

# Prevalence and risk factors of urinary incontinence among women in Africa: a systematic review and meta-analysis

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## Systematic Review

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# Abstract

## Background

Patients of urinary incontinence (UI), defined as an involuntary leakage of urine, mostly suffer in silence. African women with the condition usually feel embarrassed and may not readily seek help. In spite of this, there appears to be no recent systematic review that quantifies the prevalence and risk factors of UI. This study, therefore, synthesizes all studies that report the prevalence of UI and risk factors across African countries.

## Methods

A systematic review and meta-analysis were conducted and reported in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Comprehensive search of Google Scholar, Hinari, African Journals Online (AJOL) and PubMed databases was conducted on July 24, 2020. The Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies was used to assess the risk of bias. Summary measure was the prevalent percentage of women with UI, with 95% confidence intervals.

## Results

Prevalence of urinary incontinence ranged from 0.61% (CI 0.9, 1.03) in Sierra Leone to 39% (CI 33.59–44.41) in Tanzania. The prevalence reported among women with gynaecological issues were between 20.2% (95% CI 16–24) and 39% (95% CI 34–44). Ten of the 14 studies reported on the risk factors of UI. The risk factors include multiparity, advanced gestational periods, mode of delivery, pregnancy related constipation, having an underlying respiratory condition during pregnancy, and having a high body mass index (BMI) or being overweight.

## Conclusion

The study has revealed the discrepancy reported by various UI prevalence studies in Africa. Risk factors of UI including mode of delivery and age of women at latest delivery should be explored in further research. Enhancing treatment opportunities for UI among women will help to improve the lives of women living with UI.

## Introduction

Victims of urinary incontinence (UI) suffer in silence and the condition has been defined as an involuntary leakage of urine by The International Continence Joint Report [1, 2]. Unfortunately, most UI victims do not own up for treatment, conceal their plight and do not complain due to fear, discrimination and psychological trauma [3, 4]. Badejoko, Bola-Oyebamiji [5] identified the condition as non-life-threatening, however, individuals diagnosed with the condition generally have poor health-related quality of life [6, 7].

A number of studies have reported varying prevalence of UI among women in developing countries [8, 9]. The condition ranges from prevalence rate of as low as 0.61% [10] in a country-wide study to as high as 30.0% [11]. In Ethiopia, the condition was reported to be 11.4% [12] and 12% in a South African study [13]. A systematic review of 49 studies from low and middle-income countries reported an overall prevalence of 25% [14]. However, majority of included articles were from the upper middle-income countries and could not be representative of UI situation in Africa.

Although, Islam, Oldroyd [14] estimated the pooled prevalence of pelvic floor disorders among women in low and middle-income countries, only 5 of the 49 included studies were from Africa. Of the five included studies from Africa, four reported the prevalence of UI more specifically, and only one was published within the last six years [5], thereby making application or generalisation of the systematic review to Africa unsuitable. Another recent systematic review explored the phenomenon among older women only [15]. More women might be suffering from the condition in Africa considering the cultural context, limited human resource and essential medical equipment, [16, 17], hence the need for a systematic review to synthesize the current prevalence of UI and risk factors across the continent.

Several risk factors have been identified to be responsible for UI among women. Multiparity, poor delivery procedures, insufficient appropriate health delivery equipment, limited skilled health personnel, lack of appropriate preventive interventions for UI as well as poor attitude of both health workers and patients towards prevention of the condition are some of the risk factors [18–20]. Generally, it is reported that African women with the condition usually feel embarrassed and may not readily seek help which may lead to under-reporting of the prevalence of UI [21]. We therefore aimed to review all studies that report the prevalence of the condition in the region to help estimate the prevalence of UI among African women. This, to a large extent will assist healthcare and policy makers in strategizing efforts to mitigate the effect of the condition and improve the quality of life of women in the sub-region.

## Methods

A systematic review and meta-analysis were conducted and reported in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines [22]. This paper reports on the prevalence of urinary incontinence among reproductive women across Africa.

## Information sources

Comprehensive search of Google Scholar, Hinari, African Journals Online (AJOL) and PubMed databases was conducted. A hand search of the reference lists of included studies was also performed.

