Effects of education and income on cardiovascular outcomes: A systematic review and meta-analysis

Win Khaing[1,2], Sakda Arj-Ong Vallibhakara[1], John Attia[3], Mark McEvoy[3] and Ammarin Thakkinstian[1]

[1] Section for Clinical Epidemiology and Biostatistics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand
[2] Department of Preventive and Social Medicine, University of Medicine, Mandalay, Myanmar
[3] School of Medicine and Public Health, Faculty of Health and Medicine, The University of Newcastle, Australia

Corresponding Author:

Ammarin Thakkinstian
Section for Clinical Epidemiology and Biostatistics, 3rd Floor, Research Center Building, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand.
270 RAMA VI Road. Rachathevi, Bangkok 10400, Thailand.
Email: ammarin.tha@mahidol.ac.th

Abstract

Objective: Previous evidences reported discrepancy effects of education and income on cardiovascular diseases (CVD). This systematic review and meta-analysis was therefore conducted which aimed to summarize effects of education and income on CVDs.

Methods: Studies were identified from Medline and Scopus until July 2016. Cohorts were eligible if they assessed associations between education/income and CVDs, had at least one outcome including coronary artery diseases (CAD), cardiovascular events (CVE), strokes and cardiovascular deaths (CD). A multivariate meta-analysis was applied to pool risk effects of these social determinants.

Results: Among 72 included cohorts, 39, 19, and 14 were studied in Europe, US, and Asia. Pooled risk ratios (RRs) of low and medium versus high education were 1.36 (95% CI: 1.11, 1.66) and 1.21 (1.06, 1.40) for CAD, 1.50 (1.17, 1.92) and 1.27 (1.09, 1.48) for CVE, 1.23 (1.06, 1.43) and 1.17 (1.01, 1.35) for strokes, and 1.39 (1.26, 1.54) and 1.21 (1.12, 1.30) for CD. Effects of educations on all CVDs were still present in US and Europe settings, except in Asia was present only CD. Effects of low and medium income versus high on these corresponding CVDs were 1.49 (1.16, 1.91) and 1.27 (1.10, 1.47) for CAD, 1.17 (0.96, 1.44) and 1.05 (0.98, 1.13) for CVE, 1.30 (0.99, 1.72) and 1.24 (1.00, 1.53) for strokes, and 1.76 (1.45, 2.14) and 1.34 (1.17, 1.54) for CD.

Conclusion: Social determinants are risk factors of CVDs in developed countries, although high heterogeneity in pooling. Data in Asia countries are still needed to update pooling.

Keywords: Cardiovascular Diseases, Cardiovascular Death, Education, Income, Meta-analysis, Social Determinants of Health

Abstract word count = 250

Abbreviations

BMI	Body mass index
CAD	Coronary artery diseases
CHD	Coronary heart disease
CI	Confidence interval
CVD	Cardiovascular diseases
CVE	Cardiovascular events
CVRFs	Cardiovascular risk factors
HF	Heart failure
IHD	Ischemic heart disease
LMICs	Low- and middle- income developing countries
MI	Myocardial infarction
NCD	Non-communicable diseases
RR	Relative risks
SDH	Social determinants of health
SES	Socioeconomic status

Word Count: Abstract = 250 words**, Text body** = 2973 words, **full** = 6222 words

Number of references = 59

Number of tables = 2

Number of figures = 3

Number of supplement tables = 6

Number of supplement figures = 8

Introduction

Non-communicable diseases (NCD) are responsible for more than two thirds of global mortality with a total of 52 million deaths projected by 2030.[1] Majority are cardiovascular diseases (CVD) followed by cancers, respiratory diseases, and diabetes. CVD are a major public health problem accounting for about 30% of the annual global mortality (17.5 million annually) and 10% of the global disease burden.[1]

Framingham Heart Study,[2] WHO-MONICA Project,[3] and INTERHEART[4] studies provided evidences for the major risk factors of CVD. Interventions that modify these risk factors are known to reduce cardiovascular morbidity and mortality. Despite much effort invested in primary and secondary prevention, CVD remains a major problem in industrialized and high income countries, and in low- and middle- income developing countries (LMICs).[1]

Many studies have identified additional risk factors for CVD. Recently, the fifth epidemiological transition proposed that social upheaval,[5] a break down in existing social and health structures, leads to increased CVD morbidity and mortality. Since then, many social determinants of health (SDH) have been increasingly considered. Many studies have shown that SDH indirectly influences CVD by impacting behavioral and metabolic cardiovascular risk factors (CVRFs), psychosocial factors and environmental living conditions.[6, 7] Some landmark[8-10] and numerous other epidemiological studies[11-14] show an inverse relationship between SDH and CVD morbidity and mortality.

Some evidence shows association between education and CVRFs, i.e., low education was more likely to develop CVRFs (e.g., hypertension, diabetes, dyslipidemias, overweight, etc.), and have less healthy dietary habits.[15-17] Evidences also showed that lower education is associated with atherosclerosis, ischemic heart disease (IHD), cerebrovascular diseases, CVD mortality and all-

cause mortality.[15, 18] Similar to education, an inverse relationship of income on IHD, coronary events, pre-hospital coronary death and CVD mortality has also been reported.[19-21] These effects of education and income are more consistent in developed countries, but results are still inconclusive in LMICs.[22]

Several narrative and systematic reviews[23-28] assessed the relationship between socioeconomic status (SES) and CVDs, including myocardial infarction (MI), strokes, heart failure (HF), and death. Two meta-analyses have reported the effects of education and income on MI[23] and CVD mortality.[27] In both studies, education and income were roughly categorized as low and high and SES classes were not uniformly classified and pooled, resulting in inability to assess SES gradients. Only few studies included participants from LMICs. We therefore conducted a systematic review and meta-analysis to pool the effects of low to high educations and incomes on various cardiovascular outcomes by including more studies conducted in developing countries.

Methods

The review protocol has been registered with the international prospective register of systematic review (PROSPERO number CRD42016046615).[29]

Search strategy

Relevant studies were identified from Medline and Scopus databases since inception to 31st July 2016. Titles and abstracts were screened, and full articles were retrieved if the decision to include based on title and abstract could not be made. Reference lists were checked for studies overlooked by our searching. The search terms used and search strategies for both databases are described in Appendix A.

Selection of studies

Retrospective/prospective cohorts published in English were selected if they met following criteria: (1) assessed associations between education/income and cardiovascular outcomes in general adults or specific diseases; (2) measured education or income; (3) had at least one outcome of interest (i.e., coronary artery diseases (CAD), cardiovascular events (CVE), strokes and cardiovascular deaths); (4) had contingency data between education/income and cardiovascular outcomes, or a beta-coefficient. Studies were excluded if data for education and income were combined; or income was based on ownership of car/house/health insurance/zip-code. For missing data, we made three attempts to contact authors to request additional data.

Study factors

Education and income were our study factors, which were reported differently across studies. To standardize data for pooling across studies, they were re-categorized into 3 groups as low, medium, and high for education years ≤9 (i.e., illiteracy/no education/basic/primary education), 10–12 (i.e., secondary/high school/intermediate/technical/apprenticed/trade/vocation), and >12 years (i.e., university/college/associates/master/professional/PhD), respectively. Income expressed in other currencies was converted to US currency/year using the reported exchange rates or the online exchange converter at the time of retrieval/identify.[30] Salary income was re-categorized as low, medium, and high for income ≤20,000, 20,001 to 40,000, and >40,000 US$/year, respectively. If original studies reported income as quartiles, the 1^{st}, 2^{nd}, and 3^{rd} + 4^{th} quartiles were re-classified as low, medium, high incomes, respectively. If it was reported as quintiles, the 1^{st} + 2^{nd}, 3^{rd}, and 4^{th} + 5^{th} quintiles were classified as low, medium, and high, respectively.

Outcomes

Outcomes of interest were CVDs including CAD (e.g., acute MI, IHD, coronary heart disease (CHD)), CVE (e.g., HF, hospital admission due to cardiac causes, revascularization and composite CVDs (e.g., IHD or strokes)), strokes (ischemic or hemorrhagic strokes), and cardiovascular deaths. These were defined according to original studies.

Data extraction

Two reviewers (WK and SAV) independently extracted general characteristics of studies/patients (e.g., country, age, gender, body mass index (BMI), smoking, alcohol consumption, diabetes, hypertension, etc.). Cross-tabulated data between education/income groups and individual outcomes were extracted for pooling. Summary statistics (e.g., risk ratio (RR), or hazard ratio (HR)) along with 95% confidence interval (CI) were extracted instead if frequency data were not reported. Data were computerized and validated, any disagreements were resolved by consensus.

Risk of bias assessment

Quality of studies were independently assessed by two reviewers (WK and SAV) using the Newcastle and Ottawa risk of bias criteria (Appendix B). Three domains were evaluated, i.e., selection of study groups, comparability of groups and ascertainment of exposure and outcome. Each domain was graded by giving stars if it was low risk of bias. Total grade of seven or more stars was regarded as higher quality or lower risk of bias.

Statistical analysis

RRs of each outcome between low versus high (RR_1) and medium versus high (RR_2) education/income groups were calculated from frequency data where frequency data were available. These were then combined with reported summary statistics if frequency data were not available. Multivariate random-effect meta-analysis[31] was applied for pooling two RRs simultaneously. Variance-covariance between RR_1 and RR_2 was assumed to be zero for those studies reporting summary RRs. Heterogeneity was assessed using Cochrane's Q test and I^2 statistic. Heterogeneity was present if p-value of the Q test was <0.1 or $I^2 \geq 25\%$.

Subgroup analyses were performed to explore potential sources of heterogeneity by fitting each of co-variables (i.e., country, country income level,[32] number of co-variables adjustment, age group, BMI, sex, diabetes, obesity, hypertension, high physical activity, smoking, alcohol drinking, dyslipidemia and chronic kidney disease) in a meta-regression model.

Finally, exploration of publication bias was visualized using a funnel plot and Egger's test.[33] If any of these indicated asymmetry, contour-enhanced funnel plot[34] was constructed to distinguish whether asymmetry was due to publication bias or heterogeneity.

All analyses were performed using STATA[35] version 14.1. P-values <0.05 were considered statistically significant, except for the test of heterogeneity where p <0.10 was used.

Results

We identified 354 studies from Medline and 1,335 studies from Scopus databases with 11 additional studies identified from reference lists. Of these 1,700 studies, 115 were duplicates, leaving 1,585 to be screened. After screening titles and abstracts, 1,399 studies did not answer our primary question, leaving 72 studies for inclusion. Reasons for exclusion of the studies are

116 presented in Figure 1 following the Preferred Reporting Items for Systematic Review and Meta-
117 analysis (PRISMA) guideline.[36]
118
119 *General Characteristics of included studies*
120 Characteristics of the 72 included cohorts published between 1982 and 2016 are described, see
121 Supplement Table 1. Among them, 14, 39 and 19 studies were conducted in Asia, Europe, and the
122 United States, respectively. Most studies were from high-income countries (93.1%); mean age and
123 mean BMI ranged from 38.5 to 78 years and 23.02 to 30.33 kg/m^2, respectively. Percentages of
124 males, diabetes, smoking or hypertension varied from 35.9% to 78%, 1.3% to 42%, 7.28% to
125 72.64%, and 6.25% to 72.5% respectively. Among 72, 33, 10, and 29 studies assessed association
126 effects of education, income, and both on cardiovascular outcomes, with a sample size ranged from
127 128 to 4,157,202.
128
129 *Risk of bias assessment*
130 Results of "risk of bias" assessment of the included studies are shown in Supplement Table 2.
131 Total stars ranged from 5 to 9 with a median of 7. Among the included studies, 45 out of 72 (62%)
132 had low risk of bias and 27 out of 72 (38%) had high risk of bias.
133
134 *Education and cardiovascular outcomes*
135 A total of 62 studies assessed the association between education and cardiovascular deaths (N=35
136 and 31 for low and medium vs high), CAD (N=21 and 18 for low and medium vs high), CVE
137 (N=13 and 15 for low and medium vs high) and strokes (N=15 and 13 for low and medium vs
138 high). Among these, only few studies assessed relative effects of education without adjusting co-

variables, or frequency data were available (3 in cardiovascular deaths[37-39] and CAD[37, 40, 41], 2 in CVE[38, 39], and 2 in strokes[37, 40]). For consistency, only studies with adjusted relative education effects were pooled. Effects of education on outcomes were heterogeneous across studies with the I^2 ranging from 83% to 99% (Table 1). Multivariate meta-analysis was applied indicating significant educational effects on all outcomes (Table 1 and Figure 2). Strongest education effect was on CVE, where low and medium education increased risk of CVE by 50% and 27 % compared to high education. A similar trend was observed for cardiovascular deaths, in which the risks for low and medium vs high education were 39% and 21%, respectively. Additionally, patients with low education showed 36% higher risk, and patients with medium education showed 21% higher risks for CAD. Furthermore, low and medium education levels were associated with 23% and 17% higher risks, respectively for developing strokes when compared to high education level.

