Review. Scand J Work Environ Health – online first

Shift work and the risk of cardiovascular disease. A meta-analysis including dose–response relationship[1]

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1 *Supplementary material*

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Table S1. Risk of bias assessment tables, based on Ijaz et al.(2013) (1)

Study ID	
1) Exposure definition	
Support for the judgment	low risk- Definition included at least two of the aspects recommended by IARC ((1) shift system: rotating or fixed, forward or backward rotation (2) shift duration: number of years (3)shift Intensity high risk – defined only one aspect unclear – not reported
2) Exposure assessment	
Support for the judgment	High risk- subjectively measured: Reported by participants (interviews/questionnaires) OR subjectively measured: Proxy used to allocate exposure status (job matrix, job title) Low risk - objectively measured: direct measurement of exposure (logging data, shift schedule data from the HR or employers records. prospective self measurement of exposure e.g. with diaries) Unclear – no reported
3) Blinding of assessors	
Support for the judgment	High risk- not blinding reported Low risk - assessors were blind to exposure status in cohort studies and to case status in case-control studies Unclear risk – not reported
4) Reliability of exposure estimates	
Support for the judgment	*For cohort studies* – High risk - Intra-observer variability is reported by means of a subjective judgment of reliability Low risk - Good inter observer reliability achieved with reliability values reported/ not applicable for the measure used Unclear - risk Not reported *For case-controls* High risk - The authors used different methods to measure exposure (shift work) in cases and controls Low risk - The authors used same methods for cases and controls to measure exposure Unclear - The authors did not state that the same methods were used to measure exposure risk
5) Confounding	
Support for the judgment	High risk- Major confounding factors/effect modifiers (Age, BMI, Ethnicity, and Socioeconomic status) were not assessed or assessed partially. Low risk - Major confounding factors/effect modifiers (Age, BMI, Ethnicity, and Socioeconomic status) were assessed in full. Unclear - Not reported
1a) Attrition	

	For cohort studies High risk - Total loss to follow-up is larger than acceptable (20% or more) OR drop out differs between the groups by more than 10% OR the reasons for drop out are different for exposed and non exposed groups Low risk - less than 20% Unclear – not reported *For case-control* High risk - % of nonresponse differed among cases and controls OR; % of non response reported for cases only OR reasons for non response not reported/ different between cases and controls Low risk - no differences in groups non-response Unclear – not reported
2a) Analysis/research specific bias	
Support for the judgment	High risk - Authors did not obtain methods to reduce bias OR did not justify their choice of statistical models to reduce research specific bias Low risk - Authors reported use of one or more methods to reduce bias (standardization, matching, adjustment in multivariate model, stratification, propensity scoring) Unclear - Methods to reduce research specific bias not reported
3a) Selective reporting	
Support for the judgment	High - Incomplete/ selective reporting of the tested hypotheses (compared to aim and objectives) AND/OR Crude estimates presented only Low risk - Adjusted estimates presented for all hypothesis tested as per aims Unclear risk - Unclear reporting of tested hypothesis
4a) Funding	
Support for the judgment	High risk - Industry (one or more corporate sponsors), Combined industry + Grant Low risk - Grant/ not-for-profit sponsors Unclear - Not reported
5a) Conflict of interest	
Support for the judgment	High risk - conflict of interest exists (at least one author) Low risk - Reported not having conflict of interest or clear from report/communication that study not affected by author(s) affiliation Unclear - Disclosure not reported

Table S2 – Meta-regression results for items of the risk of bias assessment tool with high risk of bias score