## Search strategy

Databases were searched on July 24, 2020 for all studies on prevalence of urinary incontinence among women in Africa. Medical subject headings and keywords relating to urinary incontinence and Africa including "((((("epidemiology"[Subheading] OR "epidemiology"[All Fields] OR "prevalence"[All Fields] OR "prevalence"[MeSH Terms]) OR magnitude[All Fields]) AND ("urinary tract"[MeSH Terms] OR ("urinary"[All Fields] AND "tract"[All Fields]) OR "urinary tract"[All Fields] OR "urinary"[All Fields])) AND incontinence[All Fields]) OR leakage[All Fields]) AND ("women"[MeSH Terms] OR "women"[All Fields])) AND ("africa"[MeSH Terms] OR "africa"[All Fields]) AND ("2013/07/26"[PDat] : "2020/07/24"[PDat])" were used.

## Study selection and eligibility criteria

The search was carried out with key words such as *prevalence*, *urinary incontinence*, *epidemiology*, *women* and *Africa*. Only articles written in English and had full text from July 2013 to 24 July 2020 were included. Exclusion criteria included the following: male sample, UI among other populations outside Africa and methodological assessments not focusing on prevalence of UI among women, interventional studies looking at the effect of a particular drug, review articles, case reports, qualitative studies, opinion papers, reports to editors and editorials. The following inclusion criteria were applied: study based on female sample, those reporting the prevalence of UI from Africa and written in English Language.

## Data Extraction

The review process for selecting studies is shown in Fig. 1. The following data were extracted and entered into a Ms Excel for all included studies: author (s), the year of publication, the place and country of the study, study design, the estimated sample size, the total sample included, the sample population, the period of data collection, the study design used, the prevalence of UI and risk factors. The prevalence and the sample size were used to estimate the sample error for each study.

PLEASE INSERT FIGURE 1 HERE

## Risk of bias (quality) assessment

The first author (E.T.) independently assessed risk of bias for each study using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies [23]. Additionally, 20% of the articles were independently assessed by the third author (E.K.A), with the remaining risk of bias assessment continued by E.T. alone after a 100% agreement. Disagreements were resolved by discussion and/or when necessary, a third person arbitrating. The assessment tool consisted of 9 items which assessed the internal and external validity of studies included in the meta analysis [23]. Studies were classified into low or high risk of bias using a cut-off of 70%.

## Statistical analysis

Meta-analysis of prevalence data was undertaken separately in accordance with the Cochrane Handbook for Systematic Reviews, using random effects models [24]. The summary measure was the prevalent percentage of women with UI, with 95% confidence intervals. Heterogeneity between estimates was measured using  $\chi^2$  and  $I^2$  statistics, using recommended thresholds [25]. For studies that reported multiple outcome variables, we obtained the estimate of prevalence of UI.

## Results

Of the 9,519 articles retrieved, 8,448 were excluded based on the title and abstracts after 1,001 duplicates removed. Next, 70 full-text articles were assessed, and 56 excluded leaving 14 articles for inclusion reporting 14 studies.

## Characteristics of included studies

A summary of included studies reporting the prevalence of UI among African women is presented in Table 1. Included articles reported from seven different African countries with a total sample of 9,186 participants. Majority of studies (n = 6) were done in Nigeria with others from Malawi (n = 2), Ethiopia (n = 2), while one each was reported in South Africa, Tanzania, Democratic Republic of Congo, and Sierra Leone. Majority of the studies were cross-sectional (n = 8), three were longitudinal; two were retrospective reviews, while one was a randomized controlled trial. Majority (n = 11) of studies were carried out in tertiary hospitals, two in a district hospital while the only countrywide study was reported by the Sierra Leone's study (refer to Table 1).

