 18.04)] and history of alcohol intake [AOR = 17.0, 95%CI: (1.49, 194.41)] were found to be significantly associated with UI while moderate severity UI [AOR = 12.9, 95%CI (1.46, 113.28)] and severe UI [AOR = 27, 95%CI (1.98, 138.38)] were significantly associated with Poor quality of life at *p*-value of < 0.05. Based on severity score UI was moderate in 34 (65.4%) and severe in 8 (15.4%) of the participants.

Conclusion UI affects one fifth of pregnant women (18.6%) and Stress UI is the most common type of UI during pregnancy. Previous history of UI, instrumental delivery and alcohol intake were found to be risk factors for UI.

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Pregnant women have to be advised to avoid or reduce alcohol consumption and to seek treatment for their problem. Follow up throughout pregnancy and postpartum period is very important to plan for further management of UI.

Keywords Urinary incontinence, Quality of life, Stress UI, Urge UI, Mixed urinary incontinence, Asella Hospital

Introduction

The International Continence Society (ICS) has defined urinary incontinence (UI) as any involuntary leakage of urine [1]. UI affects women in almost all age groups, although it is more common in older women [2]. It is a relatively common condition, with a prevalence ranging from 5 to 69% [2, 3]. UI during pregnancy is a common health problem. Vaginal delivery, in particular, affects the pelvic floor and increases the risk of pelvic floor dysfunctions [4]. The prevalence of urinary incontinence (UI) during pregnancy varies across different continents and countries, ranging from 14.7 to 84.5% [3–10]. UI becomes more common as pregnancy progresses [11–14]. In Ethiopia, research has shown that UI prevalence during pregnancy was 11.4% in Gonder, 23% in Mekele, and 24.6% in Addis Ababa [15–17].

UI is classified into three types: urgency UI (UUI), stress UI (SUI), and mixed UI (MUI). UUI is involuntary urinary leakage that is accompanied by or preceded by a sudden, strong urge to urinate that is difficult to postpone. SUI is defined as UI that occurs during exertion and increased abdominal pressure, in the absence of detrusor contraction. MUI is a combination of SUI and UUI [18]. The most common type of UI during pregnancy is SUI [9, 11, 15–17].

Various factors have been linked to urinary incontinence (UI) during pregnancy in different studies. These factors include smoking, constipation, use of anti-hypertensive drugs, chronic cough, depression, weak pelvic floor muscles, history of vaginal birth, previous instrumental vaginal delivery (VD), previous cesarean section, advanced gestational age (GA), prior miscarriage, home delivery, prolonged labor, increasing parity, having UI before pregnancy, obesity, and maternal age of 35 years or older [5, 6, 8, 10, 16, 19–21].

UI has a major negative impact on physical and social activities and interpersonal relationships [2]. It affects activities of daily living, associated with loss of self-esteem and feelings of depression and helplessness [22]. Despite its high impact on quality of life (QoL) fewer than 22% of the pregnant women with UI were seeking medical or professional help or discussing their issues with partners or relatives [6, 14, 17]. The main reasons for not seeking help were: minimal bother and the idea that UI would resolve by itself.

QoL is assessed using different questionnaires adapted from different studies. These are the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) and the International Consultation on Incontinence Questionnaire Lower Urinary Tract Symptoms Quality of Life (ICIQ-LUTSQoL). ICIQ-UISF has a Grade A recommendation to diagnose UI and to assess the severity of UI with the impact of UI on pregnant women [23]. The ICIQ-UI SF result can be classified into four severity levels: slight [1–5], moderate [6–12], severe [13–18], and very severe [19–21]. The ICIQ-LUTSQoL is a recommended Quality of Life (QoL) questionnaire adapted from the King's Health Questionnaire within the ICIQ structure. It assesses the social impact of UI on QoL and consists of twenty questions with seven domains. The answers are in four-point scale: "1-not at all", "2-slightly", "3-moderate", and "4-a lot" [24]. The seven domains are role limitations, physical limitations, social limitations, personal relationships, emotions, sleep, and severity measures specific to each domain's items. The overall score ranges from 19 (not at all) to 76 (always), and higher scores indicate a worsening of QoL [23, 25]. In Ethiopia there has been limited research conducted on UI among pregnant women. There is no single study conducted to assess the impact of UI on QoL among pregnant women in Ethiopia. The purpose of this study was to investigate the prevalence of UI, factors associated with UI and the impact on quality of life in pregnant women.

