

Fruits, vegetables and lung cancer risk: a systematic review and meta-analysis

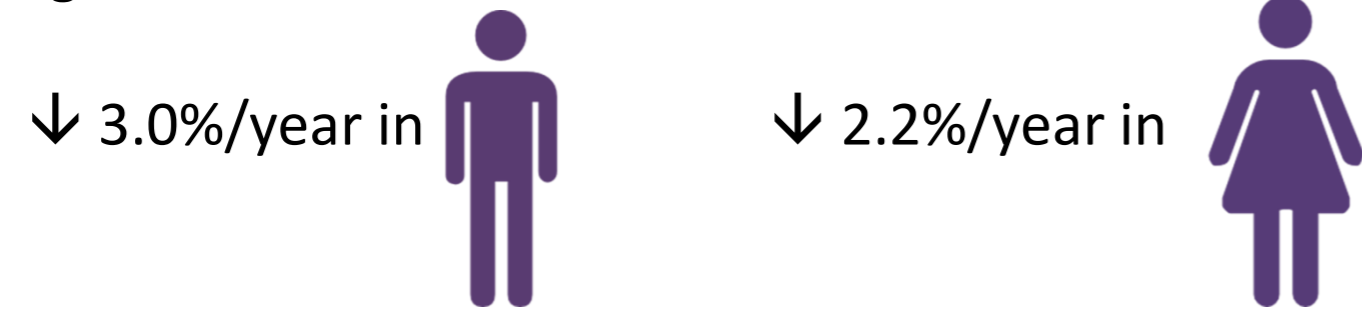
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FACTS

- ❖ Lung cancer - most common cause of cancer death
- ❖ 158 040 lung cancer deaths are expected to occur in 2015 (1)
- ❖ 2007-2011 → lung cancer incidence rates decreased:



- ❖ 5-year survival of lung cancer is only 17% (1)
- ❖ Cigarette smoking → 80% of the worldwide lung cancer burden in men and 50% of the burden in women (2, 3)

AIM AND GOALS

As part of the WCRF-AICR Continuous Update Project, we conducted a systematic review and meta-analysis of prospective studies to assess the dose-response relationship between fruits and vegetables and lung cancer risk.

METHODS

PubMed searched up to December 2014 for relevant prospective studies.

Statistical Analysis performed:

- ❖ Highest compared with lowest meta-analyses and dose-response meta-analyses using random effects models to estimate summary relative risks (RRs) and 95% confidence intervals (CIs)
- ❖ Restricted cubic splines to examine possible nonlinear associations
- ❖ We combined results from the Pooling Project with the studies we identified to increase the statistical power of our analysis

Details in the WCRF/AICR Continuous Update Project protocol:

http://www.dietandcancerreport.org/cancer_resource_center/downloads/cu/CUP_lung_cancer_protocol.pdf

RESULTS

Table 1 Summary RR (95% CI) for the highest vs lowest intakes and linear dose-response meta-analyses

	Fruits and vegetables	Vegetables	Fruits	Citrus fruits
Highest versus lowest intakes RR(95%CI) n (studies)	0.86 (0.78-0.94) n=18	0.92 (0.87-0.97) n=25	0.82 (0.76-0.89) n=29	0.85 (0.78-0.93) n=15
Current smokers n=11	0.90 (0.81-1.00)	0.93 (0.85-1.01)	0.83 (0.75-0.93)	0.80 (0.71-0.90)
Former smokers n=10	0.95 (0.83-1.10)	1.01 (0.85-1.21)	0.90 (0.81-0.99)	0.93 (0.83-1.04)
Never smokers n=11	0.94 (0.70-1.27)	0.92 (0.73-1.16)	0.88 (0.68-1.15)	1.04 (0.80-1.33)
Per 100g/day RR(95%CI) I ² (heterogeneity) n (studies) N (cases)	0.96 (0.94-0.98) I ² =64% n=14, N=9609	0.94 (0.89-0.98) I ² =48% n=20, N=12 563	0.92 (0.89-0.95) I ² =57% n=23, N=14506	0.91 (0.85-0.98) I ² =53% n=11, N=6382
P-value for non-linearity, n	< 0.01, 11	< 0.01, 15	< 0.01, 14	< 0.01, 8

- ❖ Significant inverse associations were observed only for fruits and citrus fruits in current and former smokers, and marginally significant for fruit and vegetables only in smokers.
- ❖ There was evidence of a non-linear relationship ($p < 0.01$) between fruits and vegetables intake and lung cancer risk showing that no further benefit is obtained when increasing consumption above approximately 400 g per day (Figure 1).