Table 1  
Studies reporting urinary incontinence prevalence among African women

Author	Year of Publication	Study Period	Place of Study	Country	Design	Population	Outcome Variable	Sample size	Include sample	Prevalence	Significance
Bekele et al, 2016	2016	Feb To June, 2014	University of Gondar Hospital	Ethiopia	Cross sectional study	pregnant women	prevalence of urinary incontinence	456	422	11.4	1.5
Patel et al, 2014	2014	Not specified	Country-wide survey	Sierra Leone	cluster randomized, cross sectional population-based household survey	Reproductive age women	presence of fistula	3645	1320	0.61	0.2
Bengston et al, 2016	2016	Sept 2011 to Dec 2014	Bwaila Hospital, Lilogwe Fistula Repair Center	Malawi	Prospective Cohort Study	women undergoing 1st vesicovaginal fistula repair	risk of residual urinary incontinence	417	401	24	2.1
Kopp et al, 2017	2017	Jan 2012 To Dec 2014	Bwaila Hospital, Lilogwe Fistula Repair Center	Malawi	Prospective Cohort Study	Women with vesicovaginal fistula repair	predicting continence status	431	346	20.2	2.1
Adaji & Olajide, 2014	2014	One-month period	Tertiary level hospital, Northern Nigeria	Nigeria	Descriptive cross-sectional study	Postnatal women	occurrence and severity of pelvic floor symptoms	90	90	24.4	4.5
Badejoko et al, 2015	2015	Jan To March 2014	Obafemi Awolowo University Teaching Hospital	Nigeria	Cross sectional study	women between ages of 20 and 100	presence of UI	1250	1250	5.2	0.6
Andersson et al, 2015	2015	Not specified	Karisimbi and Goma Health Districts	Eastern DRC	Descriptive cross-sectional pilot study	Health workers involved in care of victims of sexual violence	knowledge on UI	104	104	15.4	3.5
Obioha et al, 2015	2015	Nov 2012 To June 2013	University of Nigeria Teaching Hospital, Enugu	Nigeria	Longitudinal study	Pregnant women who delivered in the hospital	prevalence of urinary incontinence	250	230	12.2	2.1
Okunlola et al, 2018	2018	July 2017 To Sept 2017	State Specialist Hospital, Ekiti	Nigeria	Cross sectional prospective study	pregnant women on antenatal care	prevalence of urinary incontinence	517	442	28.1	2.1
Rabin et al, 2015	2015	5 Months Study Period	Aminu Kano Teaching Hospital	Nigeria	Descriptive study	Postnatal women	prevalence of urinary incontinence	257	257	15.2	2.2
Dehinbo et al, 2015	2015	Not specified	Tertiary Hospital in Durban	South Africa	Retrospective Chart Review	Women diagnosed with UI	prevalence of urinary incontinence	945	750	30	1.6
Megabiaw et al, 2013	2013	Not specified	Dabat District	Ethiopia	pilot cross sectional study	community women	prevalence of pelvic floor symptoms	405	395	7.8	1.3
Adaji et al 2010	2010	Not specified	Tertiary Hospital in Northern Nigeria	Nigeria	Cross sectional descriptive study	Postnatal women	prevalence of urinary incontinence	90	90	5.8	2.4
Siddle et al, 2013	2013	7 to 28 May, 2012	CCBRT Disability Hospital	Tanzania	Retrospective Chart Review	women undergoing surgery for fistula repair	availability of residual incontinence post-surgery	329	312	39	2.7

Table 2  
Assessment of the risk of bias of included studies

Included study	Appropriate sampling frame	Using a proper Sampling technique	Adequate sample size	Adequate description of study subject and setting	Sufficient data analysis	Use of valid methods for the conditions	Valid measurement for all participants	Using appropriate statistical analysis	Adequate response rate	Overall quality (Rate over 9)	Stuc qual
Bekele et al, 2016	1	0	1	1	0	1	1	0	0	5/9	High
Patel et al, 2014	0	0	0	1	0	1	1	0	0	3/9	High
Bengston et al, 2016	0	0	1	0	0	0	1	1	0	3/9	High
Kopp et al, 2017	1	0	1	1	1	1	0	1	1	7/9	Low
Adaji & Oladide, 2014	1	0	0	0	1	0	1	0	0	3/9	High
Badejoko et al, 2015	1	0	1	0	0	1	1	1	1	6/9	Mod risk
Andersson et al, 2015	1	1	0	0	0	1	0	0	0	3/9	High
Obioha et al, 2015	1	0	0	1	1	1	1	1	0	6/9	Mod risk
Okunlola et al, 2018	1	0	1	0	0	1	0	1	1	5/9	High
Rabin et al, 2015	1	0	0	0	0	0	0	0	1	2/9	High
Dehinbo et al, 2015	1	0	1	0	1	0	1	1	1	6/9	Mod risk
Megabiaw et al, 2013	1	0	0	1	0	1	1	0	1	5/9	High
Adaji et al 2010	1	0	0	0	0	1	1	0	0	3/9	High
Siddle et al, 2013	0	0	0	0	0	1	1	0	0	2/9	High

**PLEASE INSERT Tables 1 AND 2 HERE**

## Prevalence Of Urinary Incontinence Among Women

Of the 14 studies, four reported on prevalence of UI among women seeking care for diverse gynaecological issues; two Malawian, one South African, and one Tanzanian [26–29], three focused on prevalence among reproductive health women [5, 8], three reported prevalence among pregnant women [12, 30, 31], three among postnatal women [13, 32, 33], and one among health workers [34]. The lowest prevalence of urinary incontinence among women was 0.61% (CI 0.9, 1.03) [10], while the highest prevalence was 39% (CI 33.59–44.41) [29].

