Supplemental Table. Strength of evidence for primary renal outcomes.

Key Outcomes*	**Studies (N)**	**Study limitations**	**Directness**	**Consistency**	**Precision**	**Reporting Bias**	**Strength of evidence** **Finding**
Partial nephrectomy versus active surveillance							
Continuous renal functional outcomes	2 (524)	High	Direct	Unknown	Imprecise	Undetected	**Insufficient** One study combined both partial nephrectomy and cryoablation without the ability to separate the groups. The other study found no difference in GFR change between groups. The evidence was insufficient to determine effectiveness of partial nephrectomy alone.
Categorical renal functional outcomes	2 (312)	High	Direct	Unknown	Imprecise	Undetected	**Insufficient** One study combined both partial nephrectomy and cryoablation without the ability to separate the groups. The other study found no difference in rates of CKD between groups. The evidence was insufficient to determine effectiveness of partial nephrectomy alone.
Partial nephrectomy versus thermal ablation							
Continuous renal	20 (2,867)	Medium	Direct	Inconsistent	Imprecise	Undetected	**Low** Meta-analyses demonstrated 1.0 (95%CI -0.2-2.1)

Key Outcomes*	**Studies (N)**	**Study limitations**	**Directness**	**Consistency**	**Precision**	**Reporting Bias**	**Strength of evidence** **Finding**
functional outcomes							ml/min/1.72 m^2 larger decrease in GFR for partial nephrectomy compared to thermal ablation, but the result was not statistically significant and there was significant heterogeneity.
Categorical renal functional outcomes	11 (1,893)	Medium	Direct	Inconsistent	Imprecise	Undetected	**Low** No statistically significant differences seen in rates of CKD stage ≥3, ≥3b, ≥4, or ESRD.
Radical nephrectomy versus active surveillance							
Continuous renal functional outcomes	2 (334)	Medium	Direct	Consistent	Imprecise	Undetected	**Low** While results are limited by having only two studies, decline in eGFR was 14 ml/min/1.73 m^2 less in those assigned active surveillance.
Categorical renal functional outcomes	2 (471)	Medium	Direct	Consistent	Imprecise	Undetected	**Low** While results are limited by having only two studies, rates of new onset CKD Stage ≥3 were 3-6% with active surveillance and 40-76% with radical nephrectomy.
Radical nephrectomy versus partial nephrectomy							

Key Outcomes*	**Studies (N)**	**Study limitations**	**Directness**	**Consistency**	**Precision**	**Reporting Bias**	**Strength of evidence** **Finding**
Continuous renal functional outcomes	34 (9,221)	Medium	Direct	Consistent	Precise	Undetected	**Moderate** 30 of 34 studies demonstrated worse renal functional outcomes for radical nephrectomy, with pooled results showing 3.6 (95% CI 3.2-4.1) ml/min/1.72 m^2 larger decrease in GFR for radical nephrectomy compared to partial nephrectomy with significant heterogeneity in the magnitude of the difference.
Categorical renal functional outcomes	24 (11,236)	Medium	Direct	Consistent	Precise	Undetected	**Moderate** Incidence of all stages of CKD were lower in those undergoing partial nephrectomy compared to radical nephrectomy, with risk 0.39 times lower for CKD stage 3, 0.37 times lower for CKD stage 3b, 0.76 times lower for CKD stage 4, and 0.47 times lower for ESRD. Heterogeneity did exist in the magnitude of the findings.

Key Outcomes*	**Studies (N)**	**Study limitations**	**Directness**	**Consistency**	**Precision**	**Reporting Bias**	**Strength of evidence** **Finding**
Radical nephrectomy versus thermal ablation							
Continuous renal functional outcomes	7 (390)	Medium	Direct	Consistent	Precise	Undetected	**Moderate** eGFR change was consistently larger following radical nephrectomy, with pooled estimate 9.9 (95% CI 7.6-12.3) ml/min/1.72 m2 larger decline in eGFR.
Categorical renal functional outcomes	4 (1,125)	Medium	Direct	Consistent	Precise	Undetected	**Moderate** Rate of CKD Stage >3 was 3.5 fold higher (95% CI 1.1-11.1) for those receiving radical nephrectomy. Rates of CKD stage 3b and ESRD were limited to two studies.
Thermal ablation versus active surveillance							
Continuous renal functional outcomes	2 (473)	High	Direct	Unknown	Imprecise	Undetected	**Insufficient** One study combined both partial nephrectomy and cryoablation without the ability to separate the groups. The other study found no difference in GFR change between groups. The evidence was insufficient to determine effectiveness of thermal ablation alone
Categorical renal	2 (312)	High	Direct	Unknown	Imprecise	Undetected	**Insufficient**

Key Outcomes*	**Studies (N)**	**Study limitations**	**Directness**	**Consistency**	**Precision**	**Reporting Bias**	**Strength of evidence** **Finding**
functional outcomes							One study combined both partial nephrectomy and cryoablation without the ability to separate the groups. The other study found no difference in rates of CKD between groups. The evidence was insufficient to determine effectiveness thermal alone.