Sources of heterogeneity were next explored by meta-regression or subgroup analyses (Table 2 & Supplement Tables 3–6). Geographical regions were grouped as Asia, Europe, and US but few studies in the Asian setting were available for most outcomes. Effects of both low/medium education still remained for all 4 cardiovascular outcomes after pooling within Europe and US, but not for Asia, which was likely due to the small numbers of studies (Table 2).

We performed subgroup analyses by co-variables including number of adjusted variables, age (≤60 vs >60 years), BMI (<25 kg/m^2 vs ≥25 kg/m^2), percentage of males, diabetes, and smoking (Supplement Tables 3–6); and none of these was identified as a source of heterogeneity. However, education levels were associated with all four CVD outcomes in the subgroup younger than 60 years (Supplement Tables 3–6). Risk of cardiovascular deaths and CAD outcomes was higher in studies comprising a higher percentage of male participants. Likewise, risk of CVD

(except CAD) was higher in studies with a higher proportion of diabetic participants. Association between BMI and CVE was detected in the BMI subgroup ≥25 kg/m^2 (Supplement Tables 3–6).

There was no evidence of publication bias using Egger's test except for low versus high education level on CVD outcomes (Egger's test: β=2.33, p=0.008), for which funnel plots showed asymmetry (Supplement Figures 1 & 2). Contour-enhanced funnel plot showed that some studies fell in both non-significant and significant areas, so asymmetry was more likely due to heterogeneity (Supplement Figures 3 & 4). No individual study significantly changed the overall estimates based on results of the sensitivity analysis.

Income and cardiovascular outcomes

Thirty-nine studies assessed income effects on cardiovascular deaths (N=22 and 13 for low and medium vs high), CAD (N=13 and 14 for low and medium vs high), CVE (both N=8 for low and medium vs high) and strokes (both N=7 for low and medium vs high). Five studies (1, 3, 2, and 1 for cardiovascular deaths[40], CAD[40-42], CVE[43, 44], and strokes[40]) reported unadjusted relative effects of income were excluded. Effects of income on these outcomes were highly heterogeneous across studies, i.e., I^2 95% to 99% (Table 1 and Figure 3). The largest income effect was observed for cardiovascular deaths, with 76% and 34% higher risk of cardiovascular deaths for low and medium versus high income, respectively. Comparable effects were seen on CAD, with 49% and 27% higher risks, respectively. Furthermore, low income patients showed 17% higher risk, and medium income patients showed 5% higher risk for CVE. Additionally, low and medium incomes were associated with about 30% and 24% higher risks of developing strokes compared to high income.

Sources of heterogeneity were explored by meta-regression or subgroup analyses (Table 2 & Supplement Tables 3–6). By geographical region, European studies showed income effects similar to the overall pooled effect (Table 2). Subgroup analyses were performed by age groups

indicating low income was associated with higher risk for cardiovascular deaths, CAD and CVE, in the studies with participants aged ≤60 years (Supplement Tables 3–6).

No publication bias was identified by Egger's test except for medium versus high income level groups with CAD outcome (Egger's test: β=2.98, p=0.009), but funnel plots showed asymmetry (Supplement Figures 5 & 6). Contour-enhanced funnel plots suggested that asymmetry was more likely due to heterogeneity (Supplement Figures 7 & 8). Overall estimates were similar to the sensitivity analyses.

Discussion

We performed a systematic review and meta-analysis to pool effects of education and income on CVD outcomes. Our findings indicate that groups with low to medium education and income are higher risk of CAD, CVE, strokes and cardiovascular deaths than high education and income. The pooled RRs for low and medium versus high education were 1.36 and 1.21 respectively for CAD, 1.50 and 1.27 respectively for CVE, 1.23 and 1.17 respectively for strokes, and 1.39 and 1.21 respectively for cardiovascular deaths. The pooled RRs for low and medium versus high income for these corresponding outcomes were 1.49 & 1.27, 1.17 & 1.05, 1.30 & 1.24, and 1.76 & 1.34, respectively.

Direct or indirect mechanisms linking education and income with CVD have been described showing behavioral risk factors,[45] lifestyle or living environment conditions,[46] health literacy[47] and psychological factors[48] play important roles. Those with low education or low income had a higher prevalence of risk behaviors (smoking, obesity, physical inactivity, unhealthy diet, etc.), more likely to have poor polluted environment, poor health literacy (ability to read/understand comprehend medical information, lacking awareness of impact of lifestyle

behavior, poor adherence/incorrect medication, ignorance of medical checkups), and had higher prevalence of depression with poorer coping in response to cumulative stress. Consequently, mortality was high, potentially due to delayed access to medical care, poor understanding in disease progress management, and lack of post-disease cardiac rehabilitation.[49]

Moreover, education and income have mutual causal influences on CVD morbidity and mortality and one should not rely on single, potentially biased parameters.[50] Combined effects of education and income had been studied previously,[51] and persons with low income and education had the highest risk of incident CHD, when compared with high education/low income, low education/high income, and high education/high income. However, some researchers have suggested education and income should not be combined and should not be interchangeable,[52] because they may affect CVD outcomes through different, potentially independent, causal pathways. For example, Ahmed et al[53] found low income was a significant independent predictor of HF regardless of education level in community-dwelling older population age ≥65 years population. To test this hypothesis, individual patient data containing education and income variables are required, and mediation analysis applied.

Many studies[52, 54] assessed education/income effect by comparing highest and lowest strata, which could not dose-response effects.[10, 55, 56] To increase comparability across the studies and exposure gradient, the medium-level education and income categories were maintained. This confirmed the social gradient effect of education and income. Although there was high heterogeneity in the results, statistical significance was seen, except for effects of income on CVE and strokes outcomes. This may result from different definitions and classifications of education and income categories between individual studies, and between different geographical regions,

economies, educational systems and cultures. Differences in study periods over time could lead to variability in scales used to classify the exposure.

Strengths and limitations

Our meta-analysis has some strengths. We believe, it is the first meta-analysis assessing levels of education and income effects on major CVD outcomes. To increase comparability across studies and study social gradient effects, three strata of education/income were categorized into three groups to yield more details than previously.[23, 27] Effects of educations/incomes were simultaneously pooled using multivariate meta-analyses. In addition, only cohort studies providing more reliable effects of education and income on CVD outcomes were included. This review followed PRISMA guidelines.[36]

However, our study also has some limitations. Pooled estimates were affected by high heterogeneity, from differences in characteristics of the study populations, differences in definitions and classifications of education and income in both developed and developing countries, and differences in measurement timing of education and income categories across studies. Although many efforts were made to explore the heterogeneity, we could not identify sources. We also did not have access to primary data and many studies did not adjust and report confounding variables, so estimated risk might be confounded.

Clinical Implications and further research

Braveman et al[52] explained educational influence on general and health-related knowledge, health literacy, and problem-solving skills, which can change health outcome. Results of our meta-analysis provided some evidence of effects of education and income on CVD outcomes. However,

whether education or income is directly associated with CVD outcomes,[50] or education is indirectly associated with CVD outcomes through income as mediator,[57] or both education and income are indirectly associated with CVD outcomes through other risk factors such as BMI,[58] diabetes, smoking as mediators has not been clearly answered in studies. Further research should focus on the causal pathway between education and income on CVD outcomes with more advanced statistical models, such as mediation/moderation analysis.[59]

Conclusion

In conclusion, low/medium education and income increased risk of CAD, CVE, strokes and cardiovascular deaths. Further studies should be conducted to assess causal pathway of education/income on cardiovascular outcomes to confirm our findings, especially in Asian countries.

Acknowledgement

Thanks to Mr. Stephen John Pinder for checking and improving the English of this manuscript.

Declaration of conflicting interests

The Authors declared that there is no conflicts of interest.

Funding

None.

Details of ethics approval

There is no need for ethical approval for a systematic review.

Contribution to authorships

WK, SAV, AT contributed to conception and design, data analysis and interpretation of data, WK, SAV contributed to study selection, risk of bias assessment, and data extraction, WK, SAV, JA, MM, AT contributed to drafting the manuscript, critical revision of the manuscript for important intellectual content, and final approval of the version to be published. All authors gave final approval.

References

1. Shanthi Mendis, Tim Armstrong, Douglas Bettcher, et al. *WHO: Global status report on noncommunicable diseases 2014*. Switzerland: World Health Organization, 2014.
2. Kannel WB and McGee DL. Diabetes and cardiovascular disease: the Framingham study. *Jama*. 1979; 241: 2035-8.
3. Keil U and Kuulasmaa K. WHO MONICA Project: risk factors. *Int J Epidemiol*. 1989; 18: S46-55.
4. Yusuf S, Hawken S, Ôunpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *The Lancet*. 2004; 364: 937-52.
5. Yusuf S, Reddy S, Ôunpuu S and Anand S. Global burden of cardiovascular diseases part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. *Circulation*. 2001; 104: 2746-53.
6. Lang T, Lepage B, Schieber A-C, Lamy S and Kelly-Irving M. Social determinants of cardiovascular diseases. *Public Health Reviews*. 2012; 33: 601-22.
7. McKee M and Chow CK. The Social Determinants of Cardiovascular Disease. *Evidence-Based Cardiology, Third Edition*. 2010: 211-20.
8. Rose G and Marmot M. Social class and coronary heart disease. *British heart journal*. 1981; 45: 13-9.
9. Smith GD, Bartley M and Blane D. The Black report on socioeconomic inequalities in health 10 years on. *BMJ: British Medical Journal*. 1990; 301: 373.
10. Marmot MG, Stansfeld S, Patel C, et al. Health inequalities among British civil servants: the Whitehall II study. *The Lancet*. 1991; 337: 1387-93.

11. Johnson JL, Heineman EF, Heiss G, Hames CG and Tyroler HA. Cardiovascular disease risk factors and mortality among black women and white women aged 40–64 years in Evans County, Georgia. *American journal of epidemiology*. 1986; 123: 209-20.
12. Lin CC, Rogot E, Johnson NJ, Sorlie PD and Arias E. A further study of life expectancy by socioeconomic factors in the National Longitudinal Mortality Study. *Ethnicity & disease*. 2002; 13: 240-7.
13. Nietert PJ, Sutherland SE, Keil JE and Bachman DL. Demographic and biologic influences on survival in whites and blacks: 40 years of follow-up in the Charleston heart study. *International journal for equity in health*. 2006; 5: 1.
14. Beebe-Dimmer J, Lynch JW, Turrell G, Lustgarten S, Raghunathan T and Kaplan GA. Childhood and adult socioeconomic conditions and 31-year mortality risk in women. *American Journal of Epidemiology*. 2004; 159: 481-90.
15. Notara V, Panagiotakos D, Kogias Y, et al. The impact of education status on the 10-year (2004-2014) cardiovascular disease incidence and all cause mortality, among Acute Coronary Syndrome patients: the GREECS longitudinal study. *Journal of Preventive Medicine and Public Health*. 2016.
16. Jacobsen BK and Thelle DS. Risk factors for coronary heart disease and level of education the tromsø heart study. *American Journal of Epidemiology*. 1988; 127: 923-32.
17. Cirera L, Tormo M-J, Chirlaque M-D and Navarro C. Cardiovascular risk factors and educational attainment in Southern Spain: a study of a random sample of 3091 adults. *European Journal of Epidemiology*. 1998; 14: 755-63.

18. Mackenbach JP, Cavelaars A, Kunst AE and Groenhof F. Socioeconomic inequalities in cardiovascular disease mortality. An international study. *European heart journal*. 2000; 21: 1141-51.
19. Andersen I, Osler M, Petersen L, Grønbæk M and Prescott E. Income and risk of ischaemic heart disease in men and women in a Nordic welfare country. *International Journal of Epidemiology*. 2003; 32: 367-74.
20. Salomaa V, Niemelä M, Miettinen H, et al. Relationship of socioeconomic status to the incidence and prehospital, 28-day, and 1-year mortality rates of acute coronary events in the FINMONICA myocardial infarction register study. *Circulation*. 2000; 101: 1913-8.
21. Lammintausta A, Immonen-Räihä P, Airaksinen JKE, et al. Socioeconomic Inequalities in the Morbidity and Mortality of Acute Coronary Events in Finland: 1988 to 2002. *Annals of Epidemiology*. 2012; 22: 87-93.
22. Hosseinpoor AR, Bergen N, Mendis S, et al. Socioeconomic inequality in the prevalence of noncommunicable diseases in low- and middle-income countries: Results from the World Health Survey. *BMC Public Health*. 2012; 12.
23. Manrique-Garcia E, Sidorchuk A, Hallqvist J and Moradi T. Socioeconomic position and incidence of acute myocardial infarction: a meta-analysis. *Journal of Epidemiology and Community Health*. 2011; 65: 301-9.
24. Cox AM, McKevitt C, Rudd AG and Wolfe CD. Socioeconomic status and stroke. *The Lancet Neurology*. 2006; 5: 181-8.
25. Marshall IJ, Wang Y, Crichton S, McKevitt C, Rudd AG and Wolfe CD. The effects of socioeconomic status on stroke risk and outcomes. *The Lancet Neurology*. 2015; 14: 1206-18.