Covariate/sub-group	n	ES pooled (95% CI)	I^2	Meta-regression OR (95% CI)	% heterogeneity explained (R2)
1) Shift exposure definition					
Low bias	20	1.20 (1.10-1.30)	75.4	Index	-1.36
High bias	15	1.11 (0.96-1.25)	30.7	0.93 (0.75-1.15)	
2) Exposure assessment					
Low	5	1.08 (1.02-1.14)	71.2	1.05 (0.80-1.39)	-14.3
High	30	1.16 (1.06-1.28)	82.7	Index	
3) Reliability assessments					
Low	34	1.16 (1.07-1.24)	70.4	Index	
Unclear	1	1.40 (1.09-1.80)	49.2	0.87 (0.66-1.15)	-3.7
5) *Analysis methods*					
Low	32	1.17 (1.09-1.26)	66.1	Index	-9.67
High	3	1.03 (0.62-1.66)	82.8	0.90 (0.64-1.27)	
2a) *Attrition*					
Low	14	*1.09 (1.00-1.20)*	56.2	Index	2.5
High	1	2.50 (1.19-5.26)	-	2.35 (0.98-5.68)	
Unclear	19	1.27 (1.13-1.42)	66.6	1.20 (1.00-1.45)	
High risk score items					
0	3	0.86 (0.52-1.42)		Index	
1	15	1.23 (1.13-1.34)		1.45 (1.04-2.00)	29.13
2	14	1.23 (1.03-1.47)		1.42 (1.00-2.00)	

3	2	0.85 (0.67-1.08)		0.97 (0.63-1.16)
Overall	**35**	**1.17 (1.09-1.25)**	**67.0**	