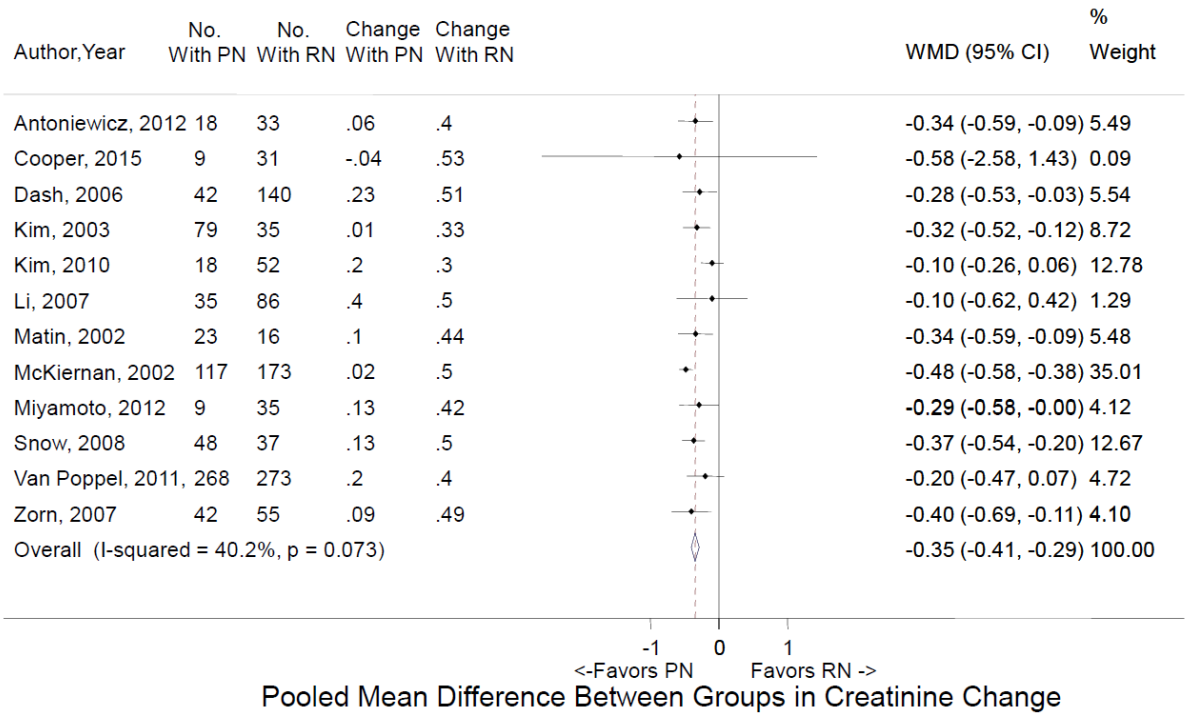
CKD=chronic kidney disease; eGFR=estimated glomerular filtration rate; ESRD=end stage renal disease
*Continuous renal functional outcomes included change in serum creatinine and/or change in eGFR; categorical renal functional outcomes included incidence of CKD stage III, IIIb, or IV, or incidence of ESRD.

Appendix: Table A. PICOTS (population, interventions, comparators, outcomes, timing, and setting)

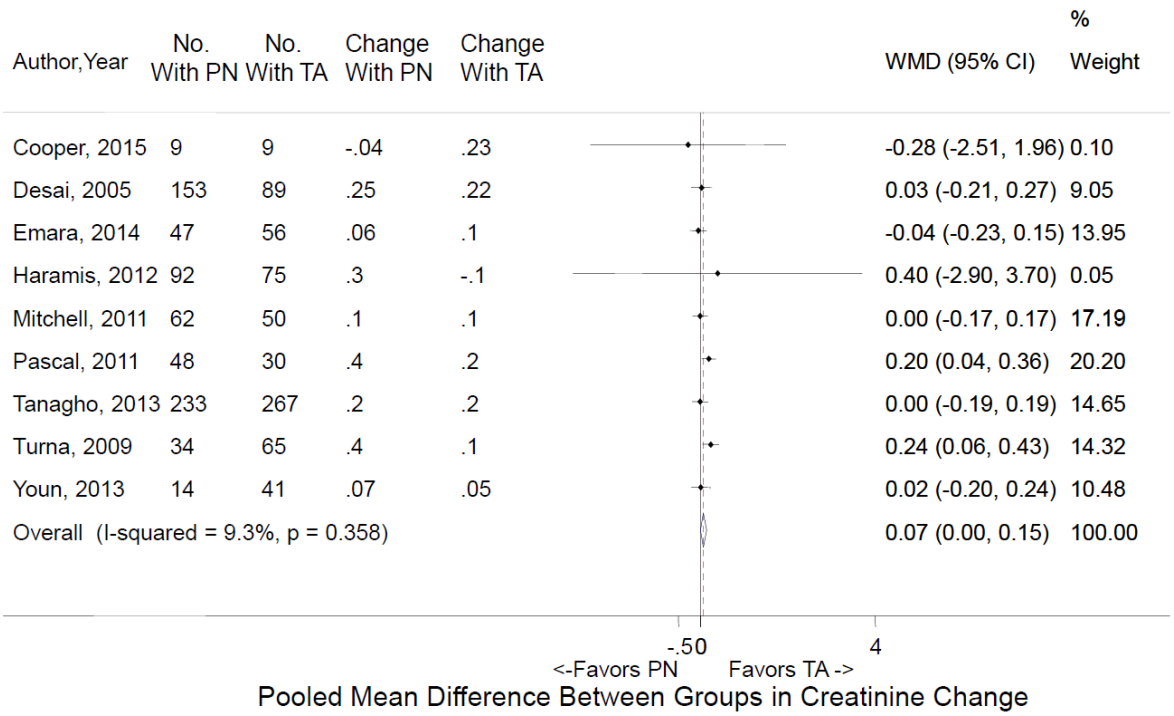
Population(s)	Newly diagnosed adults (18 years or older) with solid renal masses (or cystic renal masses with a solid component) suspicious for stage I and II renal cell carcinoma, which corresponds to clinical stage T1 (less than 7 cm and organ confined) or T2 (greater than 7 cm and organ confined) renal masses
Interventions	• Radical nephrectomy (open and minimally invasive) • Partial nephrectomy (open and minimally invasive) • Thermal ablation (e.g., radiofrequency ablation, cryoablation; surgical versus image-guided) • Active surveillance • Minimally invasive surgery may refer to standard laparoscopy or robot-assisted laparoscopy • No microwave ablation
Comparators	Comparisons include all of the management options listed above
Outcomes	**Final health outcomes** • **Renal functional outcomes**: Glomerular filtration rate decline, Incidence of chronic kidney disease, Incidence of end-stage renal disease, Acute kidney Injury • **Relevant postoperative harms**: Acute kidney Injury
Type of study	**Controlled studies** (randomized controlled trials, non-randomized controlled trials, and comparative cohort studies): All comparisons between interventions **Uncontrolled studies** (single cohort studies): Data from uncontrolled studies that addressed active surveillance are described in the report.
Timing and Setting	Any time point and setting

Supplemental Figure 1. Mean change in creatinine for (A) radical nephrectomy versus partial nephrectomy and (B) partial nephrectomy versus thermal ablation. The width of the horizontal lines represents the 95% confidence intervals for each study. The diamond at the bottom of the graph indicates the 95% confidence interval. eGFR=estimated glomerular filtration rate; No.=number; PN=Partial nephrectomy, RN=Radical nephrectomy; TA=Thermal ablation; WMD=Weighted mean difference.