26. Chen R, Hu Z, Chen R-L, et al. Socioeconomic deprivation and survival after stroke in China: a systematic literature review and a new population-based cohort study. *BMJ open*. 2015; 5: e005688.
27. Vathesatogkit P, Batty GD and Woodward M. Socioeconomic disadvantage and disease-specific mortality in Asia: systematic review with meta-analysis of population-based cohort studies. *J Epidemiol Community Health*. 2014; 68: 375-83.
28. Kaplan GA and Keil JE. Socioeconomic factors and cardiovascular disease: a review of the literature. *Circulation*. 1993; 88: 1973-98.
29. Khaing W, Vallipakorn SA-O and Thakkinstian A. The effect of education and income on cardiovascular outcomes: a systematic review and meta-analysis of registration in PROSPERO. 2016.
30. PELE L. Currency converter in the past with official exchange rates from 1953. 2016.
31. White IR. Multivariate random-effects meta-regression: updates to mvmeta. *Stata Journal*. 2011; 11: 255.
32. World Bank. World Bank Country and Lending Groups World Bank Data Help Desk. 2016.
33. Egger M, Smith GD, Schneider M and Minder C. Bias in meta-analysis detected by a simple, graphical test. *Bmj*. 1997; 315: 629-34.
34. Peters JL, Sutton AJ, Jones DR, Abrams KR and Rushton L. Contour-enhanced meta-analysis funnel plots help distinguish publication bias from other causes of asymmetry. *Journal of clinical epidemiology*. 2008; 61: 991-6.
35. StataCorp. Stata Statistical Software: Release 14. *College Station, TX: StataCorp LP*. 2015.

36. Moher D, Liberati A, Tetzlaff J and Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*. 2009; 151: 264-9.
37. Lee Y-T, Lin RS, Sung FC, et al. Chin-Shan Community Cardiovascular Cohort in Taiwan–baseline data and five-year follow-up morbidity and mortality. *Journal of clinical epidemiology*. 2000; 53: 838-46.
38. Schwarz KA and Elman CS. Identification of factors predictive of hospital readmissions for patients with heart failure. *Heart & Lung: The Journal of Acute and Critical Care*. 2003; 32: 88-99.
39. Sui X, Gheorghiade M, Zannad F, Young JB and Ahmed A. A propensity matched study of the association of education and outcomes in chronic heart failure. *International journal of cardiology*. 2008; 129: 93-9.
40. Arrich J, Lalouschek W and Müllner M. Influence of socioeconomic status on mortality after stroke: Retrospective cohort study. *Stroke*. 2005; 36: 310-4.
41. Peter R, Gässler H and Geyer S. Socioeconomic status, status inconsistency and risk of ischaemic heart disease: A prospective study among members of a statutory health insurance company. *Journal of Epidemiology and Community Health*. 2007; 61: 605-11.
42. Roux AVD, Merkin SS, Arnett D, et al. Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine*. 2001; 345: 99-106.
43. Christensen S, Mogelvang R, Heitmann M and Prescott E. Level of education and risk of heart failure: a prospective cohort study with echocardiography evaluation. *European heart journal*. 2011; 32: 450-8.

44. Van Minh H, Byass P and Wall S. Mortality from cardiovascular diseases in Bavi District, Vietnam. *Scandinavian Journal of Public Health*. 2003; 31: 26-31.
45. Lynch JW, Kaplan GA, Cohen RD, Tuomilehto J and Salonen JT. Do cardiovascular risk factors explain the relation between socioeconomic status, risk of all-cause mortality, cardiovascular mortality, and acute myocardial infarction? *American journal of epidemiology*. 1996; 144: 934-42.
46. Naska A, Katsoulis M, Trichopoulos D and Trichopoulou A. The root causes of socioeconomic differentials in cancer and cardiovascular mortality in Greece. *European Journal of Cancer Prevention*. 2012; 21: 490-6.
47. Bostock S and Steptoe A. Association between low functional health literacy and mortality in older adults: longitudinal cohort study. *Bmj*. 2012; 344: e1602.
48. Meijer A, Conradi HJ, Bos EH, Thombs BD, van Melle JP and de Jonge P. Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis of 25 years of research. *General hospital psychiatry*. 2011; 33: 203-16.
49. Nielsen KM, Faergeman O, Foldspang A and Larsen ML. Cardiac rehabilitation: health characteristics and socio-economic status among those who do not attend. *The European Journal of Public Health*. 2008; 18: 479-83.
50. Lahelma E, Martikainen P, Laaksonen M and Aittomäki A. Pathways between socioeconomic determinants of health. *Journal of Epidemiology and Community Health*. 2004; 58: 327-32.
51. Lewis MW, Khodneva Y, Redmond N, et al. The impact of the combination of income and education on the incidence of coronary heart disease in the prospective Reasons for

Geographic and Racial Differences in Stroke (REGARDS) cohort study Chronic Disease Epidemiology. *BMC Public Health*. 2015; 15.

52. Braveman PA, Cubbin C, Egerter S, et al. Socioeconomic status in health research: one size does not fit all. *Jama*. 2005; 294: 2879-88.
53. Ahmed AA, Zhang Y, Bourge RC, et al. Abstract 12064: Low Income, Regardless of Education Level, is a Significant Independent Predictor of Incident Heart Failure in Community-Dwelling, Medicare-Eligible Older Adults. *Circulation*. 2011; 124: A12064-A.
54. Shavers VL. Measurement of socioeconomic status in health disparities research. *Journal of the national medical association*. 2007; 99: 1013.
55. Marmot M, Ryff CD, Bumpass LL, Shipley M and Marks NF. Social inequalities in health: next questions and converging evidence. *Social science & medicine*. 1997; 44: 901-10.
56. Marmot MG, Rose G, Shipley M and Hamilton PJ. Employment grade and coronary heart disease in British civil servants. *Journal of epidemiology and community health*. 1978; 32: 244-9.
57. Andersen I, Gamborg M, Osler M, Prescott E and Diderichsen F. Income as mediator of the effect of occupation on the risk of myocardial infarction: does the income measurement matter? *Journal of epidemiology and community health*. 2005; 59: 1080-5.
58. Lu Y, Hajifathalian K, Rimm EB, Ezzati M and Danaei G. Mediators of the effect of body mass index on coronary heart disease: decomposing direct and indirect effects. *Epidemiology*. 2015; 26: 153-62.
59. MacKinnon DP, Fairchild AJ and Fritz MS. Mediation analysis. *Annual review of psychology*. 2007; 58: 593.

Appendix A: Search terms used and search strategies

PubMed Search

((((((((((((((("Cardiovascular Diseases"[Mesh])) OR ("cardiovascular events")) OR ("Myocardial Infarction"[Mesh])) OR ("Heart Failure"[Mesh])) OR ("Ventricular Function, Left"[Mesh])) OR ("Coronary Restenosis"[Mesh])) OR (restenos*)) OR (re-stenos*)) OR ("Coronary Disease"[Mesh])) OR ("coronary flow")) OR ("coronary blood flow")) OR ("ejection fraction")) OR ("stroke")) OR ("cardiovascular death")) OR ("cardiovascular mortality"))) AND ((((((("Education"[Mesh])) OR ("Educational Status"[Mesh])) OR ("education level"))) OR ("Income"[Mesh]))

Scopus Search

(((TITLE-ABS-KEY ("cardiovascular disease*")) OR (TITLE-ABS-KEY ("cardiovascular event*")) OR (TITLE-ABS-KEY ("myocardial infarction")) OR (TITLE-ABS-KEY (restenos*)) OR (TITLE-ABS-KEY (re-stenos*)) OR (TITLE-ABS-KEY ("cardiovascular death")) OR (TITLE-ABS-KEY ("cardiovascular mortality")) OR (TITLE-ABS-KEY ("heart failure"))) OR ((TITLE-ABS-KEY ("left ventricular function")) OR (TITLE-ABS-KEY ("ejection fraction")) OR (TITLE-ABS-KEY ("coronary flow")) OR (TITLE-ABS-KEY ("coronary blood flow")) OR (TITLE-ABS-KEY ("stroke"))))) AND ((TITLE-ABS-KEY (education)) OR (TITLE-ABS-KEY (income)))

Appendix B

NEWCASTLE - OTTAWA QUALITY ASSESSMENT SCALE (COHORT STUDIES)

Note: A study can be awarded a maximum of one star for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for Comparability

Selection

1) Representativeness of the exposed cohort

a. truly representative of the average in the community*
b. somewhat representative of the average in the community*
c. selected group of users e.g. nurses, volunteers
d. no description of the derivation of the cohort

2) Selection of the non-exposed cohort

a. drawn from the same community as the exposed cohort*
b. drawn from a different source*
c. no description of the derivation of the non-exposed cohort

3) Ascertainment of exposure

a. secure record (e.g. surgical records, medical records, census registration)*
b. structured interview*
c. written self-report
d. no description

4) Demonstration that outcome of interest was not present at start of study

In the case of mortality studies, outcome of interest is still the presence of a disease/incident, rather than death. That is to say that a statement of no history of disease or incident earns a star.

a. yes*
b. no

Comparability

1) Comparability of cohorts on the basis of the design or analysis. A maximum of 2 stars can be allotted in this category.

a. study controls for age/sex *
b. study controls for any three of the following cardiovascular risk factors: Diabetes, BMI, Obesity, Physical activity, Hypertension, Smoking, Alcohol drinking, Dyslipidemia and Chronic Kidney Disease *

Outcome

1. Assessment of outcome
    a. independent or blind assessment stated in the paper, or confirmation of the outcome by reference to secure records (x-rays, medical records, etc.)*
    b. record linkage (e.g. identified through ICD codes on database records)*
    c. self-report (i.e. no reference to original medical records or x-rays to confirm the outcome)
    d. no description.

2. Was follow-up long enough for outcomes to occur

   Minimum required follow-up period is ≥ 5 years.

   a. yes*

   b. no

   If the follow-up period is reported with a mean and a range, and the mean is longer than the required minimum, rate it as 'yes.'