Method & material

A Cross-sectional study was conducted from December 1, 2022, to April 30, 2023, on pregnant mothers attending antenatal care (ANC) at Asella Teaching Referral Hospital (ATRH). ATRH is located 165 km away from Ethiopia's capital city Addis Ababa. The Hospital provides health services for a total of 5 million people coming from the South-Eastern part of the country. A total of 279 pregnant women attending ANC in ATRH were selected for the study. Pregnant women, who were severely ill, diagnosed with kidney or urethral infection and those taking diuretic drugs were excluded from the study. The sample size of 279 was determined by using a single population proportion formula considering the proportion of pregnant mothers having UI in a study conducted at Mekele (23%) [16] using 95% CI, 5% margin of error, and a non-response rate of 5%. A systematic random sampling technique was used to select the study participants using a sampling interval (K = 2), which is calculated by considering a total number of ANC attendants during the study period(680) and sample size (279). Therefore, every other

pregnant woman attending ANC was recruited based on their coming order after the random selection of the first participant by lottery method.

Data was collected by trained third year ob-gyn residents using pretested questionnaire after written consent was obtained from each participant. The questionnaire was pre-tested on 5% of the sample size at Asella Health Center. The collected data was entered into Epi-data version 3.1 and then exported to SPSS version 26 for cleaning and analysis. To explain the relationship of relevant variables; cross-tabulation and logistic regression analysis was conducted to look into the relationship between dependent and independent variables. Those variables having *p*-value < 0.25 on bivariate analysis were taken as candidates for multivariate logistic model. Findings were presented using an adjusted odds ratio (AOR) with 95% confidence interval (CI). *P*-value < 0.05 was used to declare statistical significance.

Table 1 Socio-demographic characteristics of pregnant women attending ANC at Asella teaching & referral hospital, Ethiopia [*N* = 279]

Variable	Category	Number (*n*)	Percent (%)
AGE	< 20 years	3	1.1
	20–29 years	200	71.7
	>= 30 years	76	27.2
Residence	Rural	63	22.6
	Urban	216	77.4
Religion	Muslim	126	45.2
	Orthodox	132	47.3
	Protestant	18	6.5
	Wakefata	3	1.1
Ethnicity	Oromo	217	77.8
	Amhara	53	19.0
	Others	9	3.3
Marital status	Married	267	95.7
	Single	5	1.8
	Divorced	5	1.8
	Widowed	2	0.7
Educational level	Illiterate	29	10.4
	Primary	87	31.2
	Secondary	99	35.5
	College/University	64	22.9
Occupation	House-Wife	178	63.8
	Farmer	25	9.0
	Gov't Employee	39	14.0
	Merchant	32	11.5
	Other	1	1.8
Monthly Income	Below mean	189	67.7
	Above mean	90	32.3
Body mass index (BMI)	Under weight	10	3.6
	Normal weight	191	68.5
	Over weight	68	24.4
	Obese	10	3.6

We obtained ethical clearance from the institutional review board of Jimma University and written consent from study participants. All information collected from the study participants was handled confidentially. Participants were informed that they had the right to participate in or withdraw from the study. All methods were performed according to the relevant guidelines and regulations outlined in the Helsinki Declaration.

In this research, the following operational definitions were used.

- Poor QoL: The ICIQ-LUTSQoL score above median score [23].
- Good QoL: The ICIQ-LUTSQoL score below median score [23].