Funnel plots for publication bias analysis

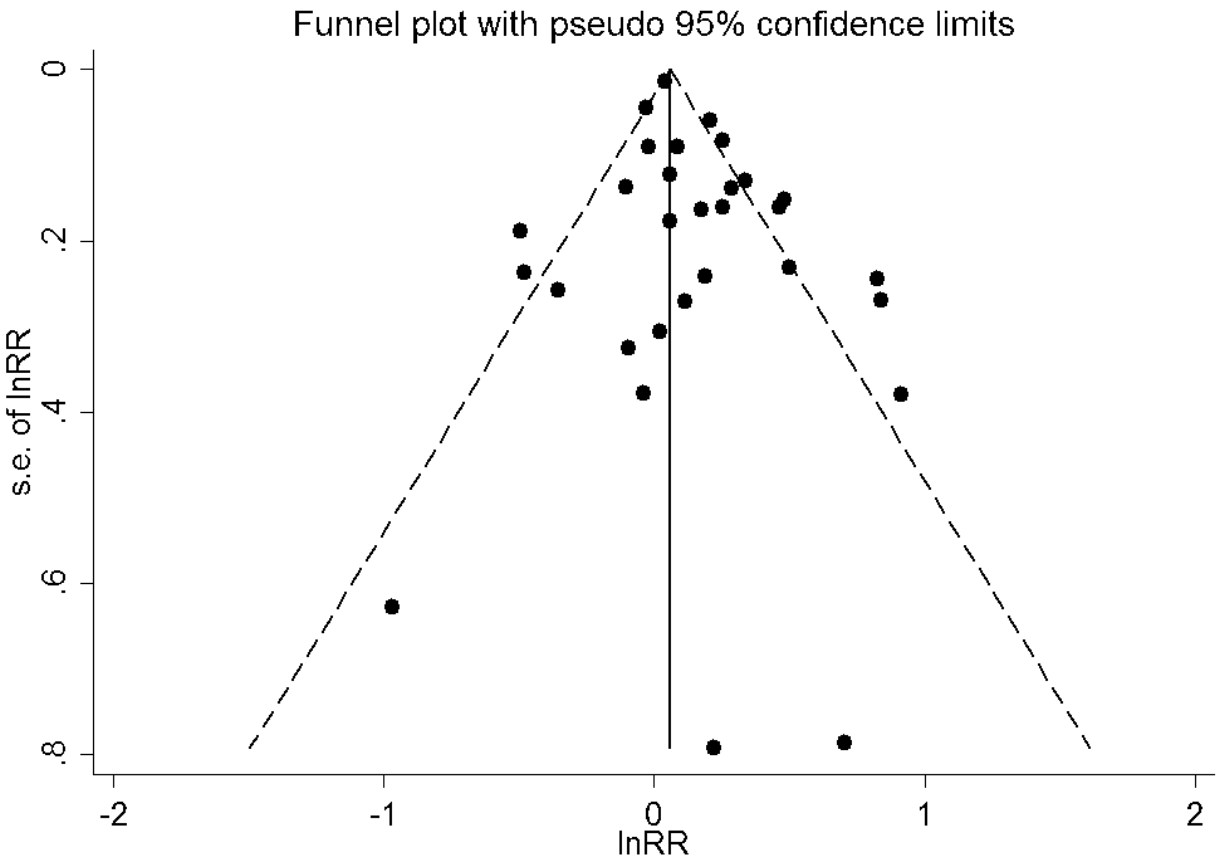

Figure S1. Funnel plot for the effect of shift work on any CVD event

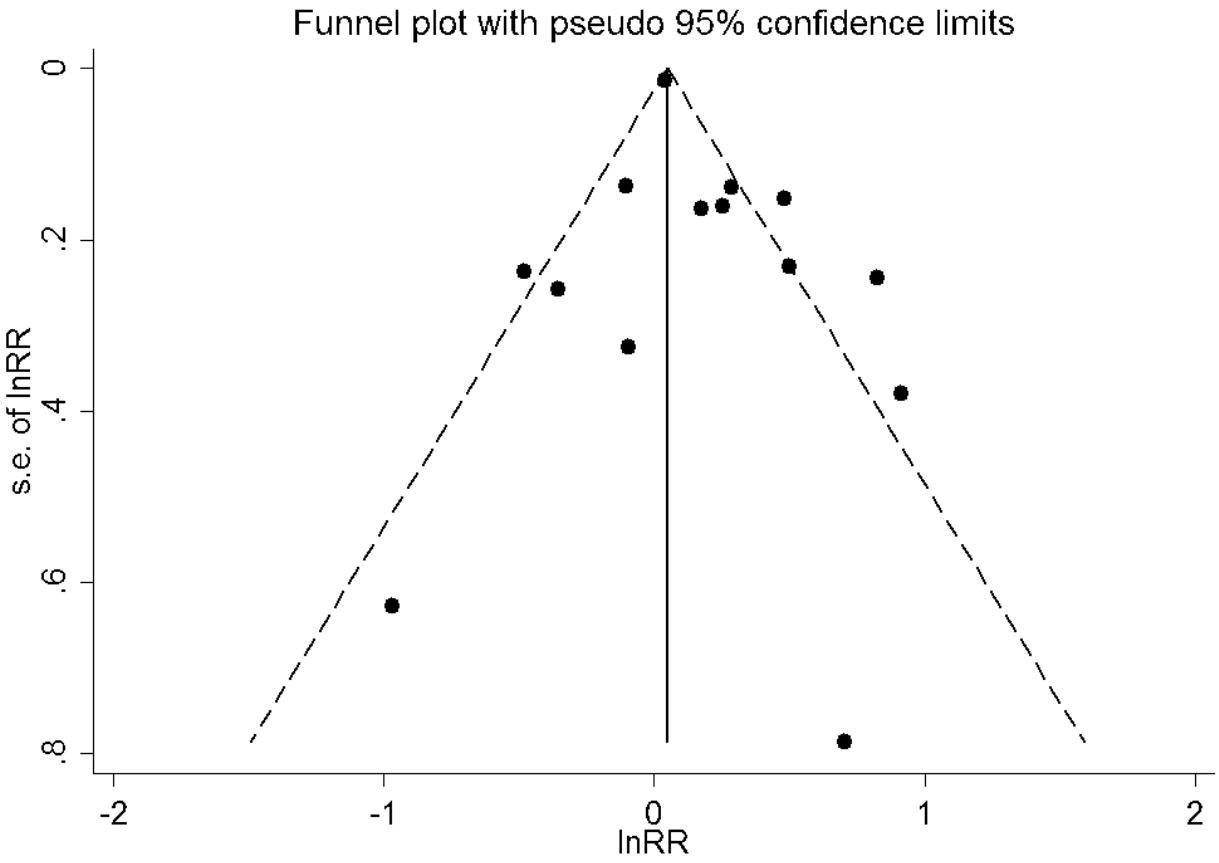

Figure S2. Funnel plot for the effect of shift work on “CHD outcomes”

