In the name of GOD

CIRCUMCISION AND LIFE TIME RISK OF URINARY TRACT INFECTION

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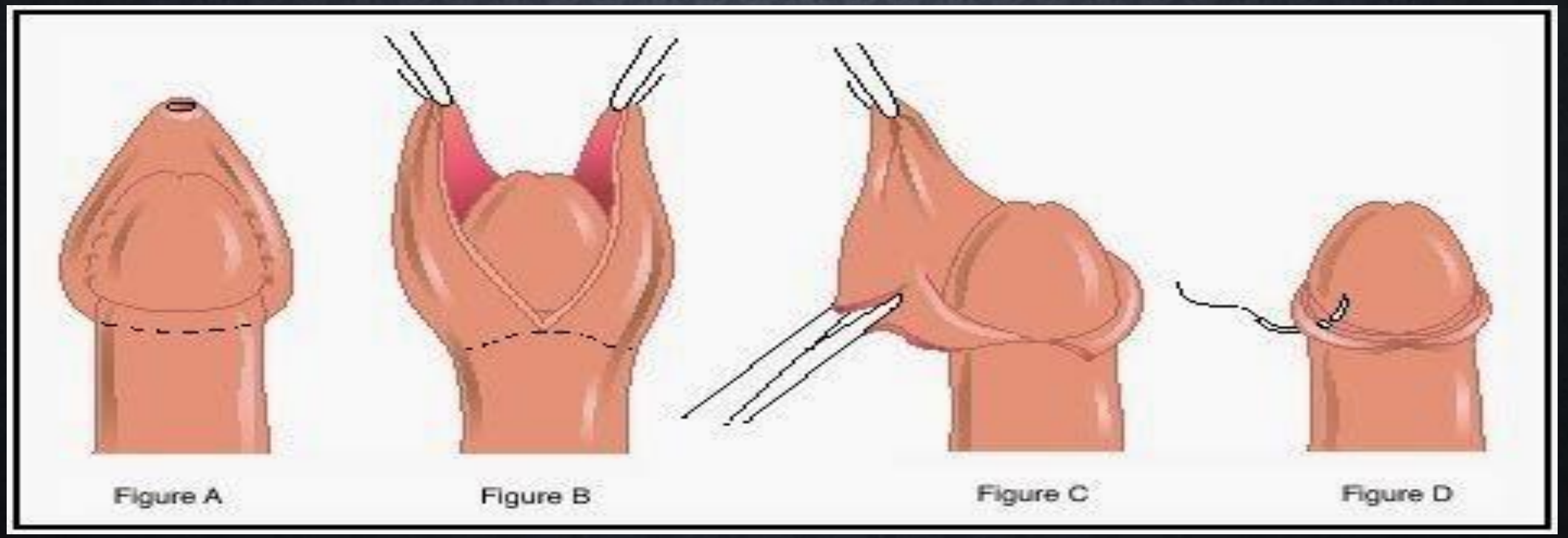
CIRCUMCISION IS……

- **circumcision** is the removal of the foreskin from the human penis



UTI IN CHILDREN

- Urinary tract infections are common in infancy and can lead to **significant morbidity**. The younger the infant, the more likely and severe will be the UTI, and the greater the risk of sepsis and death. By the age of 7 years 2% (definitely) and another 5% (probably) of boys have had at least 1 UTI. 1,2,3,4
- Rushton and Majd found that 50% to 86% of children with **febrile UTI and presumed pyelonephritis** had renal parenchymal defects which persisted. Others reported pyelonephritis in 34% to 70% of febrile UTI cases in the first year of life and another estimate was 90%. Nuclear scans in febrile infants after treatment for UTI noted scarring in 10% to 30%. 5,6,7,8.