Result

Socio-demographic, reproductive and obstetric characteristics of the study participants

In this study, a total of 279 pregnant women took part. The average age of the participants was 26.7 years (SD + 4.4), with an age range between 19 and 38 years. The average gestational age at the time of the interview was 29.7 weeks (SD + 8.5). In terms of trimester distribution at the interview date, 20 (7.2%) were in the first trimester, 77 (27.6%) were in the second trimester, and 182 (65.2%) were in the third trimester. The average monthly income of the participants was 7022 ETB (SD + 54). The majority of the participants were urban dwellers 216(77.4%) and of Oromo ethnicity 217, (77.8%). The majority of participants, accounting for 200 (71.7%), were aged between 20 and 29 years. [Table 1].

Two-thirds of the study participants 191(68.5) have a normal BMI and 190 (68%) have at least given birth once in their lifetime. Three fourth of participants 212(76.0%) have no history of abortion. Of all participants, 42(15.1%) have a history of previous pelvic surgery. Cesarean section is the commonest type of pelvic surgery performed accounting for 37(13.3%) followed by salpingectomy for ectopic pregnancy 4(1.4%) [Table 2].

Prevalence of UI during pregnancy and characteristics of urinary leakage of participants

Of all study participants, 52 have UI making an overall prevalence of 18.63%. Prevalence by type of UI during pregnancy was 9.3% for SUI, 5% for UUI, and 4.3% for MUI. When we consider participants with UI alone half of them 26(50%) have SUI followed by UUI 14 (26.9%) and MUI 12(23.1%). Considering the timing at which UI was encountered during the pregnancy period, 2(3.8%) had UI before pregnancy, while 3(5.8%), 16(30.7%), and 31(59.6%) encountered it during the first, second, and third trimester respectively. One-third of participants

Table 2 Cross tabulations of UI and Socio-demographic, Reproductive and obstetric characteristics of pregnant women attending ANC at Asella teaching & referral hospital, Ethiopia [*N* = 279]

Variables	Category	Presence of UI currently		Total *N* = 279 n (%)	*P*-Value
		Yes(*N* = 52) n (%)	No (*N* = 227) n (%)		
AGE	<20 years	0(0.0)	3(1.3)	3(1.1)	0.928*
	20–29 years	37(71.2)	163(71.8)	200(71.7)	
	>= 30 years	15(28.8)	61(26.9)	76(27.2)	
Residence	Rural	11(21.2)	52(22.9)	63(22.6)	0.785
	Urban	41(78.8)	175(77.1)	216(77.4)	
Religion	Muslim	22(42.3)	104(45.8)	126(45.2)	0.018*
	Orthodox	21(40.4)	111(48.9)	132(47.3)	
	Protestant	6(11.5)	12(5.3)	18(6.5)	
	Wakefata	3(5.8)	0(0.0)	3(1.1)	
Ethnicity	Oromo	37(71.2)	180(79.3)	217(77.8)	0.015*
	Amhara	10(19.2)	43(18.9)	53(19.0)	
	Others	5(9.5)	4(1.7)	6(3.3)	
Marital status	Married	48(92.3)	219(96.5)	267(95.7)	0.055*
	Single	3(5.8)	2(0.9)	5(1.8)	
	Others	1(1.9)	6(2.6)	7(2.5)	
Education level	Illitrate	11(21.2)	18(7.9)	29(10.4)	0.024
	Primary	11(21.2)	76(33.5)	87(31.2)	
	Secondary	17(32.7)	82(36.1)	99(35.5)	
	College/Univesity	13(25.0)	51(22.5)	64(22.9)	
Occupation	House-Wife	27(51.9)	151(66.5)	178(63.8)	0.054*
	Farmer	4(7.7)	21(9.3)	25(9.0)	
	Gov't Employee	14(26.9)	25(11.0)	39(14.0)	
	Merchant	7(13.5)	25(11.0)	32(11.5)	
	Other	0(0.0)	1(2.2)	1(1.8)	
Monthly Income	Below mean	29(55.8)	160(70.5)	189(67.7)	0.041
	Above mean	23(44.2)	67(29.5)	90(32.3)	
Body mass index (BMI)	< 18.5)	3(5.8)	7(3.1)	10(3.6)	0.584*
	18.5–24.9)	37(71.2)	154(67.8)	191(68.5)	
	25-29.9)	10(19.2)	58(25.6)	68(24.4)	
	>=30)	2(3.8)	8(3.5)	10(3.6)	
Gravidity	Primigravid	16(30.8)	53(23.3)	69(24.7)	0.263
	Multigravid	36(69.2)	174(76.7)	210(75.3)	
Parity	Nullipara	17(32.7)	72(31.7)	89(31.9)	0.277
	Primipara	11(21.2)	77(33.9)	88(31.5)	
	Multipara	21(40.4)	67(29.5)	88(31.5)	
	Grand multipara	3(5.8)	11(4.8)	14(5.0)	
Number of abortion	None	42(80.8)	170(74.9)	212(76.0)	0.568
	Once	7(13.5)	45(19.8)	52(18.6)	
	2–3 times	3(5.8)	12(5.3)	15(5.4)	
Previous History of pelvic surgery	Yes	5(9.6)	37(16.3)	42(15.1)	0.224
	No	47(90.4)	190(83.7%)	237(84.9%)	
Type of pelvic surgery done	Cesarean section	4(7.7)	33(14.5)	37(13.3)	0.495*
	Perineorraphy	0(0.0)	1(0.4)	1(0.4)	
	Salpingectomy	1(1.9)	3(1.3)	4(1.4)	
	No Pelvic surgery	47(90.4)	190(83.7)	237(84.9)	
Trimester on the date of interview	First	2(3.8)	18(7.9)	20(7.2)	0.219*
	Second	19(36.5)	58(25.6)	77(27.6)	
	Third	31(59.6)	151(66.5)	182(65.2)	