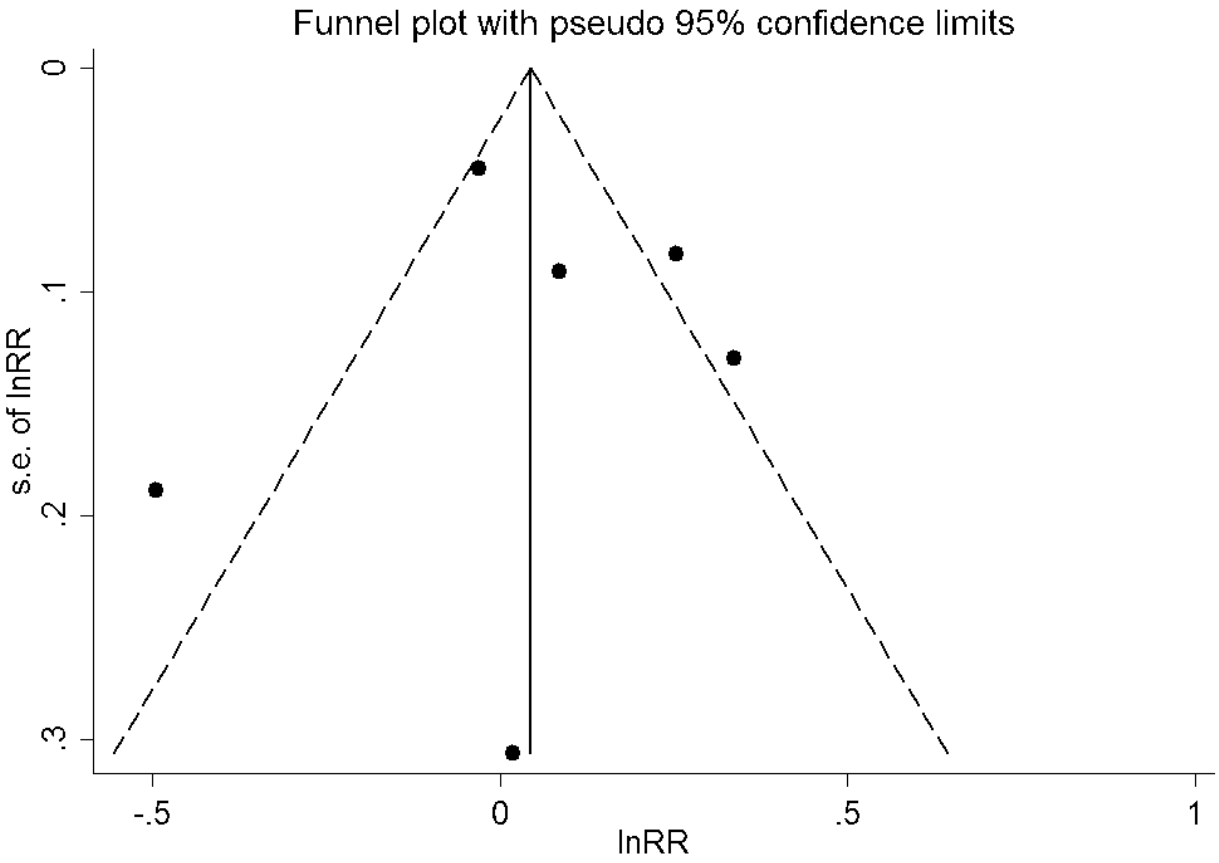

Figure S3. Funnel plot for the effect of shift work on “Other CVD outcomes”