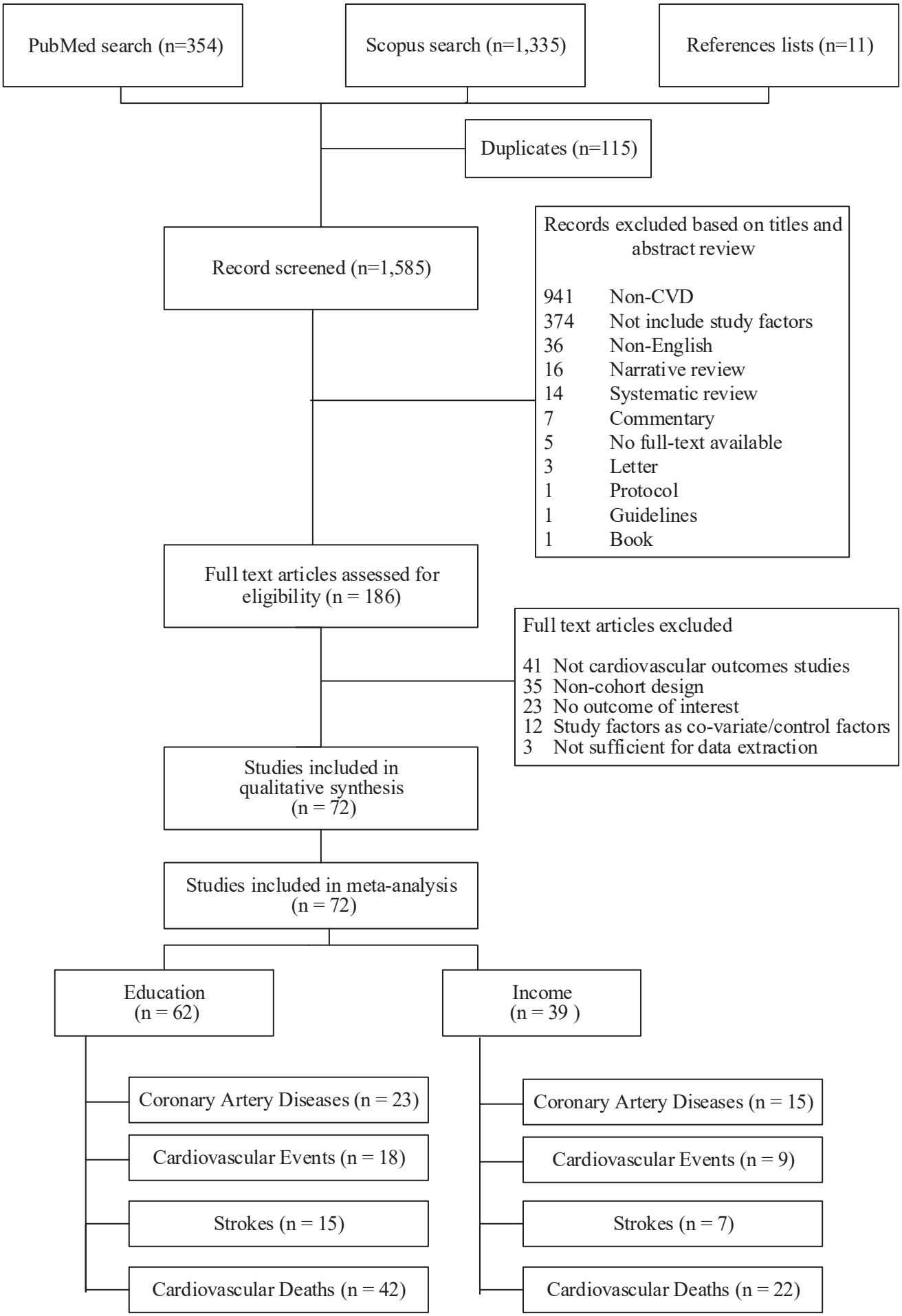
3. Adequacy of follow-up of cohorts

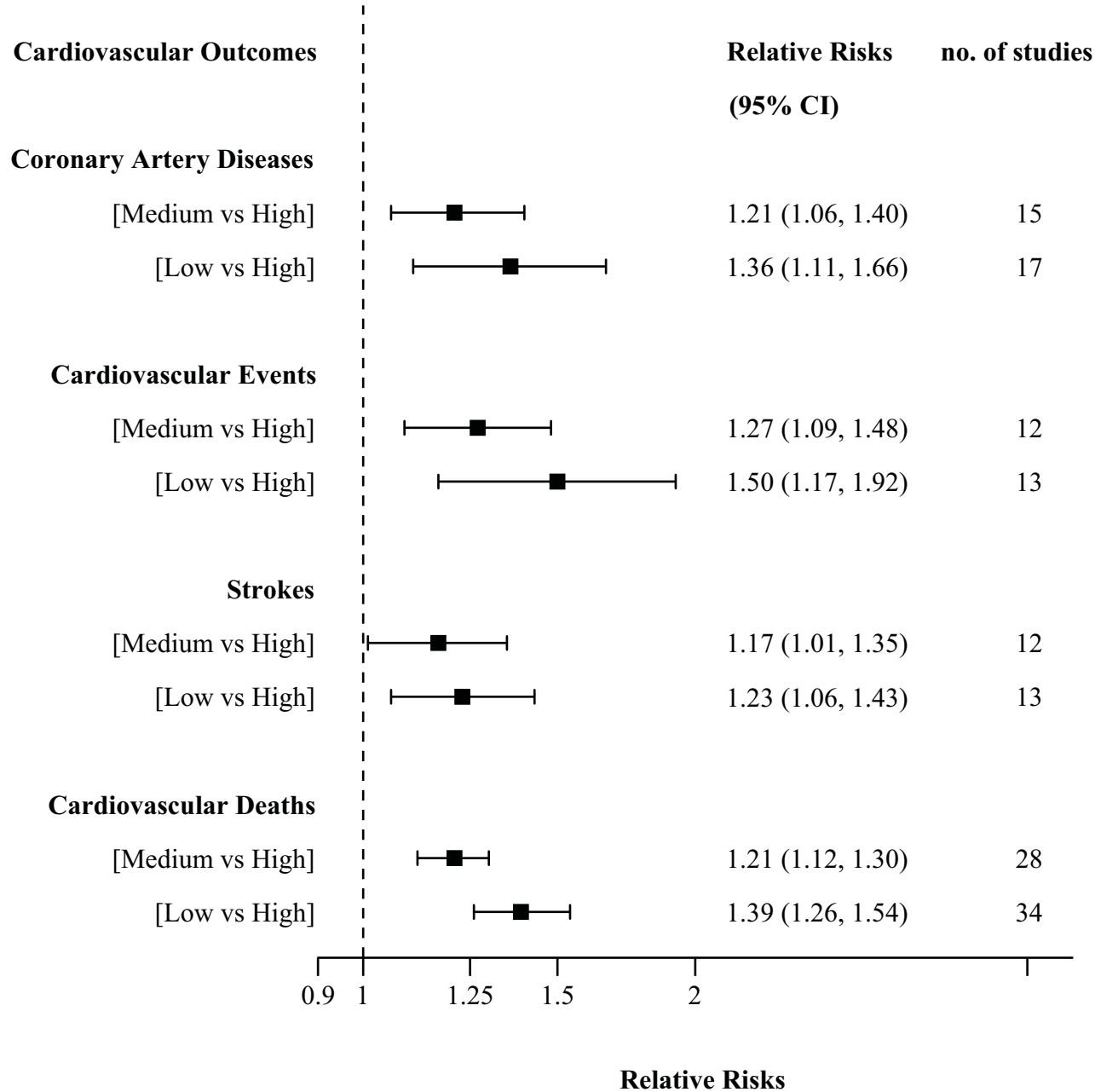
   a. complete follow-up, all subjects accounted for*

   b. subjects lost to follow-up are unlikely to introduce bias – small number lost <20%

   c. follow-up rate <80% and no description of those lost

   d. no description *or unclear*


PubMed search (n=354)
Scopus search (n=1,335)
References lists (n=11)
Duplicates (n=115)
Record screened (n=1,585)
Records excluded based on titles and abstract review
941 Non-CVD
374 Not include study factors
36 Non-English
16 Narrative review
14 Systematic review
7 Commentary
5 No full-text available
3 Letter
1 Protocol
1 Guidelines
1 Book
Full text articles assessed for eligibility (n = 186)
Full text articles excluded
41 Not cardiovascular outcomes studies
35 Non-cohort design
23 No outcome of interest
12 Study factors as co-variate/control factors
3 Not sufficient for data extraction
Studies included in qualitative synthesis (n = 72)
Studies included in meta-analysis (n = 72)
Education (n = 62)
Income (n = 39)
Coronary Artery Diseases (n = 23)
Cardiovascular Events (n = 18)
Strokes (n = 15)
Cardiovascular Deaths (n = 42)
Coronary Artery Diseases (n = 15)
Cardiovascular Events (n = 9)
Strokes (n = 7)
Cardiovascular Deaths (n = 22)


Cardiovascular Outcomes
Relative Risks (95% CI)
no. of studies
Coronary Artery Diseases
[Medium vs High]
1.21 (1.06, 1.40)
15
[Low vs High]
1.36 (1.11, 1.66)
17
Cardiovascular Events
[Medium vs High]
1.27 (1.09, 1.48)
12
[Low vs High]
1.50 (1.17, 1.92)
13
Strokes
[Medium vs High]
1.17 (1.01, 1.35)
12
[Low vs High]
1.23 (1.06, 1.43)
13
Cardiovascular Deaths
[Medium vs High]
1.21 (1.12, 1.30)
28
[Low vs High]
1.39 (1.26, 1.54)
34
0.9
1
1.25
1.5
2
Relative Risks

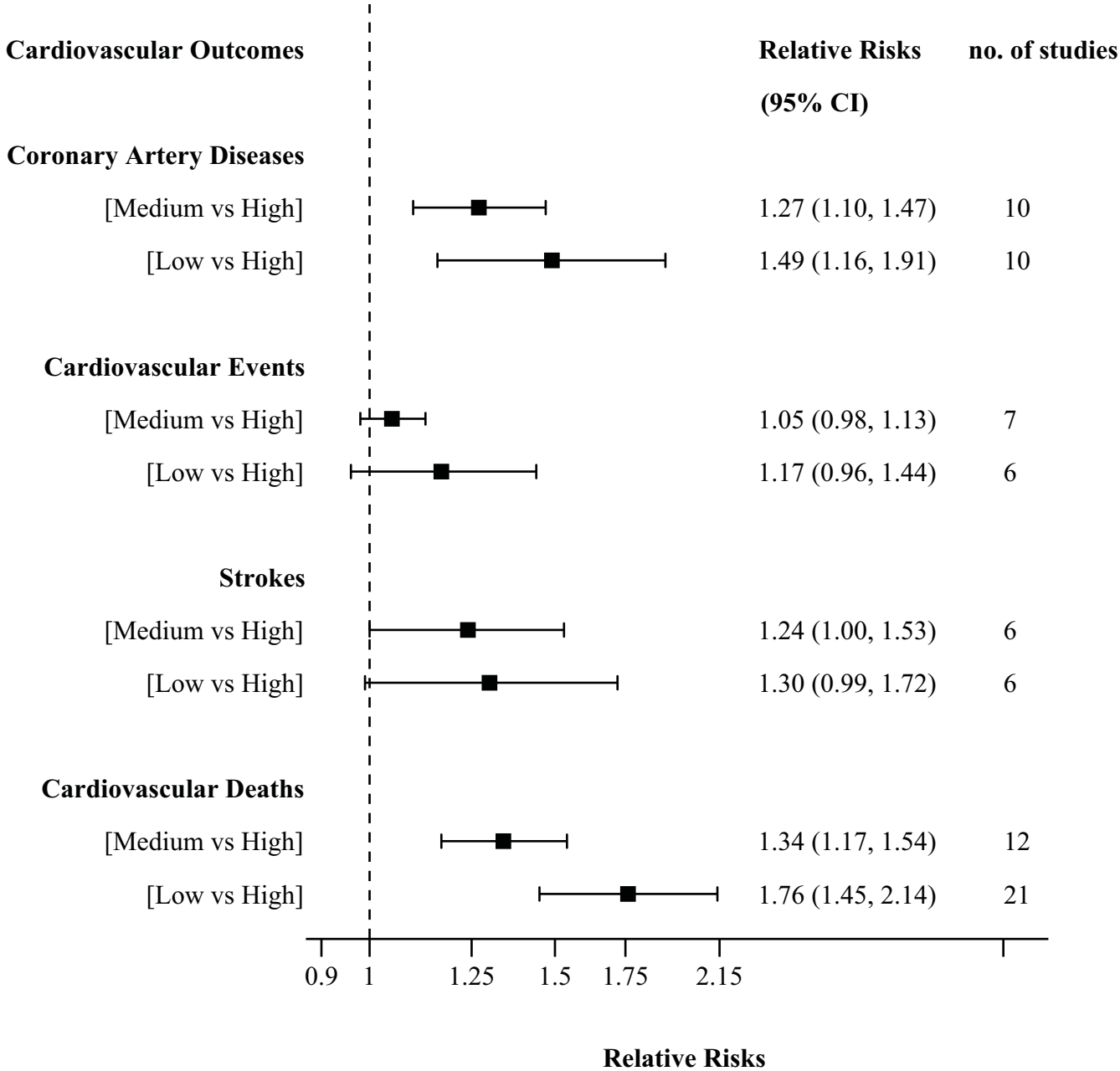
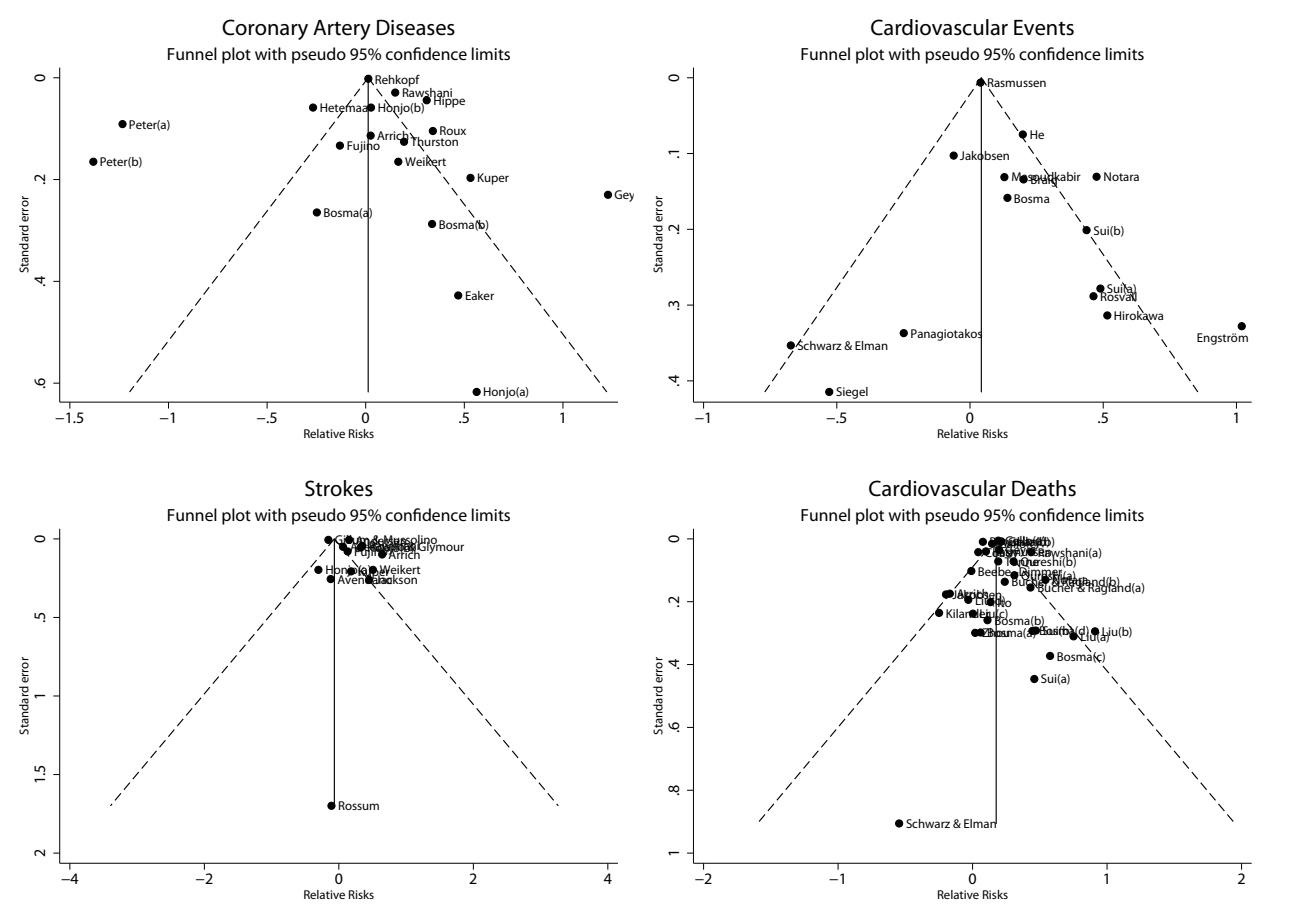