Figure 1 - Non-linear associations

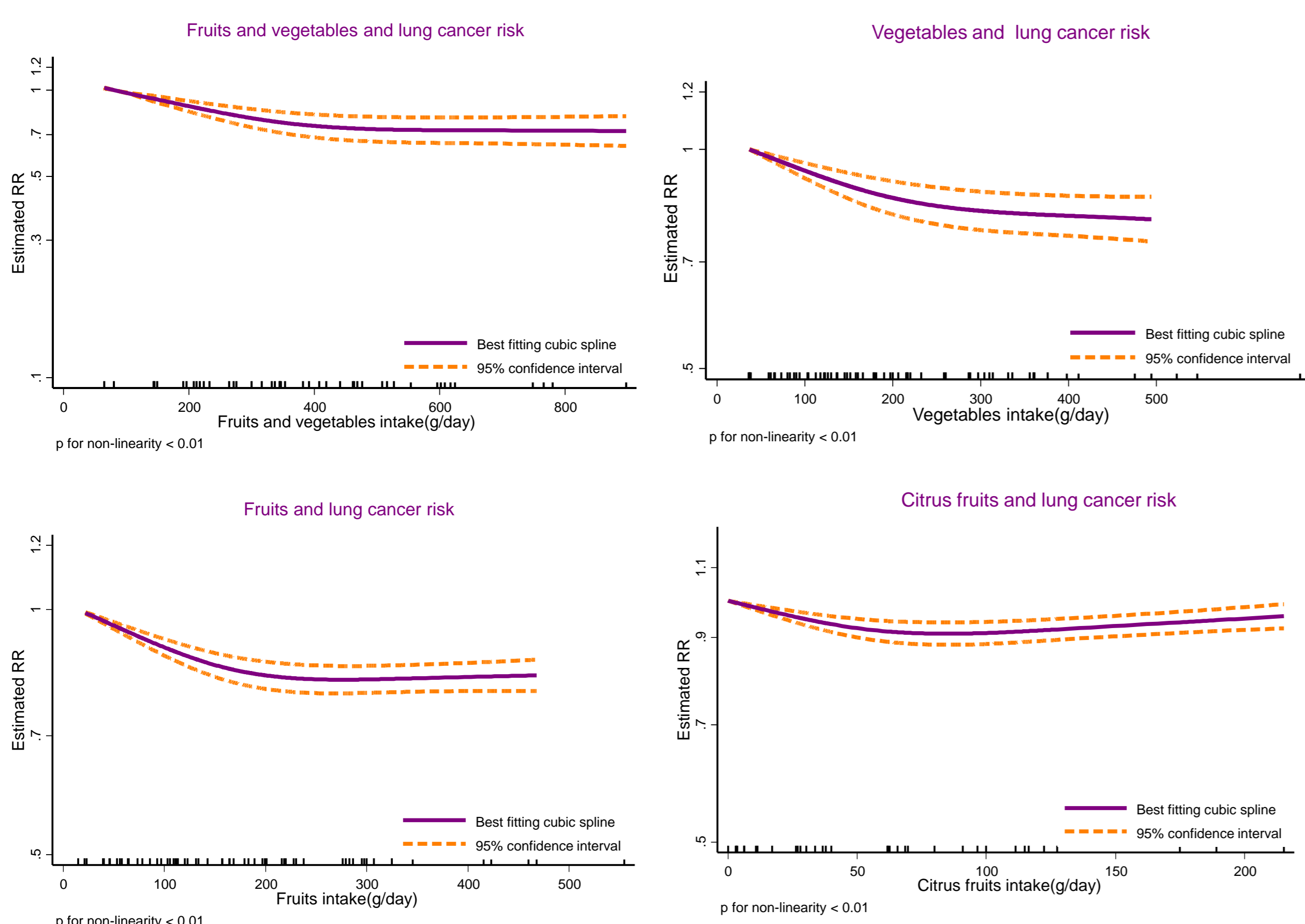


Figure 2 - Fruits and vegetables and lung cancer risk (Highest vs lowest intake)