A)

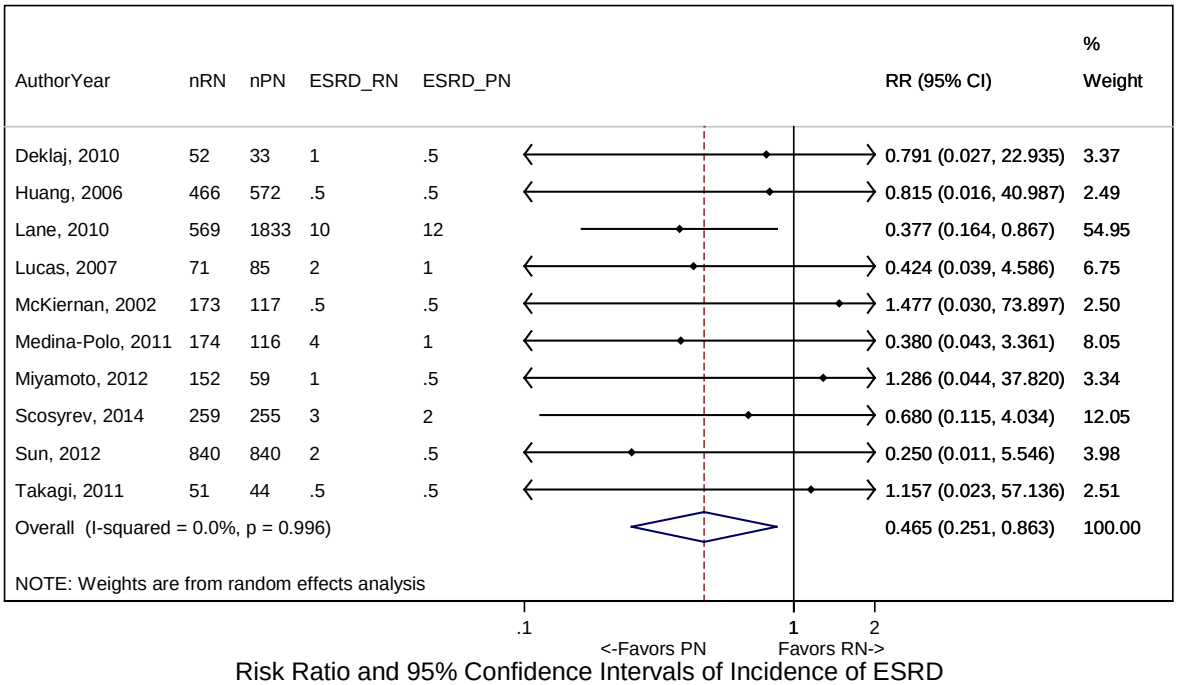


B)



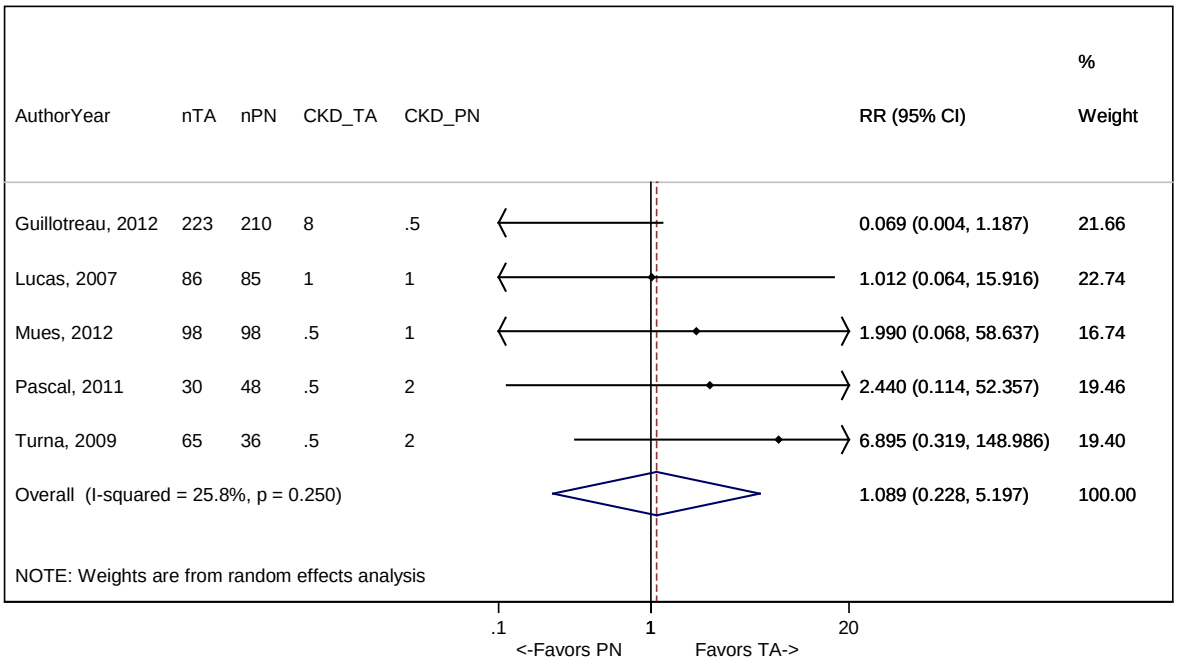
Supplemental Figure 2. Meta-analysis of the incidence of end stage renal disease for (A) radical nephrectomy versus partial nephrectomy and (B) partial nephrectomy versus thermal ablation. The width of the horizontal lines represents the 95% confidence intervals for each study. The diamond at the bottom of the graph indicates the 95% confidence interval. ESRD = end-stage renal disease; CKD=Chronic kidney disease; No.=Number; PN=Partial nephrectomy, RN=Radical nephrectomy; RR=Risk Ratio; TA=Thermal ablation; WMD=Weighted mean difference.