Cardiovascular Outcomes
Relative Risks (95% CI)
no. of studies
Coronary Artery Diseases
[Medium vs High]
1.27 (1.10, 1.47)
10
[Low vs High]
1.49 (1.16, 1.91)
10
Cardiovascular Events
[Medium vs High]
1.05 (0.98, 1.13)
7
[Low vs High]
1.17 (0.96, 1.44)
6
Strokes
[Medium vs High]
1.24 (1.00, 1.53)
6
[Low vs High]
1.30 (0.99, 1.72)
6
Cardiovascular Deaths
[Medium vs High]
1.34 (1.17, 1.54)
12
[Low vs High]
1.76 (1.45, 2.14)
21
0.9
1
1.25
1.5
1.75
2.15
Relative Risks

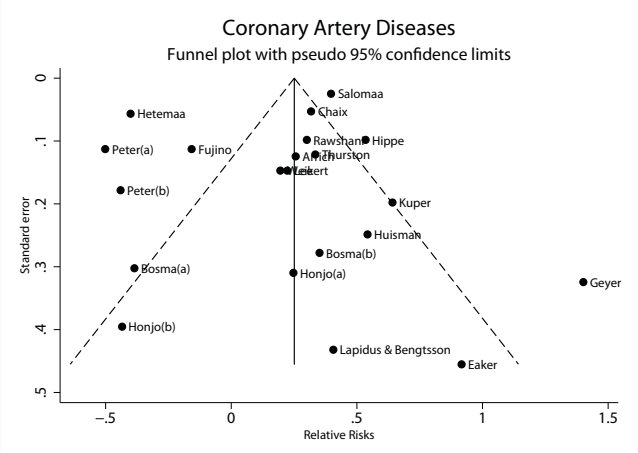
Figure Legends

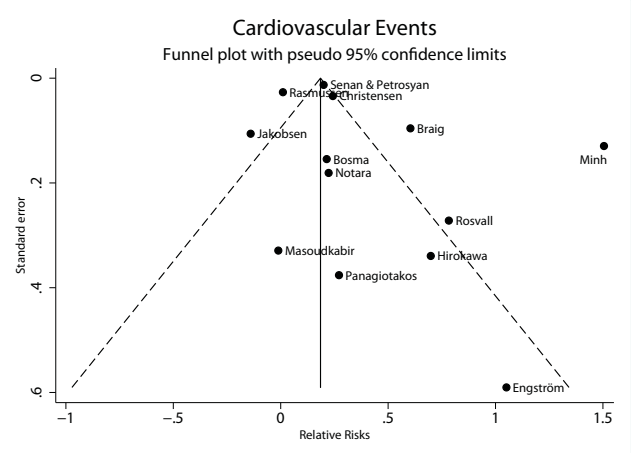
Figure 1. Flow diagram for selection of studies

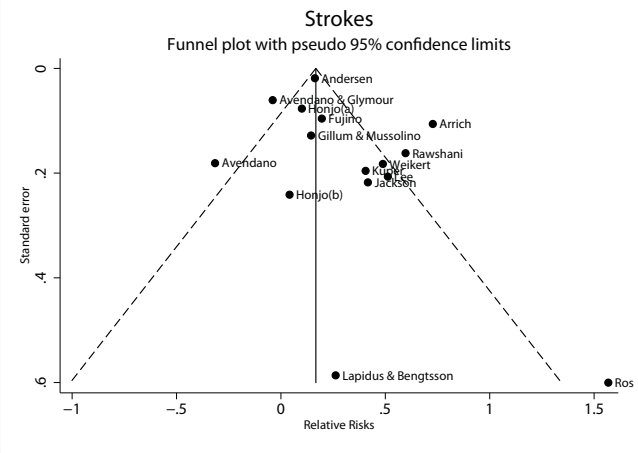
Figure 2. Pooling effects of educations on cardiovascular outcomes (co-variate adjusted studies only)

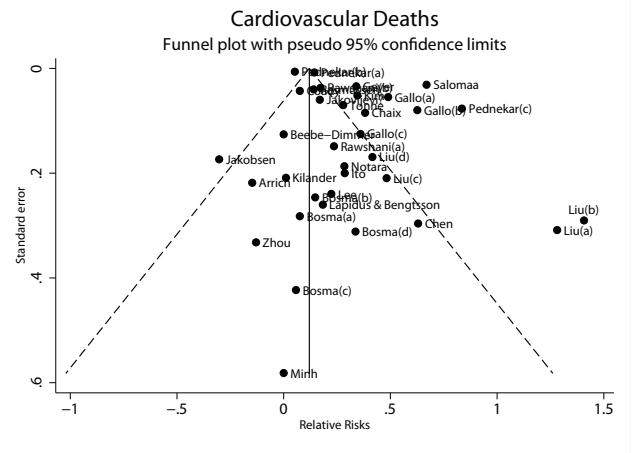
Figure 3. Pooling effects of incomes on cardiovascular outcomes (co-variate adjusted studies only)

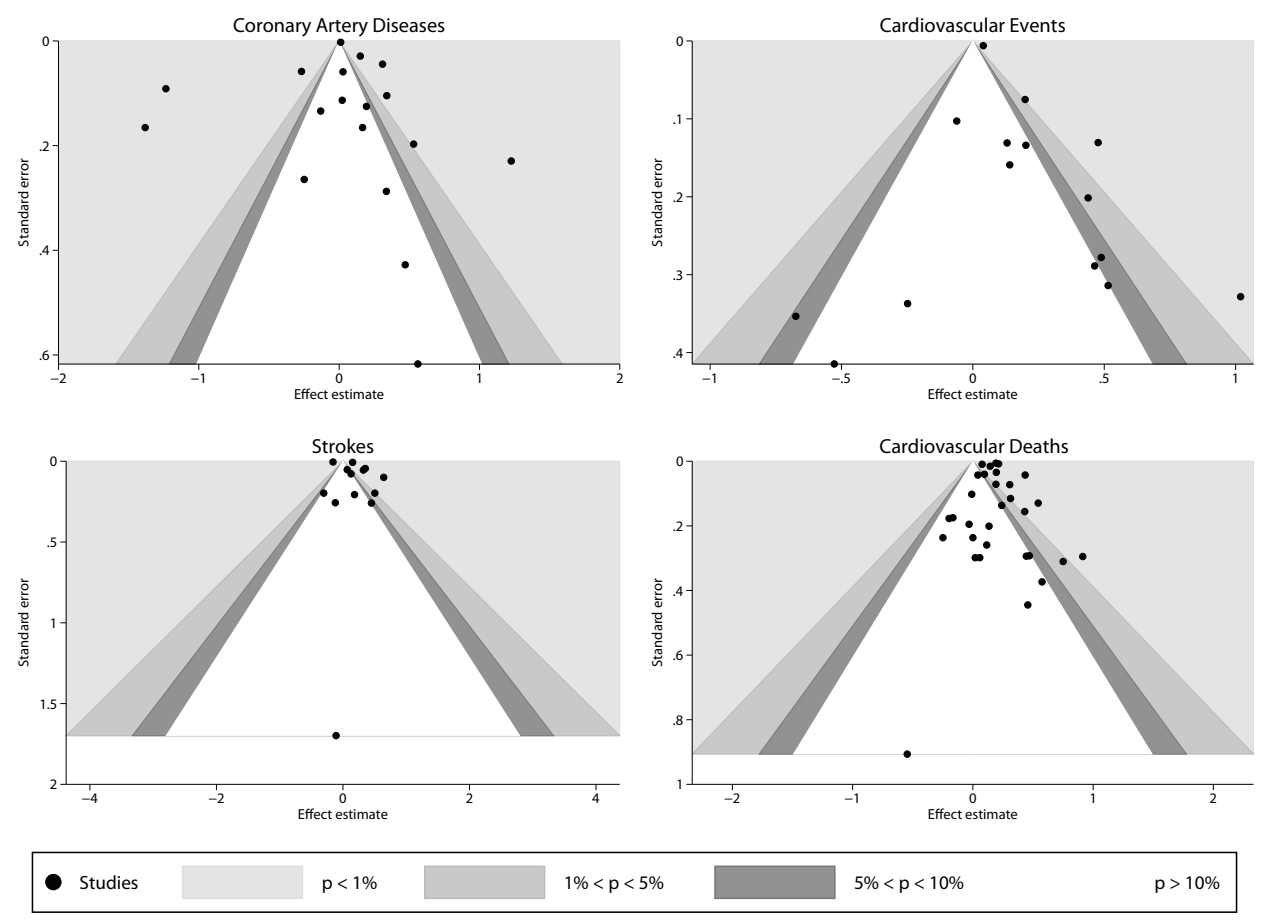

Coronary Artery Diseases
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Rehkopf
Rawshani
Hippe
Hetemaa
Honjo(b)
Peter(a)
Roux
Arrich
Thurston
Fujino
Peter(b)
Weikert
Kuper
Gey
Bosma(a)
Bosma(b)
Eaker
Honjo(a)
Cardiovascular Events
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Rasmussen
He
Jakobsen
Notara
Bosma
Sui(b)
Sui(a)
Rosvall
Hirokawa
Engström
Panagiotakos
Schwarz & Elman
Siegel
Strokes
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Weikert
Rossum
Cardiovascular Deaths
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Rawshani(a)
Qureshi(b)
Bucher & Ragland(a)
Bosma(b)
Bosma(c)
Sui(a)
Schwarz & Elman

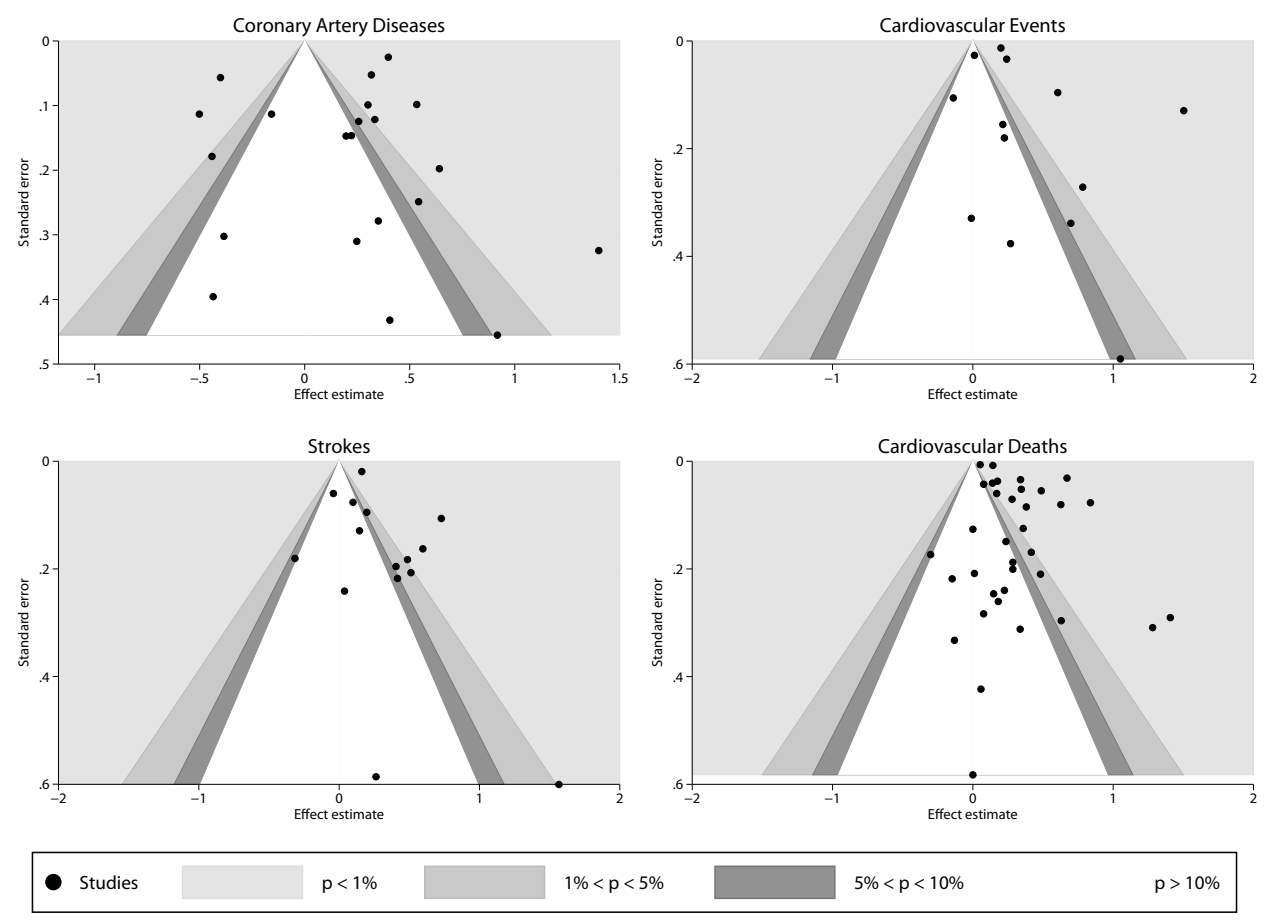

Coronary Artery Diseases
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Salomaa
Hetemaa
Chaix
Peter(a)
Fujino
Rawshani
Hippe
Thurston
Peter(b)
Kuper
Huisman
Bosma(b)
Bosma(a)
Honjo(a)
Geyer
Honjo(b)
Lapidus & Bengtsson
Eaker