UTI AND CIRCUMCISION

- The first evidence → early 1980s
- The Pediatric Research in Office Settings Febrile Infant Study of 219 United States practices found that being uncircumcised was the **strongest multivariate predictor of UTI** (OR 11.6, 95% CI 5.9–22.6).
- Among boys with UTI one study demonstrated that **19% experienced recurrent** UTIs if not circumcised compared with zero for the circumcised. 11,12,13
- Roberts estimated that infant circumcision prevents **20,000** cases of acute pyelonephritis annually.14

PURPOSE

UTI → Renal Parenchymal Dis Of Still Growing Pediatric Kidney

Although the rate of urinary tract infection is highest in the first year of life, the cumulative incidence during the rest of the lifetime is under-recognized, but is expected to be nontrivial.

Thus, **any intervention that might prevent urinary tract infection** would be expected to reduce suffering and medical costs.

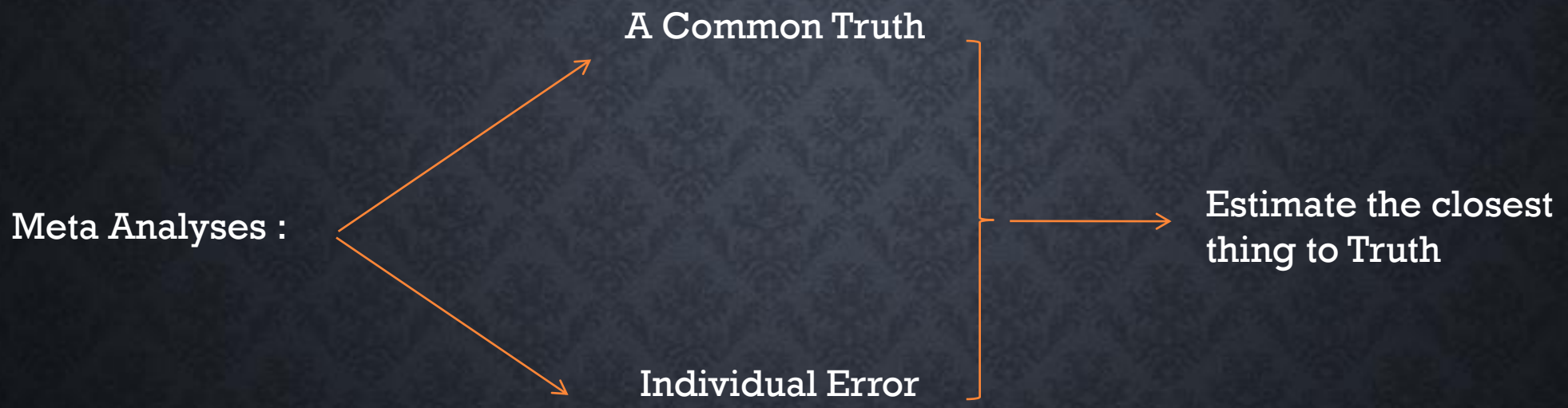
THE METHOD

a meta-analysis of 22 studies examining the single risk factor of lack of circumcision

determined the prevalence and relative risk of urinary tract infection in different age groups (0 to 1, 1 to 16 and older than 16 years).

estimated the lifetime prevalence.

META ANALYSES



CRITERIA'S

- Adjusted measures were considered more reliable than crude effect
- We calculated the appropriate crude measure and CI from published frequencies
- When frequencies of zero were shown we added 0.5 to the relevant cell.
- To assess the impact of age we created 3 binary valued variables representing participant age, namely 0 to 1 year, 1 to 16 years and 16 years