* Fisher exact test used

18(34.6) with UI lose urine involuntarily before reaching the toilet while the remaining two-thirds lose urine during exercise or coughing [Table 3].

Of all participants with UI, nearly three fourth of them 38(73.1%) did not seek treatment for their UI, the predominant reason being their consideration of spontaneous resolution of UI by itself 21(55.3%), followed by not taking it as a series issue, 9(23.7%). Two-thirds of the participants 35 (67.3%) will lose urine 2–3 times weekly to once daily while the vast majority 44(84.6%) of those having UI are losing a small amount of urine. Only eight (15.4) of the participants had severe UI. The majorly affected lifestyle change among those with UI is shopping or excursions outside the home 36(69.2%) followed by working performance & friendship 9(17.3%). The median ICIQ-UI SF score out of 21 is 9.5(range 4–18) while the median ICIQ-LUTSQoL score out of 76 is 26 (SD±5.53) (Range 19–46). An equal number of participants have ICIQ-LUTSQoL scores above the median and below the median 25 (48.1%) while two participants (3.8%) have a score of exactly equal to the median score which is 26. [Table 3].

One-third 17(32.5%) of participants with UI were taking care of fluid intake often or all the time. Although a quarter of participants with UI, 13(25%) didn't change their underwear because of UI, the remaining have changed their underwear at least some times or often. Their Sleep condition was not affected in 47(90%) of participants.

Table 3 Characteristics of urinary leakage of participants with UI among ANC attendants at Asella teaching & referral hospital, Ethiopia [*N* = 52]