A)



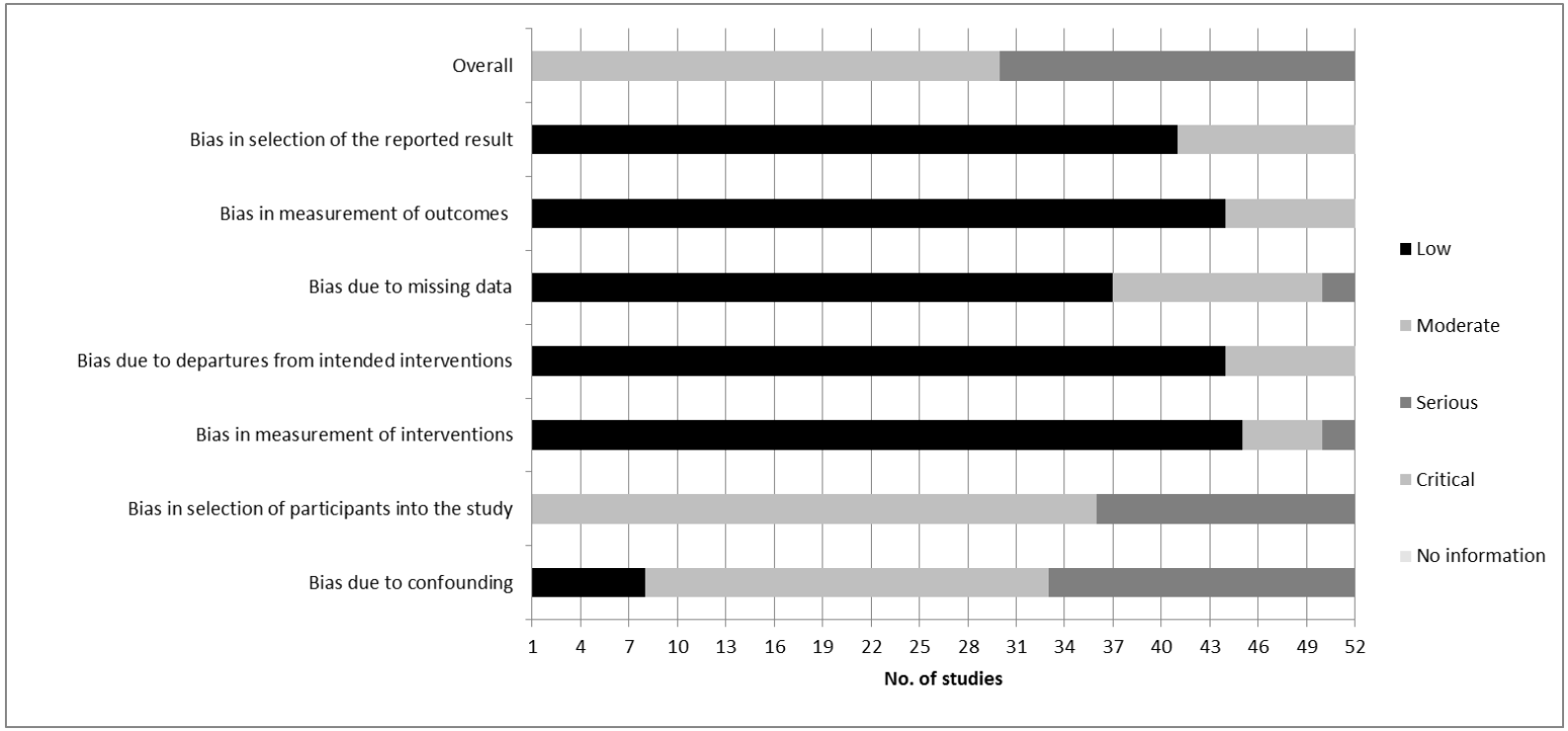
Risk Ratio and 95% Confidence Intervals of Incidence of ESRD

B)



Risk Ratio and 95% Confidence Intervals of Incidence of ESRD

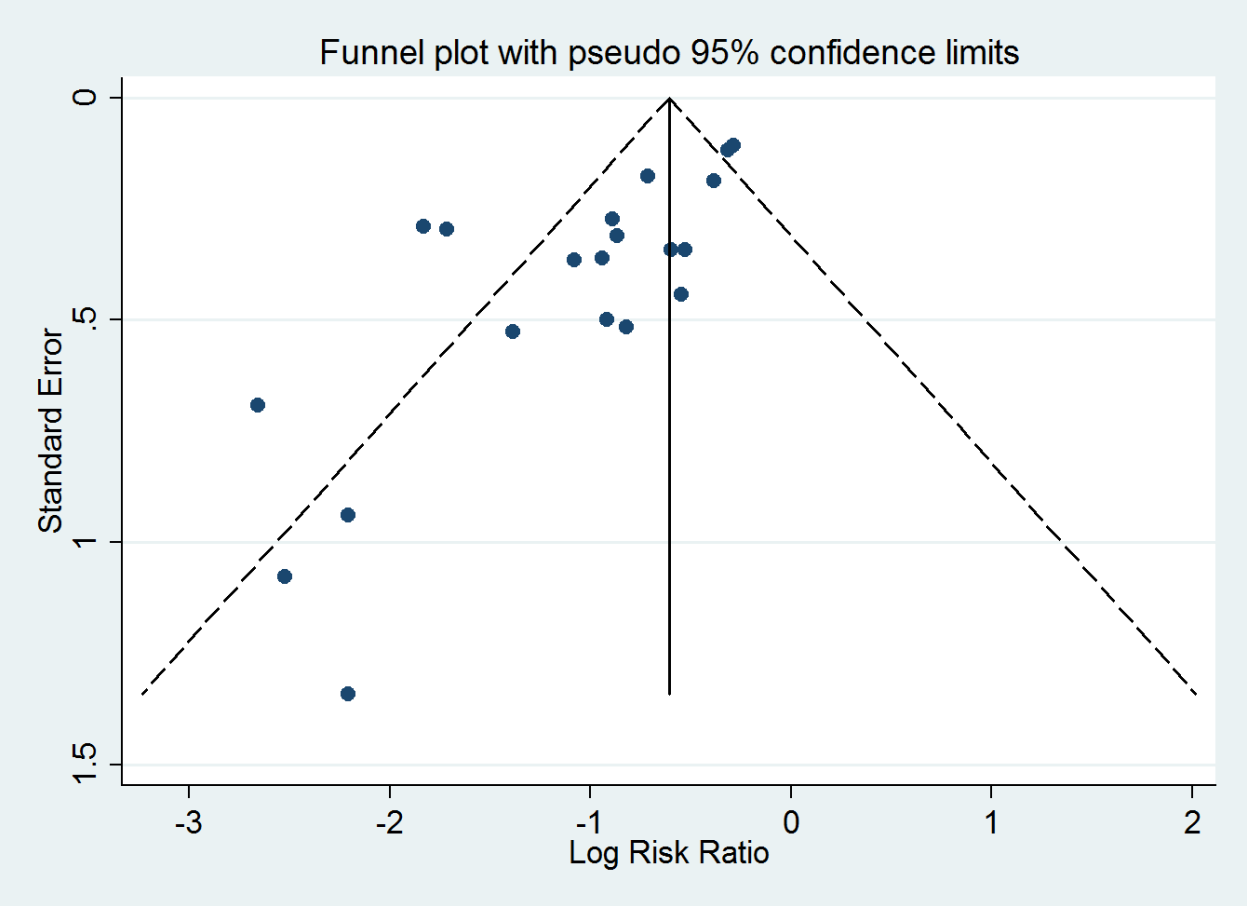
Supplemental Figure 3. Risk of bias across cohort studies of primary renal functional outcomes*