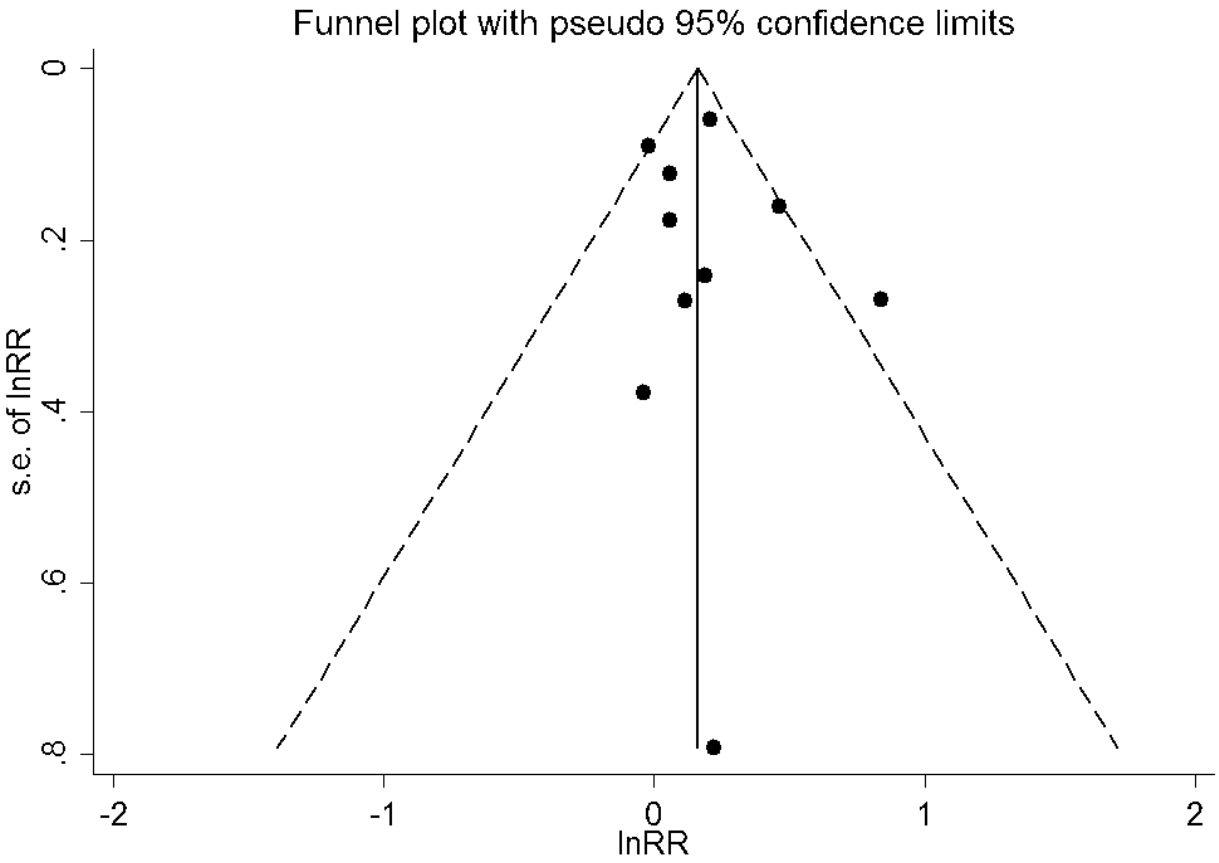

Figure S4. Funnel plot for the effect of shift work on “CVD mortality” outcomes

Supplementary meta-analysis