Variable name	Response category	Distribution *N* = 52 *N*(%)
Type of UI	SUI	26(50)
	UUI	14(26.9)
	MUI	12(23.1)
Trimester at which UI encountered	First	3(5.8)
	Second	16(30.8)
	Third	31(59.6)
	Before pregnancy	2(3.8)
How often do you leak urine	Once weekly	8(15.4)
	2–3 times weekly	19(36.5)
	Once daily	16(30.8)
	Many times daily	7(13.5)
	Always	2(3.8)
Seeking Rx for UI	YES	14(26.9)
	NO	38(73.1)
Reason for not seeking Rx for UI	Consider it resolves by itself	21(55.3)
	Didn't take it series	9(23.7)
	Do not know where to get service	7(18.4)
	Economic reason	1(2.6)
When to leak urine	Before reaching toilet	18(34.6)
	When coughing/ sneezing	22(42.3)
	While exercising	12(23.1)
Severity of UI based on ICIQ-UI SF score	Slight (1-5)	10(19.2)
	Moderate (6-12)	34(65.4)
	Severe (13-18)	8(15.4)
	Very severe (19-21)	0(0.0)
How much urine do you leak daily	Small	44(84.6)
	Moderate	8(15.4)
Bother of QoL of UI by ICIQ-UI QoL score	Below median(good QoL)	25(48.1)
	Median and above (Poor QoL)	27(51.9)
Any change in life style for UI	Shopping or excursion outside home	36(69.2)
	Working performance & friendship	9(17.3)
	Daily home activities	3(5.8)
	Sexual relationship	1(1.9)
	Nervous and anxious	3(5.8)

Factors associated with UI

On cross-tabulation, participants' religion (P=0.018), Ethnicity (P=0.007), education level (P=0.024), and monthly income (P=0.041) have shown statistical relation with UI at a P-value of <0.05 [Table 2]. Of all independent variables age category, ethnicity, marital status, educational status, occupation, pregnancy trimester, parity, BMI, cough, and constipation didn't show significant association with UI on binary logistic regression. Variables that had a p-value of <0.25 on binary regression were taken to multivariate logistic regression. Those variables include the presence of a history of UI, previous history of instrumental delivery, history of alcohol intake, educational status, monthly income, previous history of abortion, presence of concomitant POP, history of delivering macrosomic baby, previous history of pelvic surgery and Cesarean section. However, only the presence of a history of UI [AOR=38.1, 95%CI: (7.95, 182.75)], previous history of instrumental delivery [AOR=7.4, 95% CI (3.05, 18.04)], and history of alcohol intake [AOR=17.0, 95% CI (1.49, 194.41)] were found to be significantly associated with urinary incontinence at a p-value of <0.05 (Table 4).

Factors associated with QoL

Of all independent variables, variables that showed statistical relation in binary operation at P-value of <0.25 were multi-gravidity of participants, presence of concomitant POP, UUI, SUI, moderate severity UI and severe UI. However on multivariate model, only moderate severity UI [AOR=12.9, 95% CI(1.46,113.28)] and severe UI [AOR=27, 95%CI (1.98,138.38)] were found to be significantly associated with Poor quality of life at p-value of <0.05. [Table 5]

Table 4 Multivariate Logistic regression of factors associated with UI among ANC attendants at Asella teaching & referral hospital, Ethiopia [*N* = 279]

Variables	Response category	Presence of UI		COR(95%CI)	*P*-value	AOR(95%CI)	*P*-Value
		Yes	No				
Presence of history of UI	Yes	14	2	41.5(9.06,189.69)	0.000	38.1(7.95,182.75)	0.00
	No	38	225	1		1	
Previous history of instrumental delivery	Yes	17	13	8.0(3.57, 17.89)	0.000	7.4(3.05, 18.04)	0.00
	No	35	214	1		1	
History of alcohol intake	Yes	2	1	9.0(0.80,101.65)	0.075	17.0(1.49,194.41)	0.023
	No	50	226	1		1	
Educational status	Illitrate	11	18	2.4(0.912,6.3)	0.076		
	Primary	11	76	0.6(0.236,1.366)	0.206		
	Secondary	17	82	0.8(0.365,1.814)	0.614		
	College/HEIs	13	51	1		1	
Monthly income	Below mean	29	160	0.5(0.285,0.979)	0.043		
	Above mean	23	67	1		1	
Previous history of abortion	Yes	8	56	0.6(0.25,1.25)	0.155		
	No	44	171	1		1	
Presence of concomitant Pelvic organ prolapse	Yes	6	6	4.8(1.48,15.56))	0.009		
	No	46	221	1		1	
History of Macrosomia	Yes	11	16	3.5(1.53,8.17)	0.003		
	No	41	211	1		1	
Previous History of pelvic surgery	Yes	5	37	0.5(0.204, 1.466)	0.023		
	No	47	190	1		1	
Specify type of pelvic surgery	C/S	4	33	0.5(0.165,1.45)	0.189		
	Salpingectomy	1	3	1.3(0.137,13.24)	0.798		.
	Perineoraphy	0	1	1.0(0.000)	1.0		
	No pelvic surgery	47	190	1		1	