The prevalence reported among women with gynaecological issues were similar across studies; 20.2% (95% CI 16–24) [28], 24.0% (95% CI 20–28) [26], 30% (95% CI 27–33) [27] and 39% (95% CI 34–44) [29]. Women with gynaecological issues reported the highest prevalence of UI, while the lowest prevalence was reported among healthy community women.

The three studies [13, 32, 33] that reported on prevalence of UI among postnatal women ranged from 5.8% (95% CI 1–11) to 24.4% (95% CI 16–33) in Nigeria. Of the three studies that reported prevalence among pregnant women attending antenatal care, two [30, 31]

were Nigerian studies reporting prevalence estimates of 12.2% (95% CI 8–16) and 28.1% (95% CI 24–32), while 11.4% (95% CI 8–14) was reported by Bekele, Adefris [12] in Ethiopia. In all prevalence, estimates vary across studies on the continent. The meta-analysis of the 14 studies shows that using random effects model, the estimated pooled prevalence of UI among women in Africa was found to be 16.91% (95% CI 11.43%, 22.39%). The studies showed a high heterogeneity ( $I^2 = 98.7\%$  with a  $p$ -value  $< 0.001$ ) or there was a considerable heterogeneity among the studies according to the  $I^2$  test and the  $P$ -value (refer to Fig. 2).

PLEASE INSERT FIGURE 2 HERE

## Risk Factors For Urinary Incontinence Among African Women

Ten of the 14 studies reported on the risk factors of UI as multiparity, later gestational periods, mode of delivery (including having episiotomy and having an instrumental vaginal delivery (IVD)), pregnancy related constipation, having an underlying respiratory condition during pregnancy, undergoing urethral closure fistula repair, having a higher body mass index (BMI) or being overweight, experiencing prolonged labour, engaging in heavy lifting during pregnancy, increasing age of woman, and longer second stage of labour [8, 12, 13, 26–28, 30–33]. One study reported that women who often experienced constipation were 12 times more likely to have UI, whereas women who sometimes experience constipation were 7 times more likely to have a UI [12]. There was stronger risk among multiparous women than primiparous women [AOR 12.31 (95% CI 1.48-102.45)] [30].

Two studies [27, 31] reported that women with increasing weight (overweight or obesity) have increased risk of developing UI. The risk of an overweight pregnant woman developing UI is significant at an adjusted odd ratio (AOR) of 1.39 (95% CI 1.16–1.73), while obese pregnant women's risk was 1.65 (AOR 1.59–3.44) [31].

Having a prolonged second stage labour or prolonged labour of more than two days was associated with increasing risk of UI ranging from AOR 1.77 to 3.44 [8, 30]. Having a baby with birth weight greater than 4kg was associated with developing UI [5.60 (AOR 1.21–25.92)] [30].

The study revealed that an underlying respiratory condition such as chronic cough, sneezing during pregnancy [4.05 (AOR 1.5–10.5)] or asthma, allergies or sinusitis [10.6 (AOR 3.4–33.2)] were associated with higher risk of pregnancy related UI [12]. A specificity of 63% (95% CI 57–69) at a risk score cut at 20 was identified among post-operative urethral closure fistula repair individuals [26].

Having an IVD [11.54 (AOR 2.71–19.12)], being in second [1.33 (AOR 1.02–6.67)] or third trimester [11.54 (AOR 2.71–19.12)], having an episiotomy [4 (AOR 1.2-12.57)], and lifting heavy items during pregnancy [2.13 (AOR 1.03–4.40)] were all associated with increasing risk of developing UI [8, 9, 12]. Having a caesarean section, vaginal or instrumental delivery in a previous delivery and age at latest delivery were not significant factors of developing UI [8] (refer to Table 3).