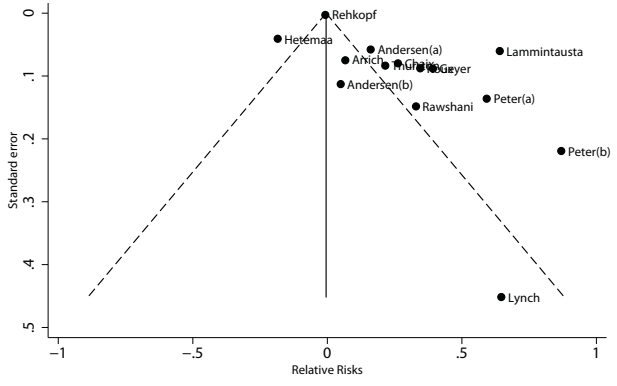

Cardiovascular Events
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Senan & Petrosyan
Christensen
Jakobsen
Braig
Minh
Bosma
Notara
Rosvall
Masoudkabir
Hirokawa
Panagiotakos
Engström

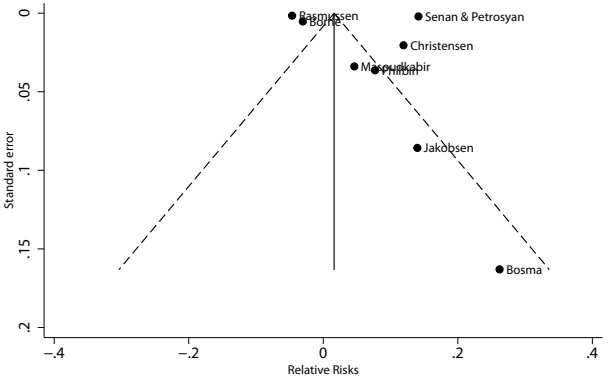

Strokes
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Andersen
Avendano & Glymour
Honjo(a)
Fujino
Arrich
Gillum & Mussolino
Avendano
Rawshani
Weikert
Jackson
Honjo(b)
Lapidus & Bengtsson
Ros

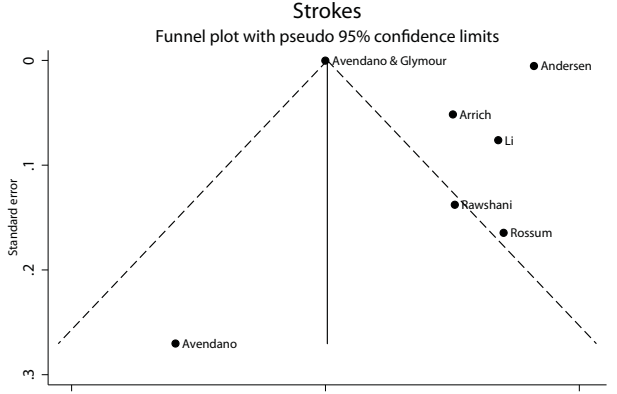

Cardiovascular Deaths
Funnel plot with pseudo 95% confidence limits
Standard error
Relative Risks
Salomaa
Gallo(a)
Chaix
Gallo(b)
Pednekar(c)
Beebe–Dimmer
Gallo(c)
Rawshani(a)
Liu(d)
Jakobsen
Notara
Kilander
Ito
Liu(c)
Arrich
Lee(b)
Lapidus & Bengtsson
Liu(b)
Bosma(a)
Chen
Liu(a)
Bosma(d)
Zhou
Bosma(c)
Minh

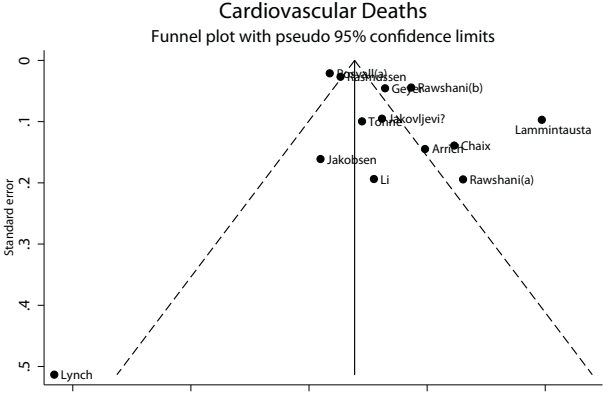

Coronary Artery Diseases
Cardiovascular Events
Strokes
Cardiovascular Deaths
Standard error
Effect estimate
Studies
p < 1%
1% < p < 5%
5% < p < 10%
p > 10%

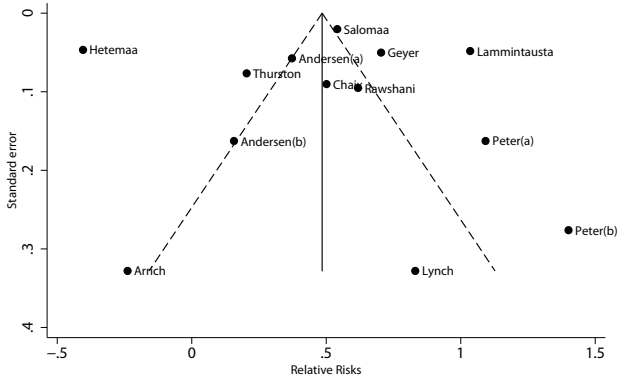

Coronary Artery Diseases
Cardiovascular Events
Strokes
Cardiovascular Deaths
Standard error
Effect estimate
Studies
p < 1%
1% < p < 5%
5% < p < 10%
p > 10%

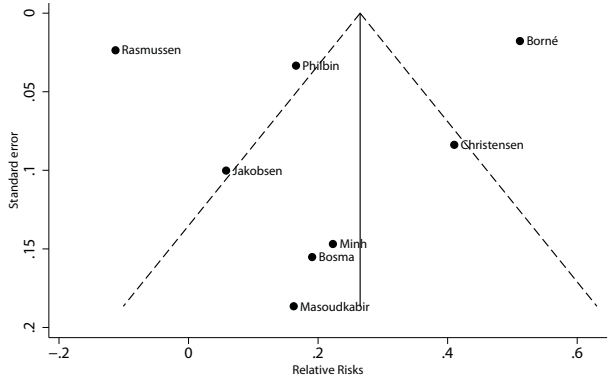

Coronary Artery Diseases
Funnel plot with pseudo 95% confidence limits
Rehkopf
Hetemaa
Andersen(a)
Arrich
Lammintausta
Andersen(b)
Rawshani
Peter(a)
Peter(b)
Lynch
Standard error
0
.1
.2
.3
.4
.5
−1
−.5
0
.5
1
Relative Risks

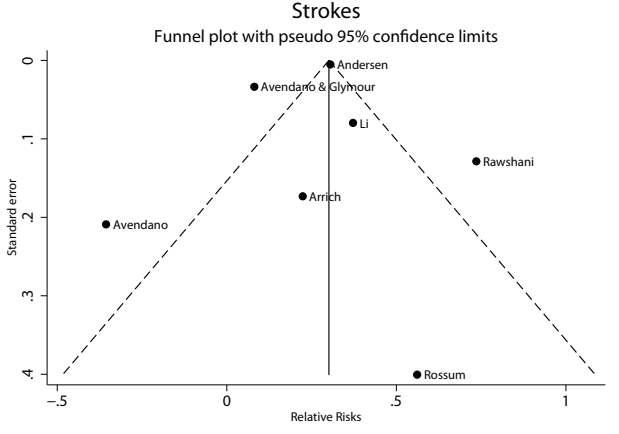

Cardiovascular Events
Funnel plot with pseudo 95% confidence limits
Rasmussen
Senan & Petrosyan
Christensen
Jakobsen
Bosma
Standard error
0
.05
.1
.15
.2
−.4
−.2
0
.2
.4
Relative Risks

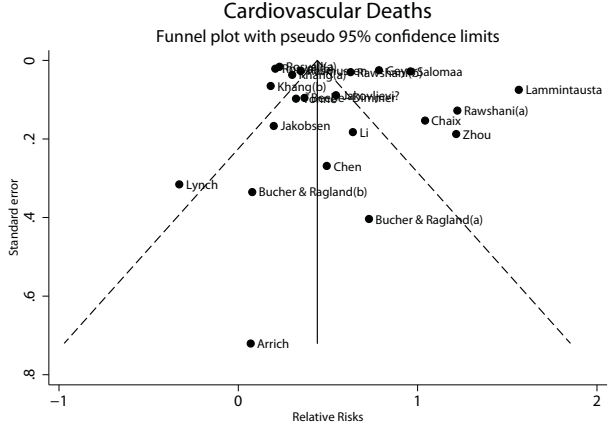

Strokes
Funnel plot with pseudo 95% confidence limits
Avendano & Glymour
Andersen
Arrich
Li
Rawshani
Rossum
Avendano
Standard error
0
.1
.2
.3
−.5
0
.5
Relative Risks

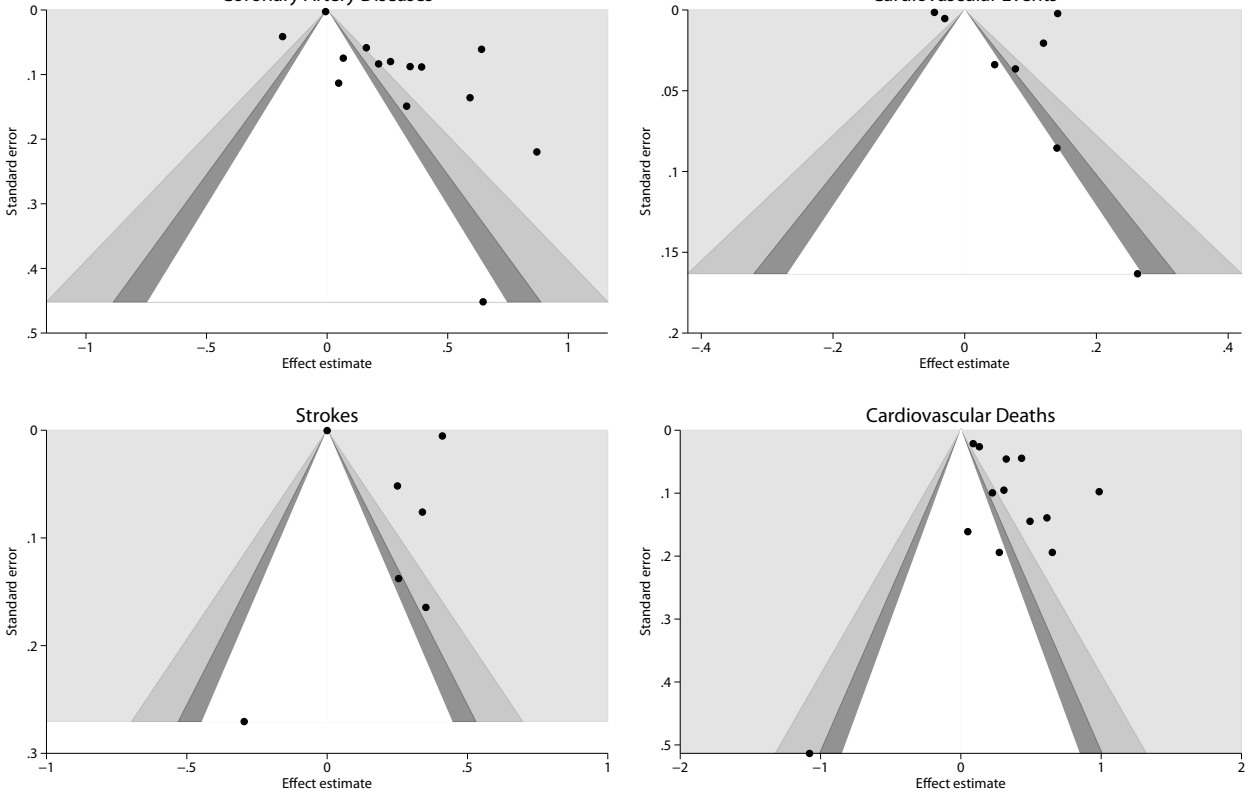

Cardiovascular Deaths
Funnel plot with pseudo 95% confidence limits
Rawshani(b)
Jakovljevi?
Lammintausta
Chaix
Jakobsen
Li
Rawshani(a)
Lynch
Standard error
0
.1
.2
.3
.4
.5
−1
−.5
0
.5
1
Relative Risks