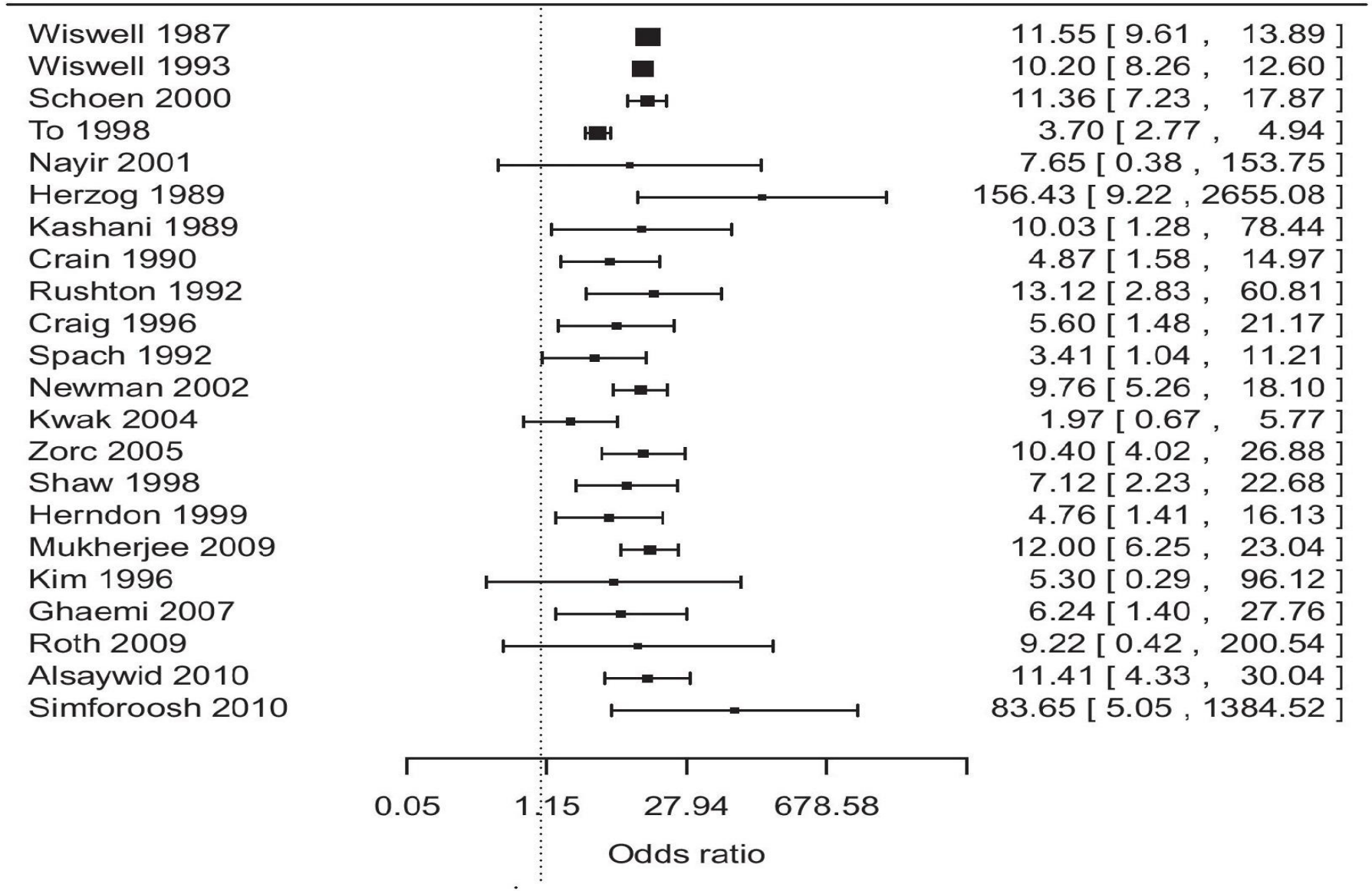
MATERIALS

Table 2. *The included studies showing frequency of UTI*

References	No./Total No. Circumcised	No./Total No. Uncircumcised	AOR,[a] ARR,[b] OR[c]*	Notes*
Wiswell et al[36]	151/173,663	459/46,112	11.4 (9.53–13.8)	e h i j
Herzog[41]	0/52	36/60	156 (9.22–26.60)	c d e h i j
Kashani and Faraday[51]	1/43	16/83	10 (1.28–78.4)	c e f h i
Crain and Gershel[42]	4/96	18/103	4.87 (1.58–15)	c e h i
Rushton and Majd[5]	2/37	21/49	13.1 (2.83–60.8)	c e h i
Spach et al[29]	18/64	8/14	3.41 (1.04–11.2)	c g h i
Wiswell and Hachey[26]	112/80,279	384/27,319	10.1 (8.17–12.4)	e h i j
Craig et al[43]	2/49	142/837	5.6 (1.4–20)	a e f h i
Kim[44]	0/19	8/70	5.3 (0.293–96.1)	c d e f i
Shaw et al[45]	6/497	6/75	7.12 (2.23–22.7)	c e i
To et al[35]	55/29,217	205/29,217	3.7 (2.8–5)	b e f h i
Herndon et al[46]	7/37	10/19	4.76 (1.41–16.1)	c e i
Schoen et al[37]	22/9,668	132/5,225	11.1 (7.08–17.4)	e h i j
Nayir[22]	0/35	3/35	7 (0.375–131)	d e f i
Newman et al[23]	15/572	41/197	9.76 (5.26–18.1)	c e i