*Renal functional outcomes included change in creatinine, change in estimated glomerular filtration rate, incidence of chronic kidney stages III, IIIb, and IV, and incidence of end stage renal disease.

Supplemental Figure 4. Funnel plots to assess publication bias for incidence of stage III chronic kidney disease for (A) radical nephrectomy versus partial nephrectomy, (B) radical nephrectomy versus thermal ablation, and (C) partial nephrectomy versus thermal ablation; incidence of acute kidney injury for (D) radical nephrectomy versus partial nephrectomy, (E) radical nephrectomy versus thermal ablation, and (F) partial nephrectomy versus thermal ablation; incidence of end-stage renal disease for (G) radical nephrectomy versus partial nephrectomy, and (H) partial nephrectomy versus thermal ablation.

A)



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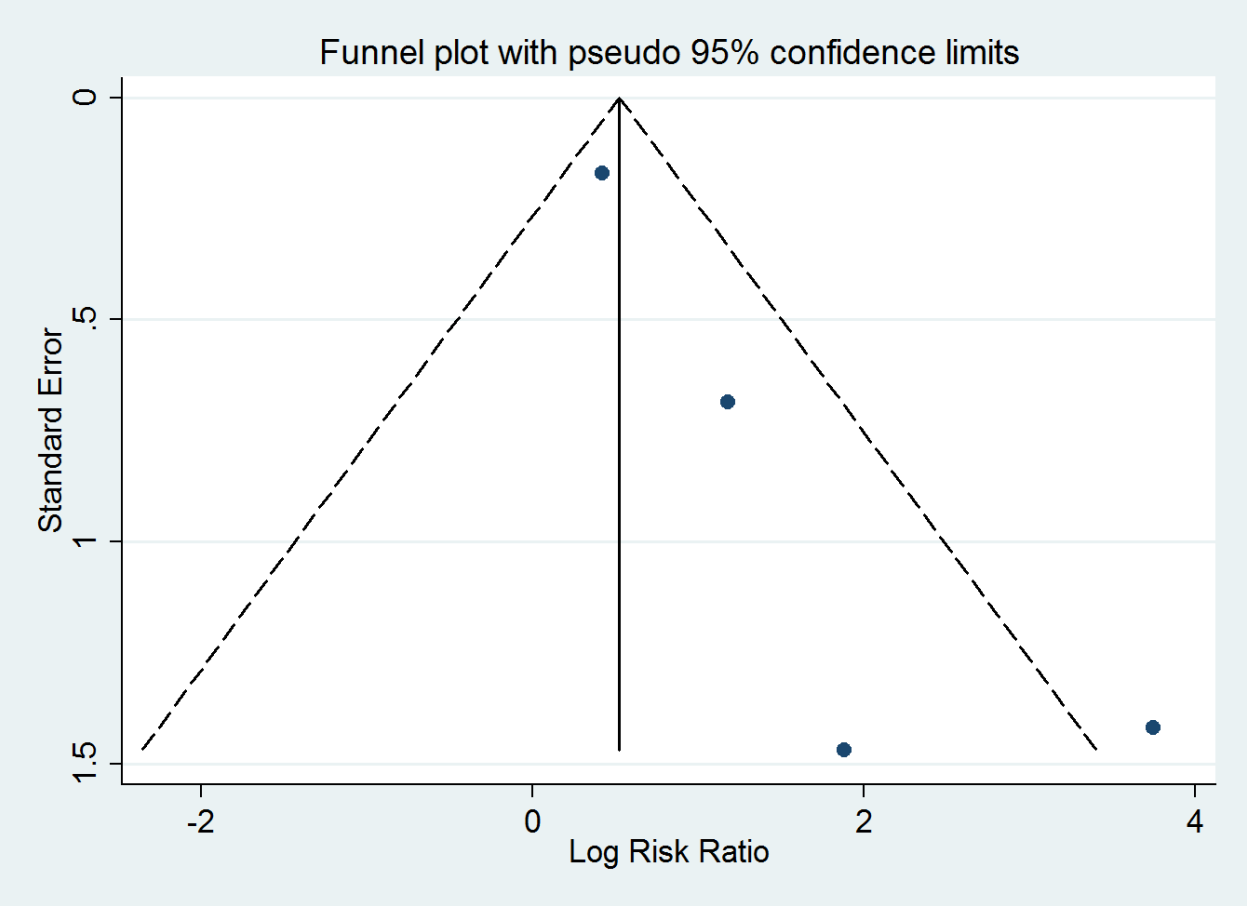