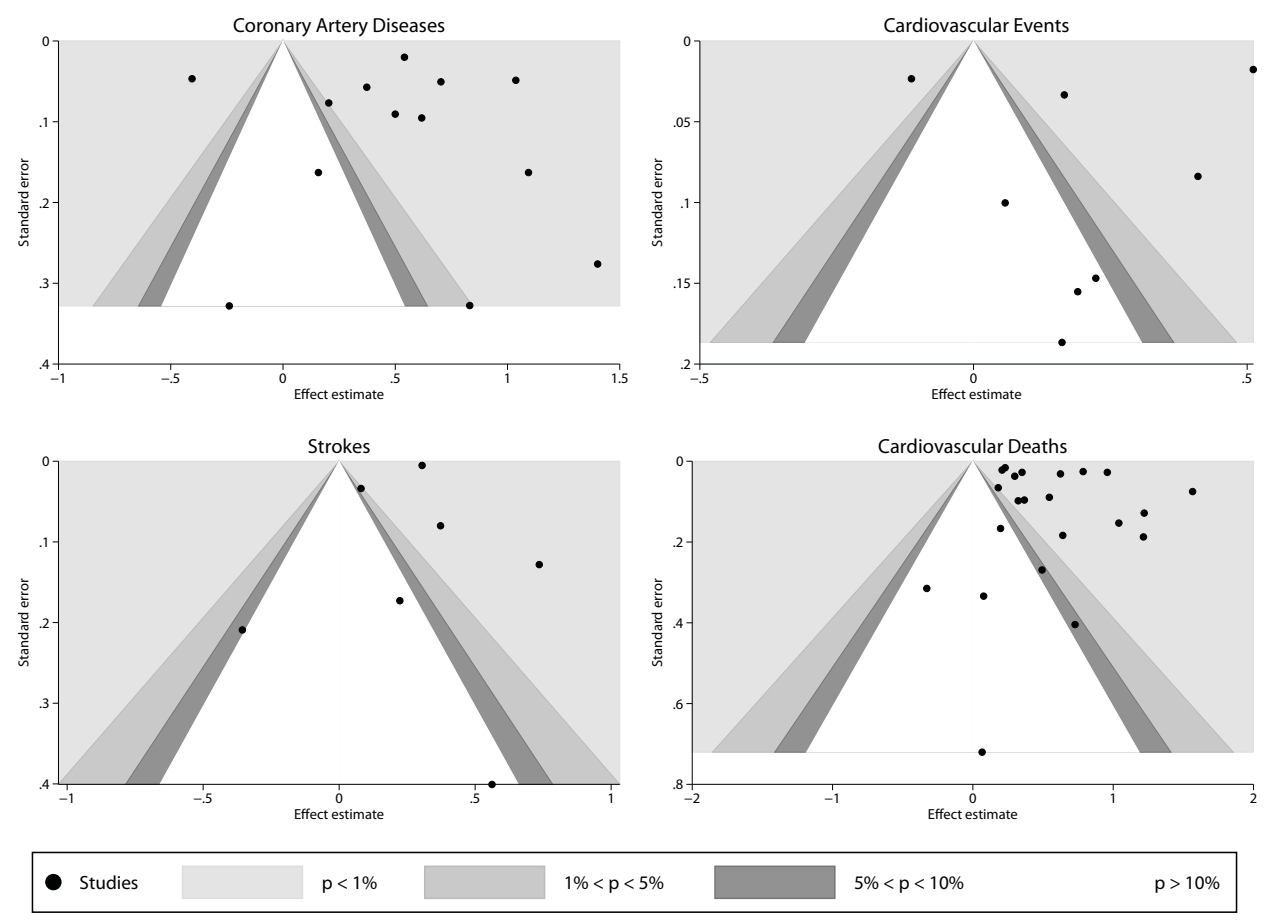

Coronary Artery Diseases
Funnel plot with pseudo 95% confidence limits
Standard error
0
.1
.2
.3
.4
Relative Risks
−.5
0
.5
1
1.5
Hetemaa
Salomaa
Andersen(a)
Geyer
Lammintausta
Thurston
Chaix
Rawshani
Andersen(b)
Peter(a)
Peter(b)
Arrich
Lynch


Cardiovascular Events
Funnel plot with pseudo 95% confidence limits
Standard error
0
.05
.1
.15
.2
Relative Risks
−.2
0
.2
.4
.6
Rasmussen
Borné
Philbin
Christensen
Jakobsen
Minh
Bosma
Masoudkabir


Strokes
Funnel plot with pseudo 95% confidence limits
Standard error
0
.1
.2
.3
.4
Relative Risks
−.5
0
.5
1
Andersen
Avendano & Glymour
Li
Rawshani
Arrich
Avendano
Rossum


Cardiovascular Deaths
Funnel plot with pseudo 95% confidence limits
Standard error
0
.2
.4
.6
.8
Relative Risks
−1
0
1
2
Salomaa
Lammintausta
Khang(b)
Rawshani(a)
Chaix
Jakobsen
Li
Zhou
Chen
Lynch
Bucher & Ragland(b)
Bucher & Ragland(a)
Arrich


Coronary Artery Diseases
Cardiovascular Events
Strokes
Cardiovascular Deaths
Standard error
Effect estimate
Studies
p < 1%
1% < p < 5%
5% < p < 10%
p > 10%


Coronary Artery Diseases
Standard error
0
.1
.2
.3
.4
−1
−.5
0
.5
1
1.5
Effect estimate
Cardiovascular Events
Standard error
0
.05
.1
.15
.2
−.5
0
.5
Effect estimate
Strokes
Standard error
0
.1
.2
.3
.4
−1
−.5
0
.5
1
Effect estimate
Cardiovascular Deaths
Standard error
0
.2
.4
.6
.8
−2
−1
0
1
2
Effect estimate
Studies
p < 1%
1% < p < 5%
5% < p < 10%
p > 10%

Supplement Figure Legends

Supplement Figure 1. Funnel plots of relative risks of cardiovascular outcomes among medium versus high education levels

Supplement Figure 2. Funnel plots of relative risks of cardiovascular outcomes among low versus high education levels

Supplement Figure 3. Contour-enhanced plots of relative risks of cardiovascular outcomes among medium versus high education levels

Supplement Figure 4. Contour-enhanced plots of relative risks of cardiovascular outcomes among low versus high education levels

Supplement Figure 5. Funnel plots of relative risks of cardiovascular outcomes among medium versus high income levels

Supplement Figure 6. Funnel plots of relative risks of cardiovascular outcomes among low versus high income levels

Supplement Figure 7. Contour-enhanced plots of relative risks of cardiovascular outcomes among medium versus high income levels

Supplement Figure 8. Contour-enhanced plots of relative risks of cardiovascular outcomes among low versus high income levels

Table Legends

Table 1. Estimations of pooled effects of education and income on cardiovascular outcomes (co-variate adjusted studies only)

Table 2. Pooled education and income effects on cardiovascular outcomes by regions

Table 1. Estimations of pooled effects of education and income on cardiovascular outcomes (co-variate adjusted studies only)

	Coronary Artery Diseases				Cardiovascular Events			
	n	RR (95% CI)	Q p-value	I^2 (%)	n	RR (95% CI)	Q p-value	I^2 (%)
Education								
Medium vs High	15	1.21 (1.06, 1.40)	0.005	96	12	1.27 (1.09, 1.48)	0.003	83
Low vs High	17	1.36 (1.11, 1.66)	0.002	94	13	1.50 (1.17, 1.92)	0.001	99
Income								
Medium vs High	10	1.27 (1.10, 1.47)	0.001	95	7	1.05 (0.98, 1.13)	0.131	99
Low vs High	10	1.49 (1.16, 1.91)	0.002	98	6	1.17 (0.96, 1.44)	0.117	97

	Strokes				Cardiovascular Deaths			
	n	RR (95% CI)	Q p-value	I^2 (%)	n	RR (95% CI)	Q p-value	I^2 (%)
Education								
Medium vs High	12	1.17 (1.01, 1.35)	0.034	99	28	1.21 (1.12, 1.30)	<0.001	98
Low vs High	13	1.23 (1.06, 1.43)	0.005	83	34	1.39 (1.26, 1.54)	<0.001	98
Income								
Medium vs High	6	1.24 (1.00, 1.53)	0.049	99	12	1.34 (1.17, 1.54)	<0.001	96
Low vs High	6	1.30 (0.99, 1.72)	0.061	98	21	1.76 (1.45, 2.14)	<0.001	99

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%);

Table 2. Pooled education and income effects on cardiovascular outcomes by regions

		Education				Income			
		n	RR (95% CI)	Q p-value	I^2	n	RR (95% CI)	Q p-value	I^2
Cardiovascular deaths									
Asia	Medium vs High	2	1.12 (0.78, 1.60)	0.540	5	0	NA	NA	NA
	Low vs High	8	1.34 (1.04, 1.72)	0.024	99	4	1.69 (1.07, 2.67)	0.024	96
Europe	Medium vs High	15	1.17 (1.06, 1.29)	0.001	99	12	1.40 (1.18, 1.67)	<0.001	97
	Low vs High	19	1.32 (1.17, 1.49)	<0.001	91	14	1.89 (1.47, 2.44)	<0.001	99
US	Medium vs High	14	1.30 (1.14, 1.49)	<0.001	72	1	NA	NA	NA
	Low vs High	8	1.69 (1.28, 2.22)	<0.001	95	4	NA	NA	NA
CAD									
Asia	Medium vs High	3	1.03 (0.85, 1.25)	0.750	28	0	NA	NA	NA
	Low vs High	4	1.03 (0.79, 1.33)	0.839	45	0	NA	NA	NA
Europe	Medium vs High	11	1.04 (0.72, 1.50)	0.852	99	11	1.39 (1.18, 1.63)	<0.001	92
	Low vs High	15	1.24 (0.97, 1.60)	0.086	96	12	1.74 (1.31, 2.32)	<0.001	98
US	Medium vs High	4	1.21 (0.97, 1.51)	0.085	75	3	NA	NA	NA
	Low vs High	2	1.51 (0.93, 2.45)	0.099	47	1	NA	NA	NA
CVE									
Asia	Medium vs High	2	1.47 (0.82, 2.63)	0.191	61	2	NA	NA	NA
	Low vs High	4	1.85 (0.93, 3.70)	0.081	96	2	NA	NA	NA
Europe	Medium vs High	8	1.26 (1.06, 1.49)	0.090	76	5	1.05 (0.95, 0.37)	0.368	99
	Low vs High	9	1.36 (1.07, 1.72)	0.011	95	5	1.24 (0.98, 1.58)	0.080	98
US	Medium vs High	5	1.07 (0.69, 1.66)	0.758	78	1	NA	NA	NA
	Low vs High	0	NA	NA	NA	1	NA	NA	NA
Strokes									
Asia	Medium vs High	4	1.22 (0.91, 1.65)	0.192	87	0	NA	NA	NA
	Low vs High	5	1.27 (1.07, 1.50)	0.006	34	0	NA	NA	NA
Europe	Medium vs High	6	1.46 (1.23, 1.72)	<0.001	87	5	1.37 (1.24, 1.52)	<0.001	70
	Low vs High	7	1.61 (1.28, 2.02)	<0.001	76	5	1.54 (1.33, 1.79)	<0.001	64
US	Medium vs High	3	0.98 (0.81, 1.19)	0.848	89	2	0.89 (0.62, 1.27)	0.514	49
	Low vs High	3	0.99 (0.83, 1.20)	0.957	53	2	0.91 (0.58, 1.41)	0.661	78

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%); CAD, Coronary Artery Diseases; CVE, Cardiovascular Events; US, United States; NA, Not available or insufficient data;