Table 5 Multivariate Logistic regression of factors associated with QoL among ANC attendants having UI at Asella Hospital, A, Ethiopia [*N* = 52]

Variables	Response category	Quality of life		COR(95%CI)	*P*-value	AOR(95%CI)	*P*-Value
		Good QoL	Poor QoL				
Severity of UI	Slight	9(36.0)	1(3.7)	Ref			
	Moderate	14(56.0)	20(74.1)	12.9(1.45,113.3)	0.021	12.9(1.46,113.28)	0.021
	Severe	2(8.0)	6(22.2)	27.0(1.98, 368.4)	0.013	27(1.98,138.38)	0.013
Participant's Gravidity	Primigravid	10(40.0)	6(22.2)	Ref			
	Multigravid	15(60.0)	21(77.8)	2.3(0.696,7.823)	0.170		
Type of UI	UUI	8(32.0)	6(22.2)	0.3(0.05,1.34)	0.106		
	SUI	14(56.0)	12(44.4)	0.3(0.06,1.30)	0.106		
	MUI	3(12.0)	9(33.3)	Ref			
Presence of POP	Yes	1 (4.0)	5(18.5)	5.5(0.59,50.40)	0.135		
	No	24(96.0)	22(81.5)	Ref			

Discussion

Prevalence of UI

The overall prevalence of UI among pregnant women attending ANC at ATRH is 18.6% (*N*=52). This prevalence is similar to the reported prevalence in Ethiopia, which ranges from 11.4 to 24.6% [15–17]. It is also comparable to the prevalence reported from Brazil (14.7%) [7], Nigeria (28.1%) [20], and Iran (29.7%) [10]. However, this prevalence is lower than the reported prevalence in many studies, which ranges between 39.5% in Finland [4] to 84.5% in Malaysia [8]. The prevalence of UI found in different studies varies, such as 57.7% and 40% in Turkey [5, 9], 66.8% in the Netherlands [14], 52% in China [6], 49.7% and 71% in Brazil [19, 26], 75.3% in India [13], and 42% in Tanzania [21]. There are various reasons for these differences.One of which is the ethnic variation of the study participants. One study found significant differences between women of African and European/

North American origins and between women of African and South Asian origins [27]. This finding is also supported by a study conducted in California; they found that black women are at less risk of having a UI than Hispanic and white women [28]. The fact that our study participants are black Africans can probably explain why the prevalence of UI in our study is lower than in studies conducted in Asia and Europe. The other reason for this disparity might also be due to the methodology used and the definition used for UI. In our study, we excluded cases of functional or transient types of urinary incontinence (UI) caused by infection or medication. However, studies with a higher prevalence of UI did not exclude these cases. One study specifically focused on mothers in the third trimester, which showed a positive correlation with the occurrence of UI [13]. Another reason for the lower prevalence rate might be under-reporting due to cultural and religious barriers.

Among incontinent pregnant women, the most frequent type of UI was SUI at 50%, followed by UUI at 26.9%, and MUI at 23.1%. In Ethiopia, a study from Gonder showed the proportion of SUI at 58%, MUI at 24.5%, and UUI at 12.5% [15]. Another study from Mekele found that SUI had a prevalence of 58.9%, followed by MUI at 30.14% and UUI at 10.96% [16]. In Addis Ababa, the prevalence was SUI at 46.3%, UUI at 18.3%, and MUI at 35.4% [17]. A Nigerian study reported SUI at 62.1%, UUI at 24.2%, and MUI at 13.7% [20]. These findings differ from studies in Brazil which showed MUI as the most frequent type of UI at 61.8%, followed by SUI at 31.8%, and UUI at 6.4% [19]. The reason why SUI is the more common than UUI might be due to the combination of anatomical changes, hormonal influences, and increased abdominal pressure during pregnancy. The growing uterus, the weight gain and increased intra-abdominal pressure from the growing uterus and fetus can further weaken the pelvic floor muscles and increase the likelihood of SUI by causing bladder-neck and urethral mobility unlike UUI which is often associated with overactive bladder syndrome, which typically involves detrusor muscle over activity unrelated to pregnancy-related anatomical changes.