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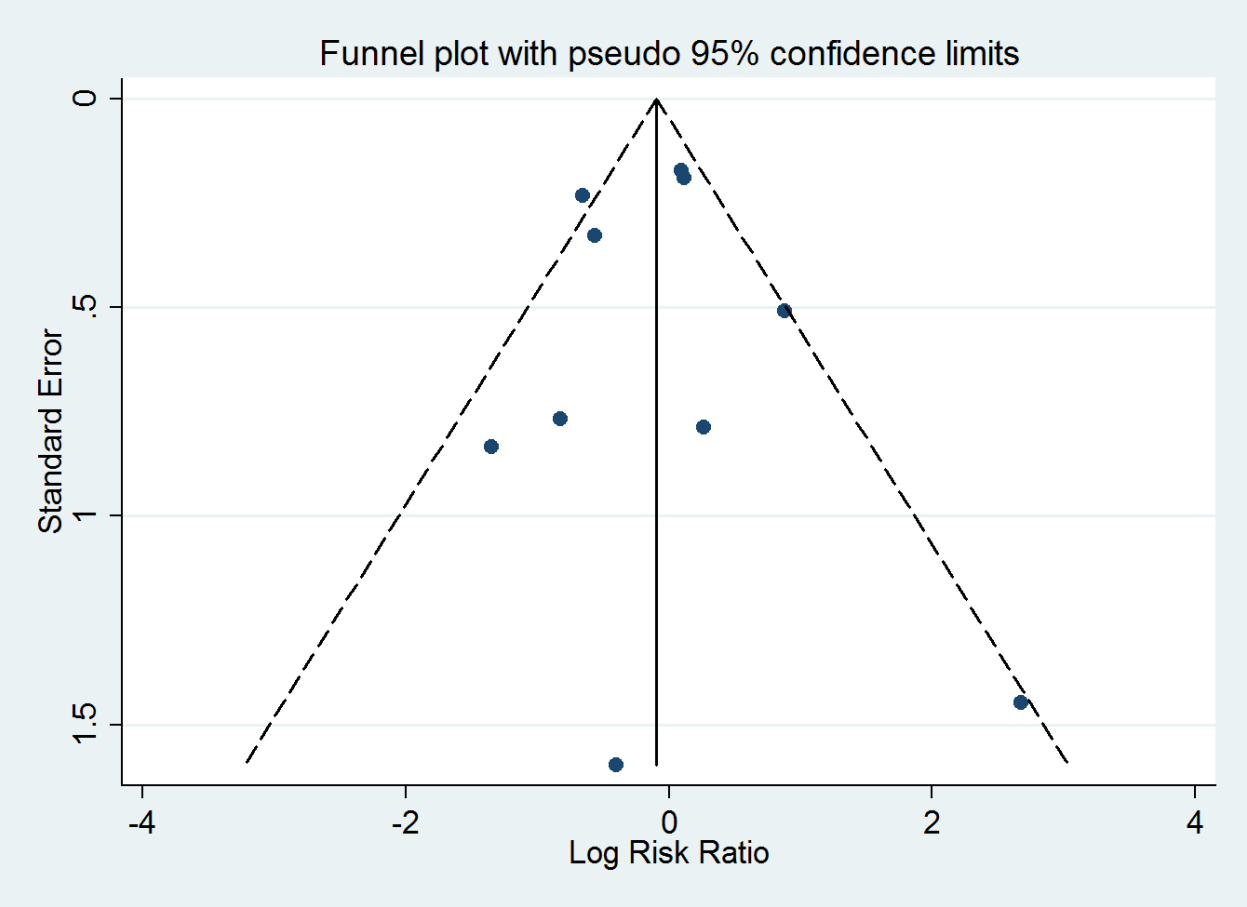

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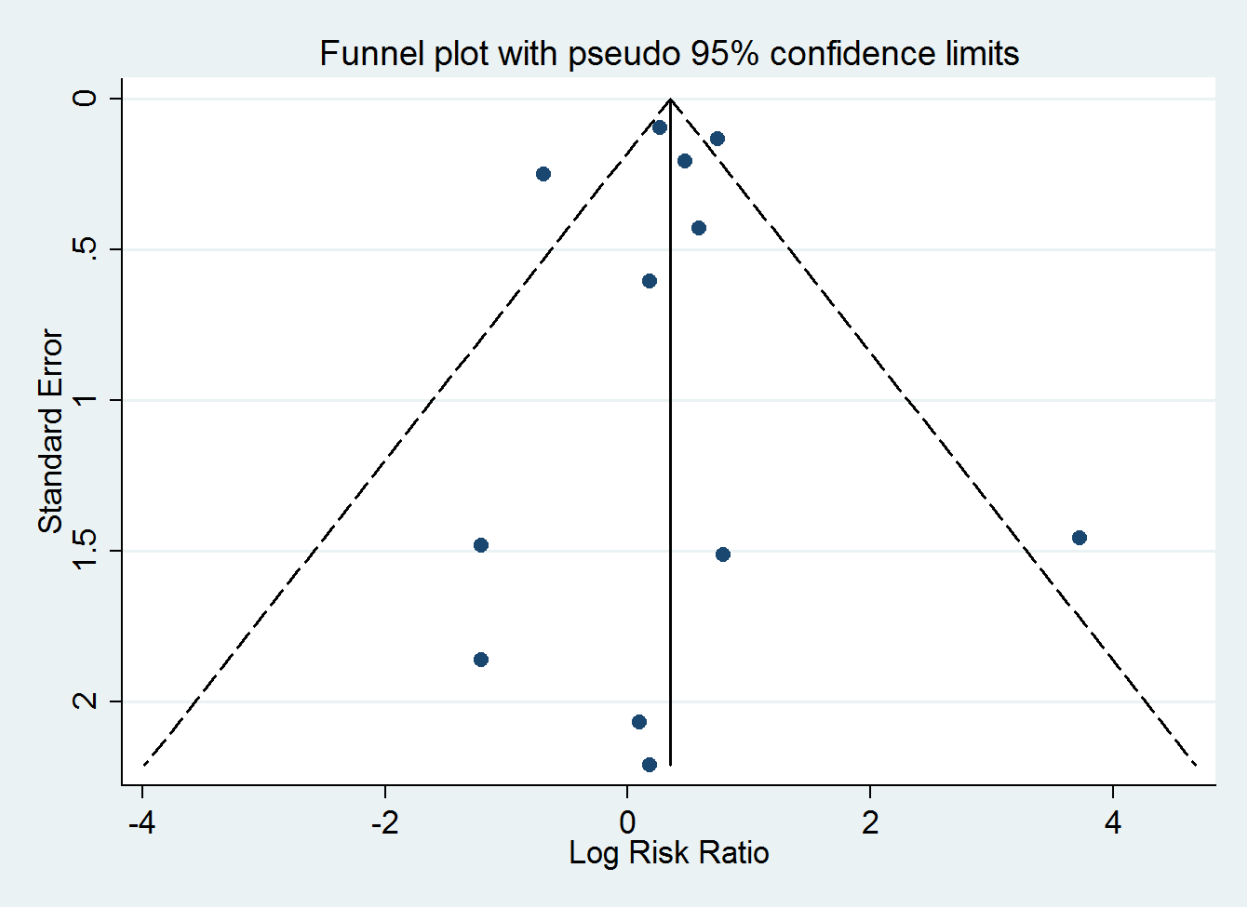