Kwak et al[47]	6/27	18/50	1.97 (0.672–5.77)	c f i
Zorc et al[48]	6/262	62/291	10.4 (4.7–31.4)	a e i
Ghaemi et al[49]	2/105	16/148	6.24 (1.4–27.8)	c e i
Mukherjee et al[34]	—/Not available	—/Not available	12 (6.4–23.6)	a f i
Roth et al[50]	0/41	2/24	9.22 (0.424–201)	c d e i
Alsaywid et al[52]	5/74	62/137	11.4 (4.33–30)	c e f i
Simforoosh et al[53]	0/2,000	20/1,000	83.7 (5.05–1,380)	c d e f h i

The studies are listed in chronological order.

* a, adjusted odds ratio. b, adjusted relative risk. c, odds ratio. d, small sample correction. e, infant. f, child. g, adult. i, systematic search. j, USA. When a, b or c does not appear, the study did not report one of these.



Forest plot showing odds ratios derived from studies included in meta-analysis. Mean is shown as square symbol and as first number in column on right. Horizontal bars and numbers in brackets depict 95% CIs.

RESULT

R.R.

Age 0 to 1 year → 9.91 (95% CI 7.49–13.1)

1 to 16 years → 6.56 (95% CI 3.26–13.2)

older than 16 years → 3.41-fold (95% CI 0.916–12.7)