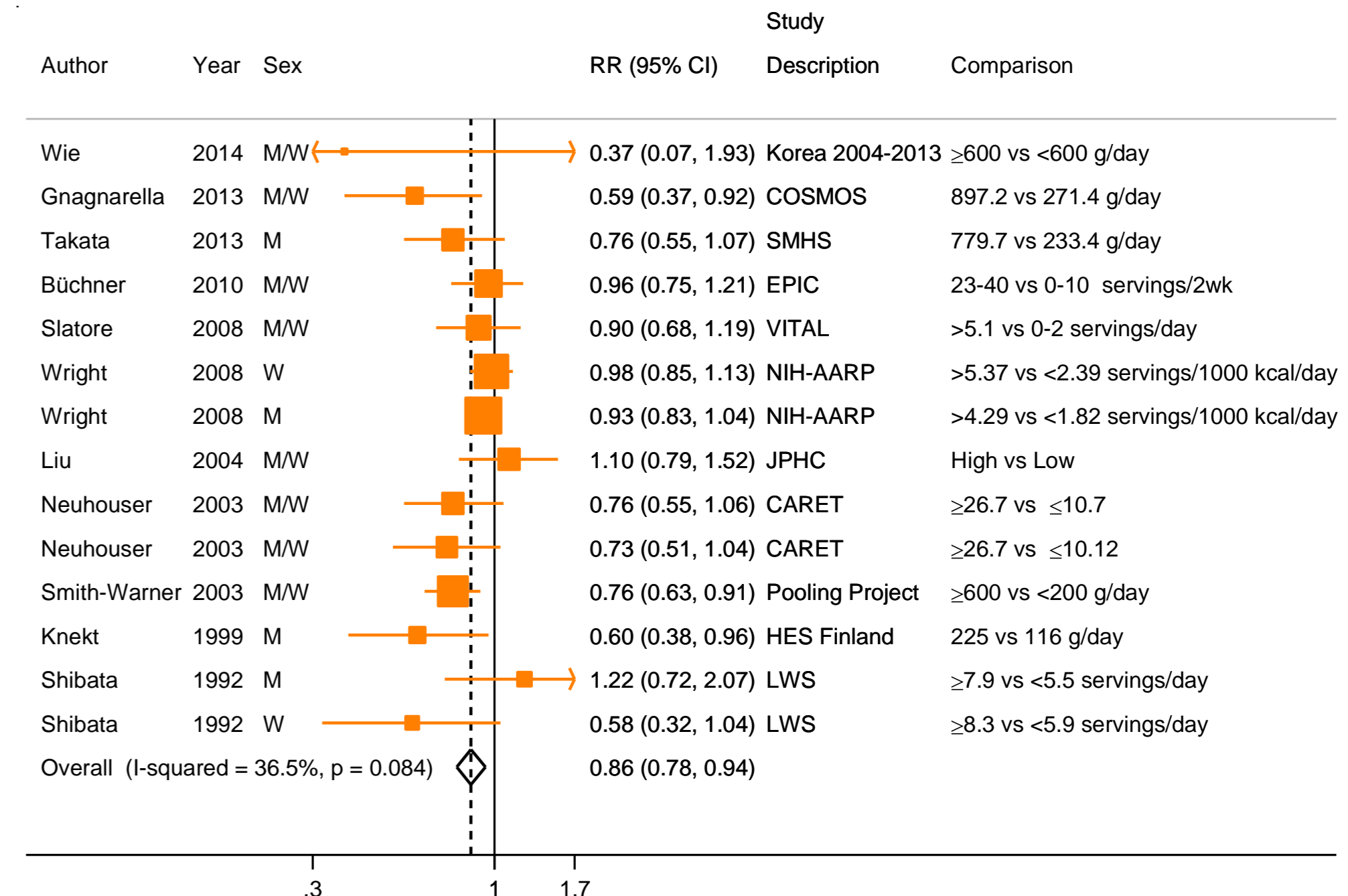


Figure 3 - Fruits and lung cancer risk (Highest vs lowest intake)