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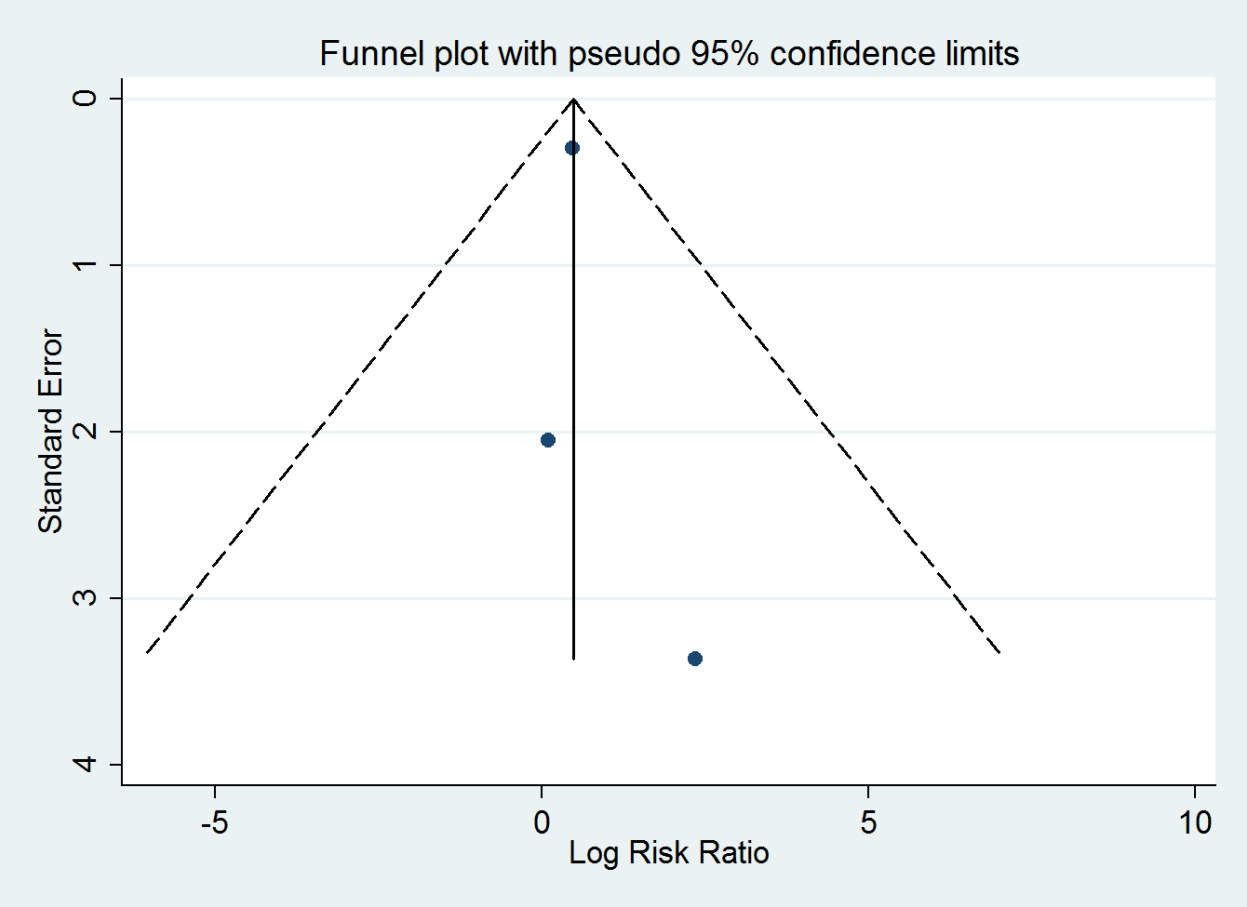