### Table 3: Risk factors of Urinary Incontinence

Risk factor	Author	Adjusted odds ratio (AOR)
Age $\geq$ 35	Obioha et al [30]	8.52 (AOR 2.98-24.31)
Multiparity		12.31 (AOR 1.48-102.45)
Duration of second stage of labour $\geq$ 2h		3.44 (AOR 1.11-10.65)
Birth weight $\geq$ 4kg		5.60 (AOR 1.21-25.92)
Multiparity	Adaji et al [32]	-
Older gestational women	Adaji et al [13]	-
Multiparity		-
Spontaneous vaginal delivery		
Having episiotomy	Bekele et al [12]	4 (AOR 1.2-12.57)
Having constipation during pregnancy		7 (AOR 2.5-19.9)
Presence of underlying constipation		
• Chronic cough/sneezing		
• Asthma/allergies/sinusitis		4.05 (AOR 1.5-10.5)
		10.6 (AOR 3.4-33.2)
Post-operative urethral closure fistula repair	Bengtson et al [26]	Specificity of 63 % (95% CI 57-69)
Mode of delivery (complicated vaginal delivery)	Dehinbo et al [27]	-
Overweight/obesity		-
Type of fistula closure	Dehinbo et al [27]	-
Prolonged labour ( $\geq$ 2days)	Megabiaw et al [8]	1.77 (AOR 1.01-3.08)
Heavy lifting /day		2.13 (AOR 1.03-4.40)
Overweight	Okunola et al [31]	1.39 (AOR 1.16-1.73)
Obesity		1.65 (AOR 1.59-3.44)
2 <sup>nd</sup> Trimester		1.33 (AOR 1.02-6.67)
3 <sup>rd</sup> Trimester		2.09 (AOR 1.18-3.69)
Having IVD		11.54 (AOR 2.71-19.12)
Ethnicity		
• Ibo tribe		3.29 (AOR 1.40-7.70)
• Ebira tribe		8.86 (AOR 1.27-16.73)

IVD- Instrumental vaginal delivery; AOR- Adjusted odds ratio

PLEASE INSERT Table 3 HERE

## Sub-group Analysis

The level of heterogeneity recorded across the included studies was considerable. All studies reported high risk of bias except the study by Kopp, Bengtson [28] that rated over 70% on the JBI checklist for prevalence studies.

## Discussion

This systematic review is the first to attempt to estimate prevalence and risk factors of UI in Africa. Women presenting with gynaecological issues reported higher prevalence of urinary incontinence, while lower prevalence was recorded among women within reproductive age. The pooled prevalence of UI was 16.9% (95% CI 11.4–22.4). Urinary incontinence results were too heterogenous ranging from 0.61–39%. The considerable heterogeneity recorded may be explained by the differences in study quality, the sampling techniques, sample size estimations, as well as the higher risk of bias reported in the studies.

The prevalence of UI differ from country to country. For instance in Nigeria, the prevalence ranged from 12.2–28.1% among pregnant women, and 5.8–24.4% among postnatal women. The pooled prevalence obtained in this study is lower compared to the overall pooled prevalence of UI reported by the systematic review and meta-analysis of 49 studies [30% (95% CI 25–35%)] across low- and middle-income countries [14]. A number of factors could explain the variation in prevalence across countries on the continent. The economic statuses and health systems differ in addition to the varying research methods.

Population characteristics are also different as well as the activities pursued by the various women who constituted the samples for the different studies. It is plausible that these variations accounted for the differences reported in the prevalence estimates. Subsequently, Islam, Oldroyd [14] reported that a significant association exists between economic status and the risk of developing UI and therefore, it is not surprising that prevalence reported in this study varied across individual countries. Also, in-country differences reported could partly be due to the different health-seeking behaviours, dietary patterns, cultural practices, and parity within individual countries [35, 36].

Risk factors for UI identified by this study did not differ from those reported in other studies [14, 18]. Despite different health systems, varying educational systems, governmental organisations, non-governmental organisations, and health seeking behaviours, risk factors of UI have not changed significantly [37, 38]. Risk factors identified included increasing BMI, prolonged labour, heavy lifting and fistula repairs. With increasing rates of parity across countries in Africa [39], it will be exciting to understand to what extent, multiparity impacts on the risk of developing UI. It will also be worthwhile to undertake clinical trials to examine the role of multiparity on urinary incontinence among Africa women. Laparoscopic colposuspension is also considered to play very important surgical method for urinary incontinence prevention [40]. However, due to the quality of reporting we were unable to examine its impact on urinary incontinence among Africa women.