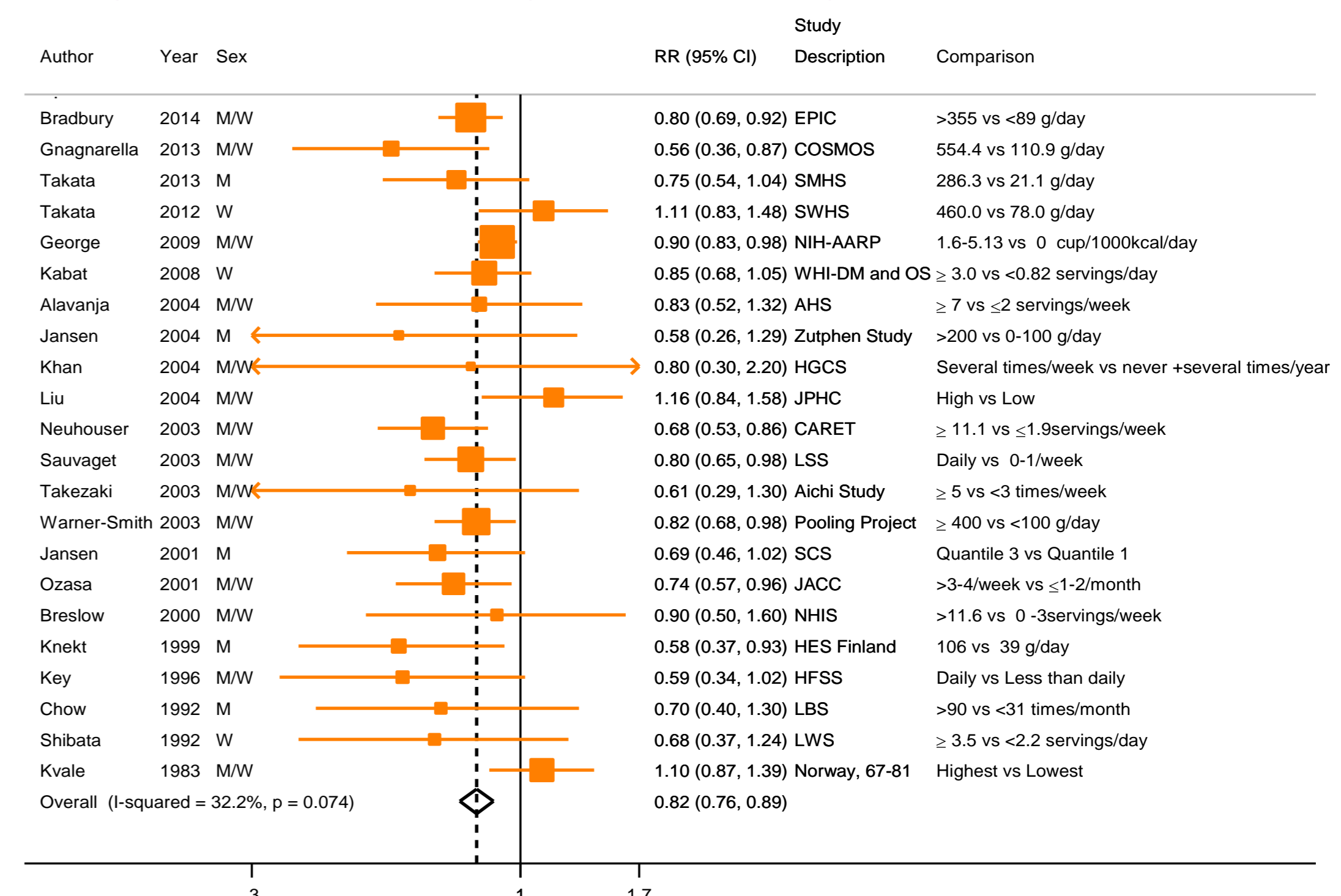
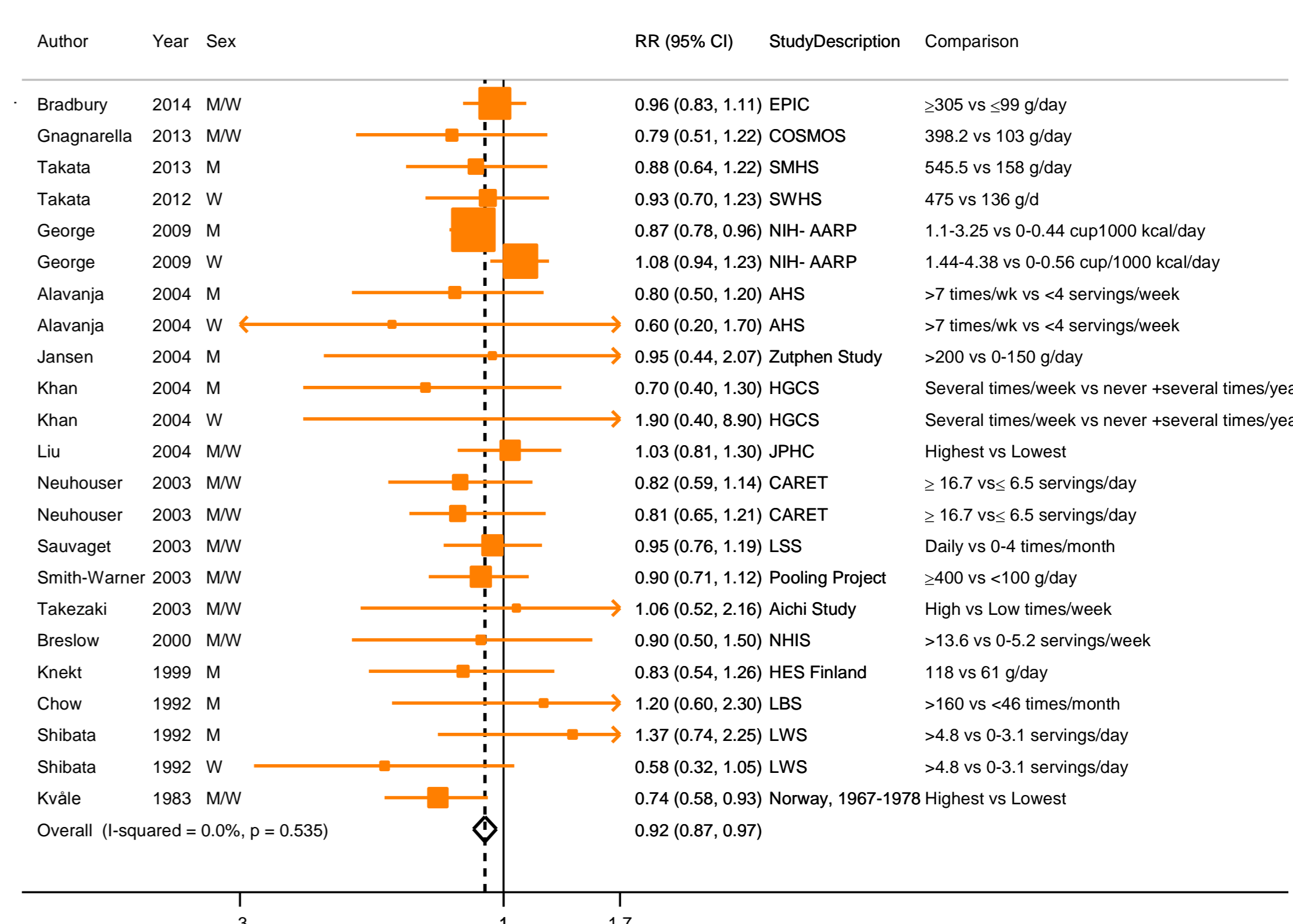