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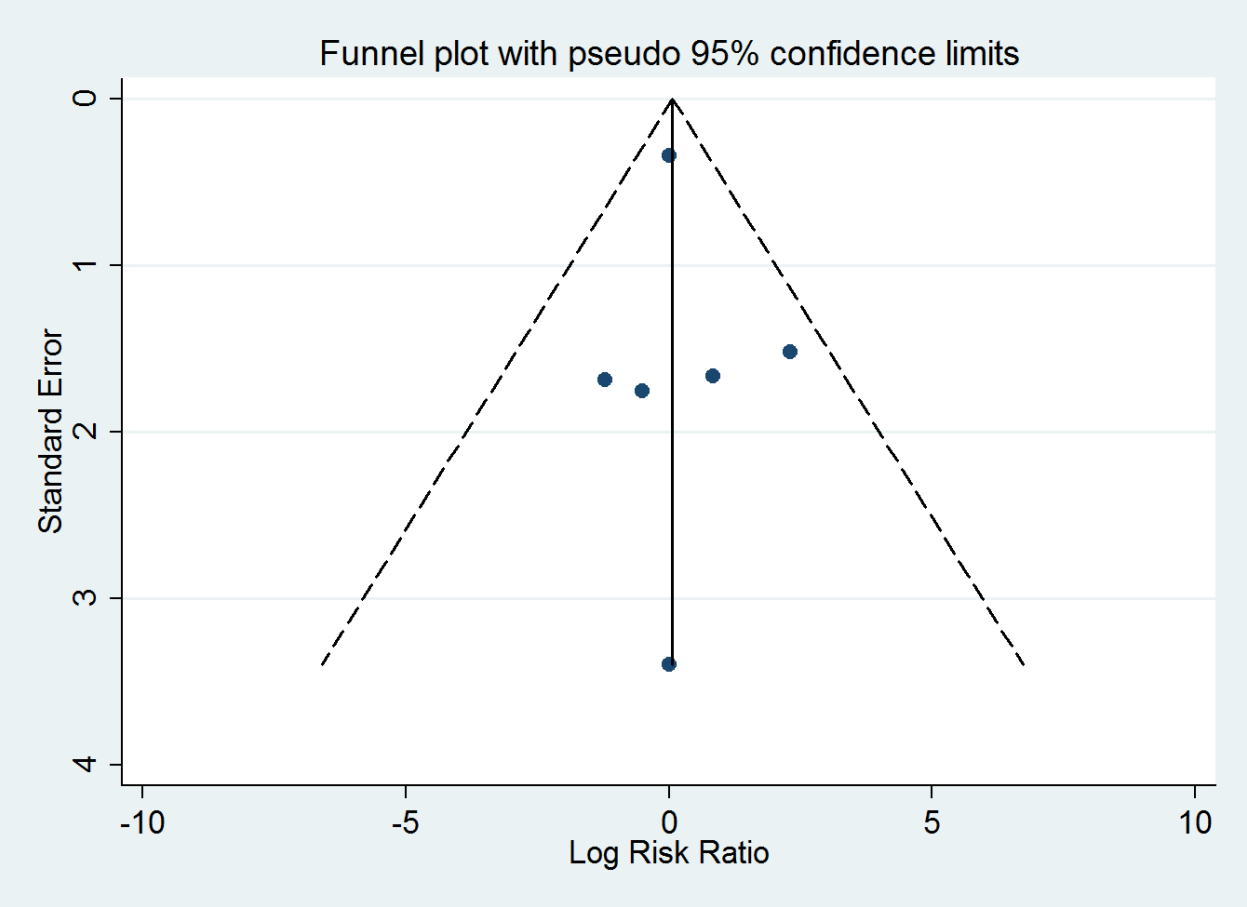

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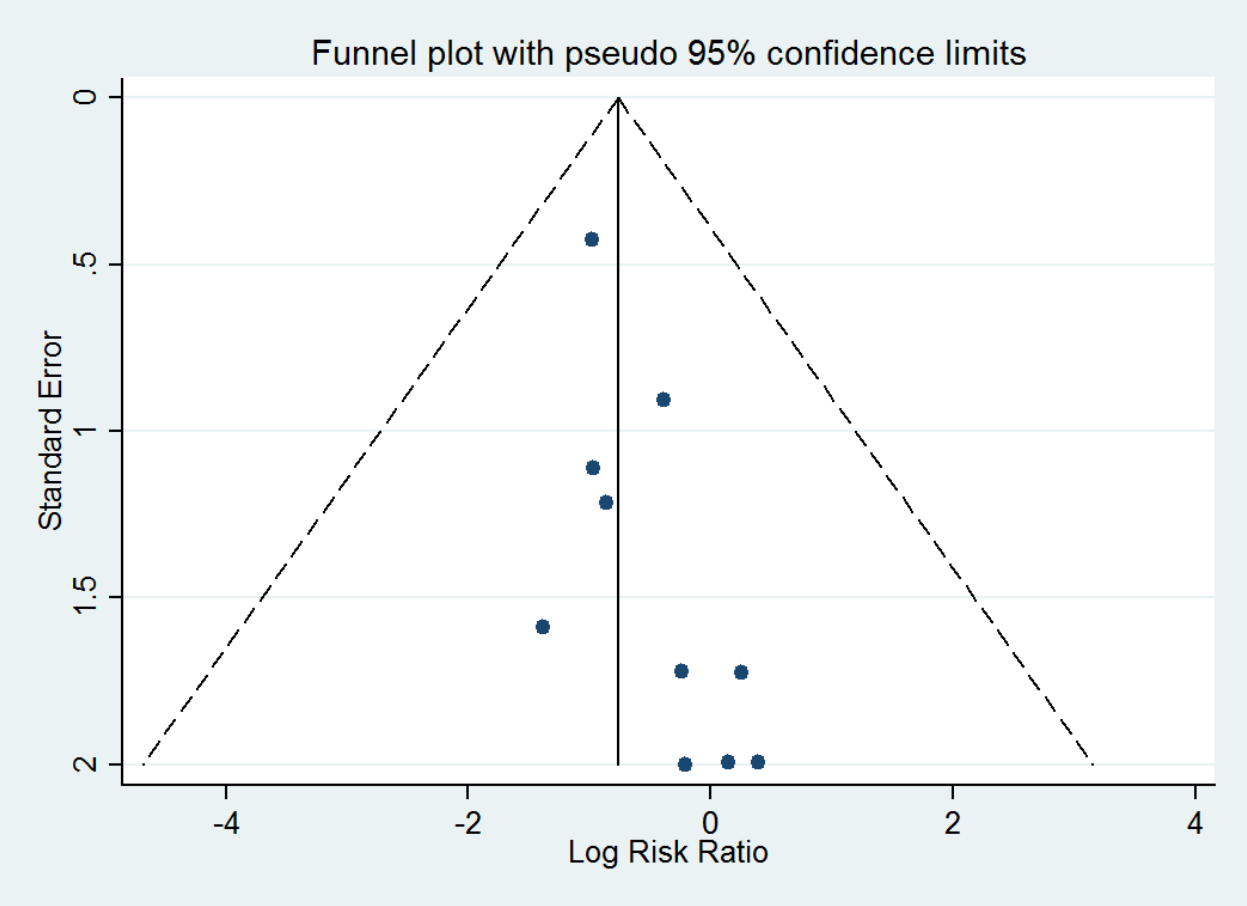

H)