## Limitations

The limitations of this study arise from the limited number of available studies and incomplete reporting, especially with regard to the type of UI and the severity of the condition. Studies had been conducted only in few African countries. It is likely that prevalence estimates may be underreported considering the level of stigmatisation associated with UI. Studies on UI prevalence among postnatal and prenatal women were limited to only Nigeria.

## Implications For Future Studies

The study reveals some notable gaps where further research is required. More research on prevalence of UI in those countries not reported in this study are encouraged to add to knowledge on the condition. Most women in Africa may explore diverse traditional methods to treat the condition [41], and therefore, it is worthwhile to explore the health seeking behaviours of women suffering from UI.

It is also likely that knowledge of women on the condition may be limited and therefore public health experts as well as health professionals must intensify education on preventive mechanisms to enhance early detection and treatment. Understanding the influence of culture and social factors on the prevalence of UI are important areas worth exploring in future research. None of the studies reported on the impact of UI on quality of life of community women. Future research studies could explore this as well.

## Conclusion

This systematic review revealed the discrepancy that is reported by various UI prevalence studies across Africa. Quality of studies including sample size estimations, recruitment strategies as well as study designs should be considered paramount when undertaking research on the continent. Risk factors of UI including mode of delivery and age of women at latest delivery should be explored in further research. Exploring treatment opportunities available for UI among women will help to improve the lives of women living with UI.

## Abbreviations

UI  
Urinary incontinence  
PRISMA  
Preferred reporting items for systematic reviews and meta-analyses  
AJOL  
African Journals Online  
JBI  
Joanna Briggs Institute  
CI  
Confidence Interval  
BMI  
Body Mass Index  
DRC  
Democratic Republic of Congo  
AOR  
Adjusted Odd Ratio



# Declarations

## Ethics approval and consent to participate

This article is based on a secondary analysis of the existing literature and does not contain any studies with human participants or animals performed by any of the authors. The PRISMA guideline for conducting systematic and meta-analysis was followed.

## Consent for publication

Not applicable

## Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Competing interests

The authors declare that they have no competing interest.

## Funding

None

## Authors' contributions

All authors developed the protocol, and contributed to the study design, manuscript development, editing, and completion of the manuscript. The article search and management were performed by ET. Article screening was completed by ET, and EA, independently screened 10% of the articles. Quality assessment and study description were performed by EL and EA. The data analysis was done by ET and consensus discussions and finalising with ET, EA, ESKM, and COA. Table design was completed by ET, COA, ESKM, and EA.