by type of mortality and CHD events

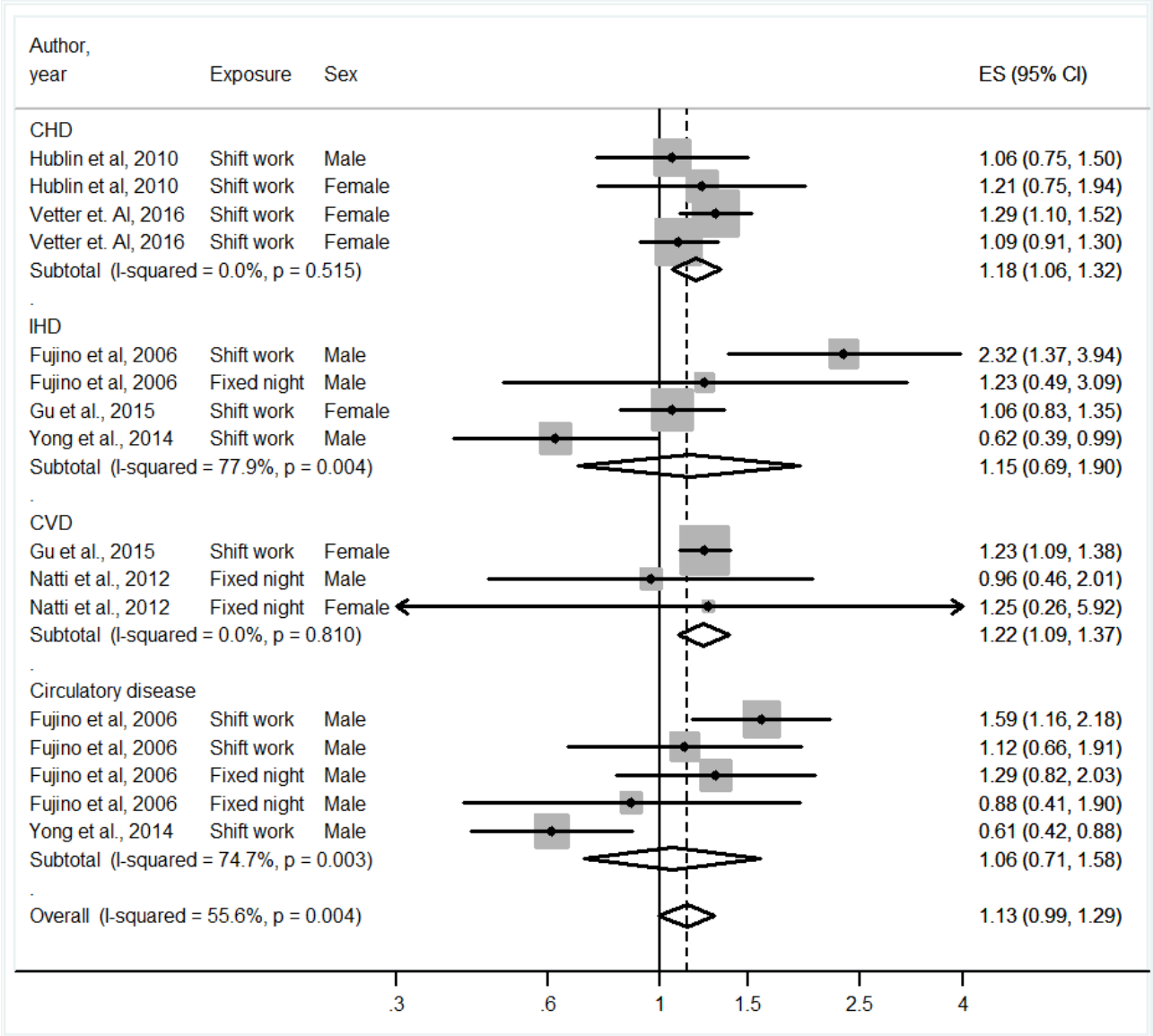

Figure S5 – Shift work and risk of CVD mortality, by type.