Urinary incontinence (UI) during pregnancy is indeed influenced by the trimester of pregnancy, with prevalence generally increasing as gestational age advances. The prevalence of UI is five times and ten times during second and third trimester respectively compared to first trimester. Although 3.8% ($N=2$) of participants where having UI before pregnancy, proportion of pregnant women having UI was 5.7% ($N=3$) during first trimester, 30.7% ($N=16$) during second trimester and 59.6% ($N=31$) during third trimester. The prevalence of UI among pregnant women was ranging from 55.1% in first trimester to 71.1% in third trimester in one Dutch study [14]. The increase of UI along with increasing GA might be due to the pressure effect of gravid uterus on bladder and pelvic floor muscles. During the first trimester, hormonal changes, particularly an increase in progesterone, can lead to relaxation of smooth muscle of the bladder and ureters resulting in decreased bladder tone and increased urinary frequency or urgency, but typically does not lead to significant UI. In second trimester the growing uterus exerts pressure on the bladder leading to increased frequency of urination and stress incontinence. In third trimester, further enlargement of uterus and the baby's position and movements can put additional pressure on the bladder and thus reduces the bladder's capacity to hold urine, resulting in more frequent urination and increased instances of SUI.

Factors associated with UI

In this study, having history of alcohol intake, previous history of UI, and previous history of instrumental delivery were found to be significantly associated with increased risk of urinary incontinence by 17, 38, and 7 times compared to no history of alcohol intake, absence of previous history of UI, and absence of instrumental delivery respectively.

Having history of alcohol intake increases risk of UI by 17 times compared to not having history of alcohol consumption. Alcohol has diuresis effect, and it may stimulate urine production. The increased urine flow results may add work on the bladder and may end up in involuntary leakage of urine. Alcohol consumption was shown to be a risk factor for the development of UI in one study conducted among Taiwanese women [29]. Although the pathogenesis of alcoholic neuropathy is not well known, the direct toxic effect of alcohol on peripheral nerves might be a cause of the etiological association between alcohol and the onset of UI [30]. Some alcohol produces an irritant that may cause inflammation of the bladder causing overactive bladder symptoms. One community-based study conducted in Japan found that alcohol intake significantly increased the risk of overactive bladder which is characterized by urinary urgency [31].

Having a history of urinary incontinence (UI) significantly increases the risk of developing UI by 38 times compared to not having UI previously. A study has shown that a previous history of UI is linked to a higher likelihood of experiencing UI during pregnancy and after childbirth [4]. This is likely due to the recurrence of factors associated with UI during pregnancy. Factors such as multiple births, vaginal delivery, and instrumental delivery may continue to contribute to pelvic floor issues.

A history of instrumental delivery has been found to be significantly associated with a seven fold increase in the risk of urinary incontinence compared to not having a history of instrumental delivery. This is consistent

with a study from Nigeria which found that previous instrumental vaginal delivery increased the risk of urinary incontinence by 11 times (AOR 11.54, $P<0.001$) [20] and with another study that also showed a positive association between urinary incontinence and instrumental delivery [32]. The use of forceps during delivery increases the risk of injury to the nerves and muscles of the pelvis. The effects of childbirth may result from direct injury to pelvic muscles and connective tissue attachments. Additionally, nerve damage from trauma or stretch injury can lead to pelvic muscle dysfunction. Specifically, rates of prolonged pudendal nerve injury after delivery are higher in women with incontinence compared to those who are not experiencing symptoms after childbirth.