$$RR = \frac{D_E / N_E}{D_N / N_N}$$

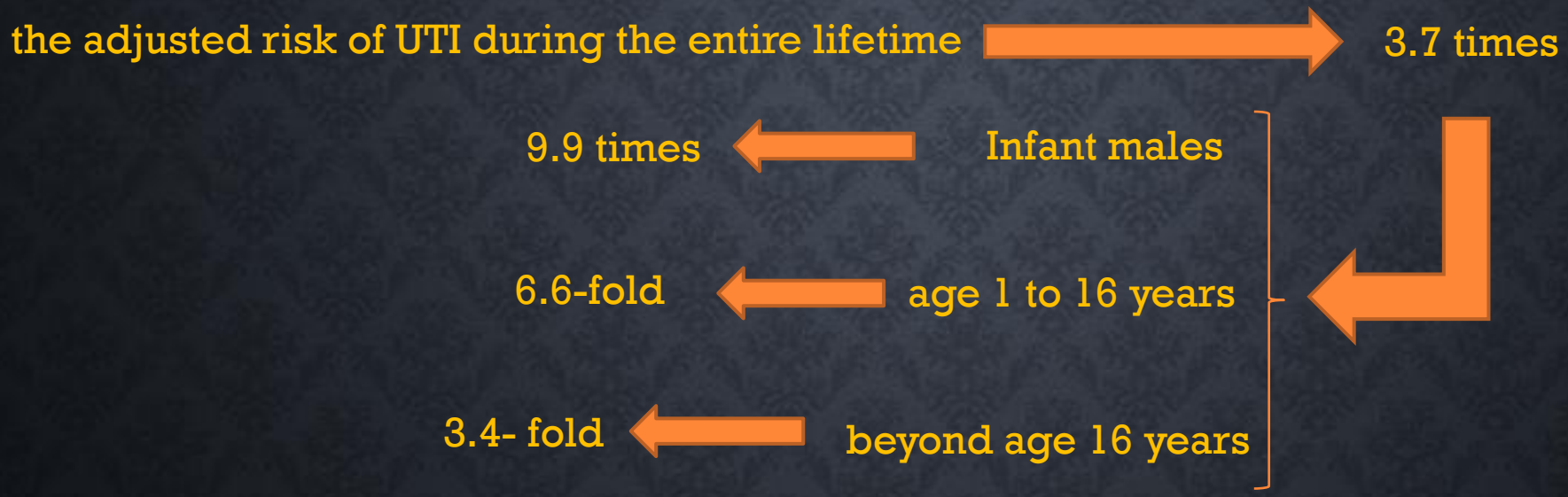
32.1% (95% CI 15.6–49.8) of uncircumcised males experience a urinary tract infection in their lifetime compared with 8.8% (95% CI 4.15–13.2) of circumcised males

Table 3. *UTI risk estimates for circumcised and uncircumcised males of different age groups*

Age Group (yrs)	RR (95% CI)	% Circumcised Risk (95% CI)	% Uncircumcised Risk (95% CI)
0–1	9.91 (7.49–13.1)	0.127 (0.072–0.223)	1.26 (0.737–2.14)
1–16	6.56 (3.26–13.2)	0.409 (0.221–0.704)	2.68 (1.67–4.13)
16+	3.41 (0.916–12.7)	8.26 (3.61–12.7)	28.2 (11.6–45.7)
Lifetime	3.65 (1.15–11.8)	8.8 (4.15–13.2)	32.1 (15.6–49.8)

Does not include results for meta-regression and stratified meta-analysis models, nor an analysis of various subsets such as studies of a general population vs those with VUR.

DISCUSSION



Lifetime UTI risk was 32% in uncircumcised males and 8.8% in circumcised males. Previous meta-analyses found risk of UTIs in uncircumcised boys to be twelvefold (95% CI 11–14, range 5 to 89-fold) and eightfold (95% CI 5–13) greater than in circumcised boys. 26,27

LIMITATIONS

- There were 3 major limitations of our analysis.

  1) **Inclusion of circumcision** (and related terms) as keywords may have introduced bias since authors might have been more likely to mention circumcision in the abstracts of papers in which associations were found. However, if we had searched by UTI and related terms and had not included circumcision and related terms, our search would have returned approximately 47,000 articles. Scrutiny of all of these
  was unrealistic.

OTHER LIMITATIONS

2) **Bag specimens or clean catch urine samples** were used in several studies. The organisms identified in these samples were typically pure cultures of known pathogens in great quantities (cfu/ml).

3) In our estimates of lifetime risk we relied on combining risk data from **dissimilar populations**. While we adjusted for different circumcision rates, it is likely that other differences among countries limited the accuracy of such calculations. Cumulative rates from a British study were for specialist referrals38 and, thus, may have underestimated the true risk since many UTIs may be treated by a general practitioner

CONCLUSIONS

The present meta-analysis is the first to estimate the lifetime risk of UTI in circumcised and uncircumcised males. Our finding that the **single risk factor of lack of circumcision** accounts for 23% of UTIs during the lifetime of males compares favorably with the 1.5% complication rate associated with infant circumcision in a meta-analysis. While most complications are minor, UTIs can be associated with long-term morbidity and potential mortality.

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Thanks for your attention