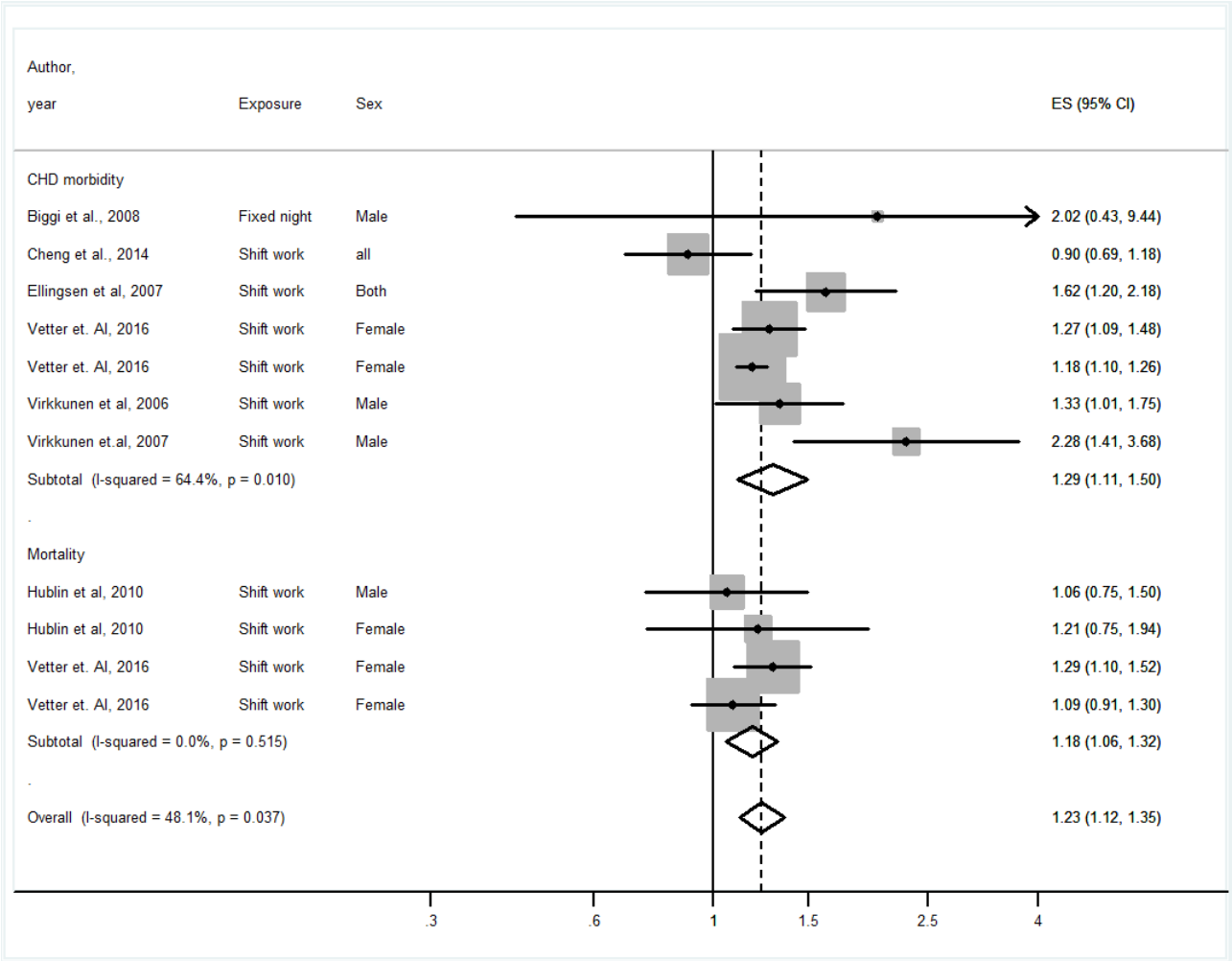

Figure S6 – Shift work and risk of any CHD event, by morbidity and mortality

REFERENCES

1. Ijaz S, Verbeek J, Seidler A, Lindbohm M-L, Ojajärvi A, Orsini N, et al. Night-shift work and breast cancer – a systematic review and meta-analysis. Scand J Work, Environ Health. 2013(5):431-47.