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# Figures

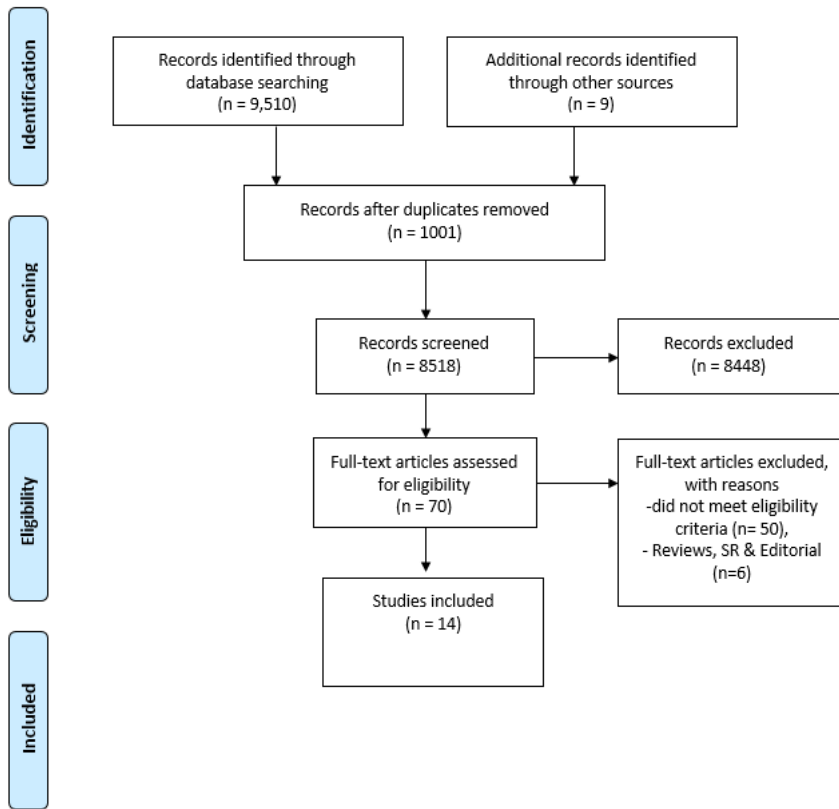


Figure 1

PRISMA Flow Diagram

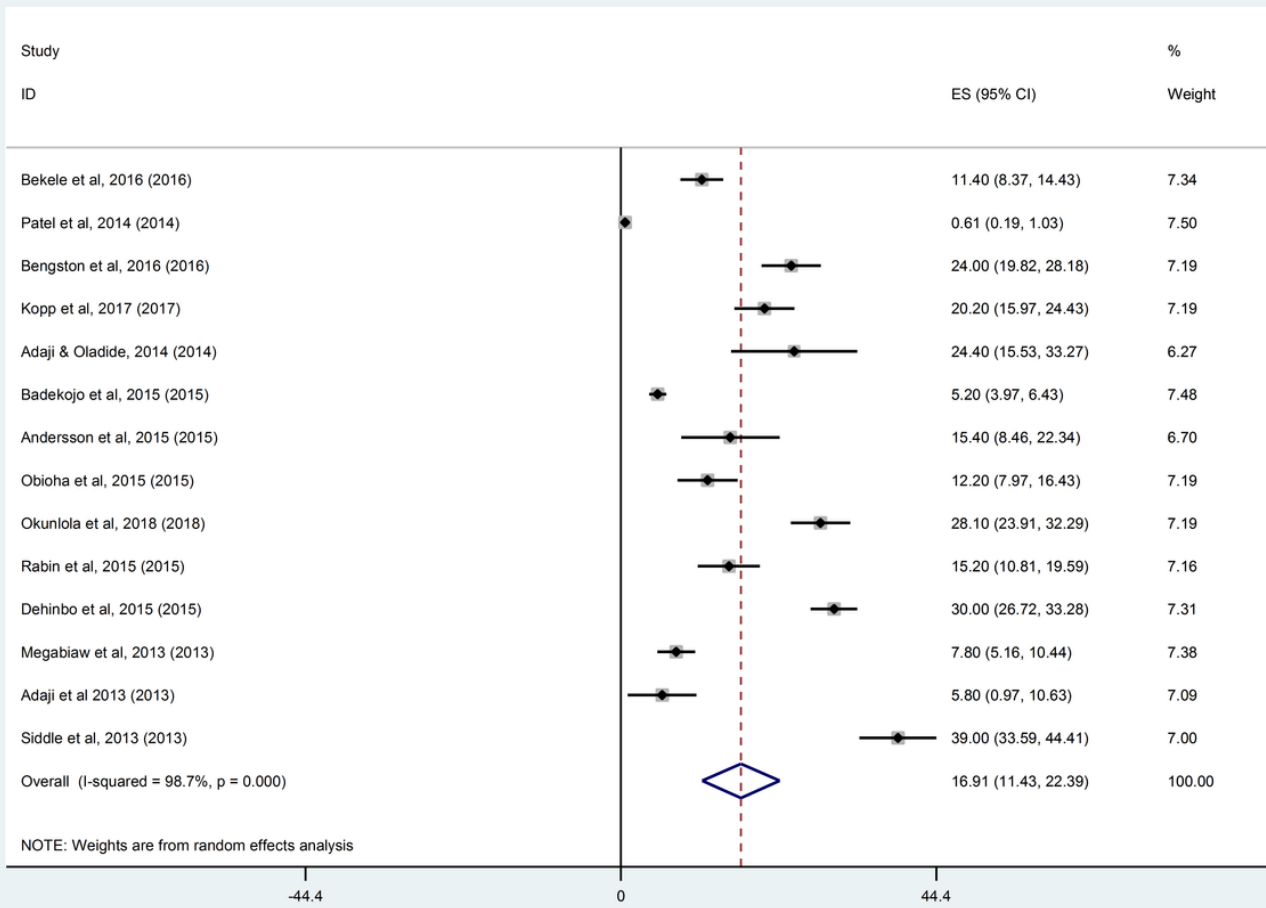


Figure 2

Forest plot of pooled prevalence studies of UI