Figure 4 - Vegetables and lung cancer risk (Highest vs lowest intake)



Note: The squares represent the RR for each study, with horizontal lines indicating the 95% confidence interval around this estimate. The area of each square is proportional to its weighting in the meta-analysis. The diamond represents the pooled estimate, with 95% confidence interval.

CONCLUSIONS

- ❖ Eliminating tobacco smoking is the best strategy to prevent lung cancer.
- ❖ Current evidence from prospective studies is consistent with a role of fruit and vegetables in lung cancer aetiology → 8-18% decreased risk of lung cancer with higher intakes of fruits and vegetables.
- ❖ Residual confounding by smoking cannot be ruled out as inverse associations were observed only in smokers and former smokers. An alternative explanation for this finding is that people who smoke or smoked benefit more of the antioxidant effect of fruits and vegetables than never smokers.

REFERENCES

(1) American Cancer Society. Cancer facts and figures 2015. Atlanta: American Cancer Society. 2015 (2) World Cancer Research Fund / American Institute for Cancer Research. Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective. Washington DC: AICR. 2007 Available at <http://www.wcrf.org/int/research-we-fund/continuous-update-project-cup/second-expert-report>. (3) Heuvels ME, Hegmans JP, Stricker BH, et al. Improving lung cancer survival; time to move on. BMC Pulm Med 2012; 12:77