Impact of UI on QoL

The QoL of two-thirds of mothers with UI 34(65.4%) was moderately affected. There is a strong association between the severity of UI and the degree of QoL compromise. Accordingly, only moderate severity UI [AOR=12.9, 95%CI (1.46, 113.28)] and severe UI [AOR=27, 95%CI (1.98, 138.38)] were found to be significantly associated with Poor quality of life at the *p*-value of <0.05.

The risk of experiencing poor quality of life (QoL) is significantly higher for individuals with moderate and severe urinary incontinence (UI) by 13 and 27 folds compared to those with slight UI. This is consistent with a study that showed eight times increased risk of poor QoL by severe UI [33] and one other study [34]. This might be explained by those with moderate UI and severe UI are those participants whose ICIQ-UI SF scores are 6–12 & 13–18 respectively. Those participants with this level of score tend to have UI at least once daily and lose a moderate amount of urine. This in turn will have a direct impact on QoL by making higher ICIQ-UIQoL thus poor quality. However, no correlation was found between the severity of incontinence and quality of life scores in one Turkish study [5].

Of all participants with UI only 14 (26.9%) have sought medical attention for their complaint while the remaining three fourth didn't seeks treatment. Proportion of mothers seeking treatment is 14.8% in Chinese study [6] and 21.9% in Addis Ababa [17]. The most common reason for not seeking help was the assumption that UI is a normal part of pregnancy and childbirth that would resolves by itself and thus they do not take it series. This is in line with study conducted in Addis Ababa [17]. The other reasons might be discussing urinary incontinence can be embarrassing for some women, especially when it involves personal and intimate bodily functions. This embarrassment might deter them from seeking help or discussing the issue with their healthcare provider. There may be misconceptions or lack of information about the causes and treatment options for UI. Without accurate information, women might not realize that effective treatments are available.

The strength of this study was that participants with urinary incontinence underwent a physical examination to accurately determine the type of urinary incontinence. However, a limitation of the study was that the initial report of urinary incontinence was based on self-reporting, which could lead to recall bias and potential underreporting of urinary incontinence. Another limitation was the wide 95% confidence interval of the measured adjusted odds ratios, which was due to the smaller number of participants with urinary incontinence.

Conclusion and recommendation

UI affects one-fifth (18.6%) of pregnant women and has a moderate to severe score in 80% of participants with UI. Previous history of UI, instrumental delivery, and alcohol intake were found to be risk factors for UI. Moderate severity of UI and severe UI were significantly associated with poor QoL. Only a quarter of participants with UI have sought treatment. The UI encounter increases as gestational age advances. As a recommendation, pregnant women have to be advised to avoid or reduce alcohol consumption and to seek treatment for their UI. Thus, proper follow-up throughout pregnancy and during the postpartum period is very crucial to plan for further management.

Abbreviations

ANC	Ante-natal care
AOR	Adjusted odds ratio
ATRH	Asella teaching and Referral hospital
BMI	Body mass index
CI	Confidence interval
COR	Crude odds ratio
ICIQ-UI SF	International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form
ICIQ-LUTSqol	International Consultation on Incontinence Questionnaire Lower Urinary Tract Symptoms Quality of Life
ICS	International Continence Society
MUI	Mixed urinary incontinence
PFM	Pelvic-floor muscles
QoL	Quality of life
SUI	Stress urinary incontinence
UI	Urinary incontinence
UUI	Urgency urinary incontinence

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Author contributions

All authors participated in the design and analysis of the study. M.G.T searched the databases, and wrote the first and second draft of the article. D.A.S and K.W.H reviewed proposal development activities and each drafts of the article. All authors revised the manuscript and approved the final version.

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Data availability
The data used to generate and or analyze the current study are available from the corresponding author upon request.

Declarations

Ethics approval and consent to participate
An official letter was obtained from the Institutional Review Board of Jimma University to conduct this research and we got permission letter from the Hospital director to collect data. Written informed consent was obtained from each study participant. We didn't require parental consent as all of the participants were older than 18 years. Legally authorized family members had provided informed consent for participation on behalf of illiterate participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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