Supplement Table Legends

Supplement Table 1

Characteristics of included studied

Supplement Table 2

Risk of bias assessment of included studies

Supplement Table 3

Pooled education and income effect on coronary artery diseases (subgroup analyses)

Supplement Table 4

Pooled education and income effect on cardiovascular events (subgroup analyses)

Supplement Table 5

Pooled education and income effect on strokes (subgroup analyses)

Supplement Table 6

Pooled education and income effect on cardiovascular deaths (subgroup analyses)

Supplement Table 1. Characteristics of included studied

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Arrich[1]	2005	Austria, Europe (High)	IHD	RR	Education (Medium vs High)	1.02 [a] (0.82, 1.28)	0	66.71	54.28	25.27	26.46	66.98	NA
					Education (Low vs High)	1.29 [a] (1.01, 1.65)							
					Income (Medium vs High)	1.07 [a] (0.92, 1.24)	0	65.5	54.35	27.03	27.6	44.95	NA
					Income (Low vs High)	0.79 [a] (0.41, 1.50)							
Rehkopf[2]	2015	US (High)	IHD	OR	Education (Medium vs High)	1.01 (1.01, 1.02)	9	47	78	8	NA	24	NA
					Income (Medium vs High)	0.99 (0.98,1.00)							
Geyer[3]	2006	Germany, Europe (High)	MI	RR	Education (Medium vs High)	3.41 (2.18, 5.35)	1	42.5	72.4	NA	NA	NA	NA
					Education (Low vs High)	4.06 (2.14, 7.67)							
					Income (Medium vs High)	1.48 (1.24, 1.76)							
					Income (Low vs High)	2.02 (1.83, 2.23)							
Honjo[4]	2008	Japan, Asia (High)	CHD	HR	Education (Medium vs High)	1.75 [b] (0.52, 5.88)	11	NA	0	2.36	7.28	14.82	NA
					Education (Low vs High)	1.28 [b] (0.67, 2.35)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (year)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Rawshani[5]	2015	Sweden, Europe (High)	CHD	HR	Education (Medium vs High)	1.16 [b, c] (1.09, 1.23)	14	39.27	53.82	100	11.81	NA	25.61
					Education (Low vs High)	1.35 [b, c] (1.10, 1.64)							
					Income (Medium vs High)	1.39 [c] (1.04, 1.86)	14	39.19	53.78	100	12.25	NA	25.6
					Income (Low vs High)	1.86 [c] (1.54, 2.24)							
Thurston[6]	2005	US (High)	CHD	HR	Education (Medium vs High)	1.22 [c] (0.95, 1.55)	13	47.42	45.64	3.75	38.11	6.54	25.59
					Education (Low vs High)	1.40 [c] (1.10, 1.77)							
					Income (Medium vs High)	1.24 [c] (1.05, 1.46)							
					Income (Low vs High)	1.23 [c] (1.05, 1.43)							
Salomaa[7]	2000	Finland, Europe (High)	MI	RR	Education (Low vs High)	1.49 [c] (1.42, 1.56)	2	NA	NA	NA	NA	NA	NA
					Income (Low vs High)	1.72 [c] (1.65, 1.79)							
Andersen[8]	2003	Demark, Europe (High)	IHD	HR	Income (Medium vs High)	1.18 [c] (1.05, 1.32)	9	52.71	46.41	NA	36.15	NA	24.96
					Income (Low vs High)	1.45 [c] (1.30, 1.63)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Hetemaa[9]	2006	Finland, Europe (High)	MI	HR	Education (Medium vs High)	0.77 [c] (0.68, 0.86)	13	67.34	61.83	16.25	NA	32.08	NA
					Education (Low vs High)	0.67 [c] (0.60, 0.75)							
					Income (Medium vs High)	0.83 [c] (0.77, 0.90)							
					Income (Low vs High)	0.67 [c] (0.61, 0.73)							
Peter[10]	2007	Germany, Europe (High)	IHD	HR	Education (Medium vs High)	0.29 [c] (0.24, 0.35)	0	38.85	53.58	NA	NA	NA	NA
					Education (Low vs High)	0.61 [c] (0.49, 0.76)							
					Income (Medium vs High)	1.81 [c] (1.39, 2.36)							
					Income (Low vs High)	2.98 [c] (2.17, 4.10)							
			MI	HR	Education (Medium vs High)	0.25 [c] (0.18, 0.35)							
					Education (Low vs High)	0.64 [c] (0.45, 0.91)							
					Income (Medium vs High)	2.39 [c] (1.55, 3.67)							
					Income (Low vs High)	4.06 [c] (2.36, 6.97)							
Lammintausta [11]	2012	Finland, Europe (High)	MI	RR	Income (Medium vs High)	1.90 [c] (1.69, 2.14)	2	56.74	44.94	NA	NA	NA	NA
					Income (Low vs High)	2.82 [c] (2.56, 3.10)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Honjo[12]	2010	Japan, Asia (High)	CHD	HR	Education (Medium vs High) Education (Low vs High)	1.03 [b, c] (0.92, 1.15) 0.65 [b, c] (0.30, 1.40)	11	54.78	38.8	3.65	23.32	14.36	NA
Roux[13]	2001	US (High)	CHD	RR	Education (Medium vs High) Income (Medium vs High)	1.41 [c] (1.15, 1.73) 1.41 [c] (1.19, 1.68)	1	NA	NA	NA	NA	NA	NA
Fujino[14]	2005	Japan, Asia (High)	IHD	RR	Education (Medium vs High) Education (Low vs High)	0.88 [c] (0.68, 1.14) 0.85 [c] (0.68, 1.07)	5	66.08	NA	NA	21.72	NA	NA
Andersen[15]	2005	Denmark, Europe (High)	MI	HR	Income (Medium vs High) Income (Low vs High)	1.05 (0.84, 1.31) 1.17 (0.85, 1.61)	11	49.5	57.34	NA	36.23	NA	NA
Lynch[16]	1996	Finland, Europe (High)	MI	HR	Income (Medium vs High) Income (Low vs High)	1.91 (0.79, 4.63) 2.30 (1.21, 4.37)	23	NA	100	NA	NA	NA	NA
Lee[17]	2000	Taiwan, Asia (High)	CAD	OR	Education (Low vs High)	1.25 [b] (0.83, 1.67)	0	NA	47.28	8.55	31.62	28.4	23.84
Weikert[18]	2008	Germany, Europe (High)	MI	RR	Education (Medium vs High) Education (Low vs High)	1.18 (0.85, 1.63) 1.22 (0.91, 1.62)	2	54.5	64.5	10.4	22.9	58.5	26.9

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Hippe[19]	1999	Demark, Europe (High)	MI	RR	Education (Medium vs High)	1.36 [b, c] (1.25, 1.49)	2	66	53.49	NA	NA	NA	NA
					Education (Low vs High)	1.71 [b, c] (1.41, 2.07)							
Huisman[20]	2008	Netherlands, Europe (High)	MI	RR	Education (Low vs High)	1.72 (1.06, 2.80)	10	42.33	67.5	NA	NA	NA	NA
Eaker[21]	1992	US (High)	MI	HR	Education (Medium vs High)	1.60 (0.70, 3.70)	6	54	0	NA	NA	NA	NA
					Education (Low vs High)	2.5 (1.00, 6.10)							
Bosma[22]	1995	Lithuania, Europe (High)	MI	RR	Education (Medium vs High)	1.40 (0.80, 2.46)	2	51.6	100	NA	72.64	NA	27.19
					Education (Low vs High)	1.42 (0.83, 2.45)							
		Netherlands, Europe (High)			Education (Medium vs High)	0.78 (0.46, 1.31)	2	52.4	100	NA	92.23	NA	25.5
					Education (Low vs High)	0.68 (0.38, 1.23)							
Chaix[23]	2007	Sweden, Europe (High)	IHD	HR	Education (Low vs High)	1.38 (1.24, 1.53)	10	NA	NA	NA	NA	NA	NA
					Income (Medium vs High)	1.30 (1.10, 1.52)							
					Income (Low vs High)	1.65 (1.38, 1.97)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(a) Coronary artery diseases													
Kuper[24]	2006	Sweden, Europe (High)	MI	HR	Education (Medium vs High) Education (Low vs High)	1.70 (1.10, 2.50) 1.90 (1.30, 2.80)	7	40.24	0	1.34	59.27	9.27	23.49
Lapidus & Bengtsson[25]	1986	Sweden, Europe (High)	MI	RR	Education (Low vs High)	1.50 (0.60, 3.50)	1	NA	0	NA	NA	NA	NA
(b) Cardiovascular events													
Braig[26]	2011	Germany, Europe (High)	CVE (MI with Stroke)	OR	Education (Medium vs High) Education (Low vs High)	1.22 (0.94, 1.59) 1.83 (1.52, 2.21)	5	50	59.61	1.69	24.17	NA	26.13
Jakobsen[27]	2012	Demark, Europe (High)	CVE	HR	Education (Medium vs High) Education (Low vs High)	0.94 (0.77, 1.15) 0.87 (0.71, 1.07)	25	NA	75	6.5	48.72	NA	NA
					Income (Medium vs High) Income (Low vs High)	1.15 (0.97, 1.36) 1.06 (0.87, 1.29)	25	NA	73.19	9.5	46.34	NA	NA
Panagiotakos [28]	2016	Greek, Europe (High)	CVE	HR	Education (Medium vs High) Education (Low vs High)	0.78 (0.41, 1.51) 1.31 (0.63, 2.74)	9	45.45	49.75	8.96	54.6	31.78	26.32

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(b) Cardiovascular events													
Rasmussen [29]	2007	Demark, Europe (High)	RV (CVE)	HR	Education (Medium vs High)	1.04 [b] (1.02, 1.05)	2	60.8	71.07	4.26	NA	NA	NA
					Education (Low vs High)	1.01 [b] (0.95, 1.06)							
					Income (Medium vs High)	0.96 [b] (0.95, 0.97)	2	60.66	71.05	9.5	NA	NA	NA
					Income (Low vs High)	0.89 [b] (0.85, 0.94)							
Senan & Petrosyan[30]	2014	India, Asia (Lower-middle)	CVE	RR	Education (Low vs High)	1.22 [b, c] (1.19, 1.25)	4	NA	75.14	NA	NA	NA	NA
					Income (Low vs High)	1.15 [b, c] (1.14, 1.16)							
Bosma[31]	2005	Netherlands, Europe (High)	CVE	HR	Education (Medium vs High)	1.15 (0.84, 1.57)	10	69.69	41.69	5.43	NA	20.37	NA
					Education (Low vs High)	1.24 (0.92, 1.68)							
					Income (Medium vs High)	1.30 (0.94, 1.79)							
					Income (Low vs High)	1.21 (0.89, 1.64)							
Masoudkabir [32]	2012	Iran, Asia (Upper-middle)	CVE (IHD with stroke)	HR	Education (Medium vs High)	1.14 [b] (0.88, 1.47)	5	58.81	45.4	21.8	25.7	59.8	27.28
					Education (Low vs High)	0.99 [b] (0.52, 1.89)							
					Income (Medium vs High)	1.05 [b] (0.98, 1.12)							
					Income (Low vs High)	1.18 [b] (0.81, 1.70)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(b) Cardiovascular events													
Minh[33]	2006	Vietnam, Asia (Lower-middle)	CVE	RR	Education (Low vs High)	4.50 (3.40, 5.80)	2	41.6	53.61	NA	NA	Na	NA
					Income (Low vs High)	1.25 [b] (0.83, 1.67)							
Hirokawa[34]	2006	Japan, Asia (High)	CVE	HR	Education (Medium vs High)	1.67 [c] (0.90, 3.09)	13	54.98	61.19	NA	24.99	35.1	23.02
					Education (Low vs High)	2.01 [c] (1.04, 3.91)							
Siegel[35]	1987	US (High)	CVE	HR	Education (Medium vs High)	0.59 (0.26, 1.33)	11	72.85	36.48	NA	11.3	NA	NA
He[36]	2001	US (High)	HF	RR	Education (Medium vs High)	1.22 [c] (1.05, 1.41)	14	49.77	40.64	3.82	35	28.2	25.6
Christensen [37]	2011	Demark, Europe (High)	HF	HR	Education (Low vs High)	1.27 [b] (1.19, 1.36)	12	52.4	45.25	2.87	63.43	6.25	25.15
					Income (Medium vs High)	1.13 [b, c] (1.08, 1.17)	0	52.4	45.25	2.87	63.43	6.25	25.15
					Income (Low vs High)	1.51 [b, c] (1.28, 1.78)							
Borne[38]	2011	Sweden, Europe (High)	HF	HR	Income (Medium vs High)	0.97 [b ,c] (0.96, 0.98)	4	60.8	44.4	NA	NA	NA	NA
					Income (Low vs High)	1.67 [b, c] (1.61, 1.73)							
Philbin[39]	2001	US (High)	HF	OR	Income (Medium vs High)	1.08 (1.01, 1.16)	6	74	43	33	NA	45	NA
					Income (Low vs High)	1.18 (1.10, 1.26)							
Schwarz & Elman[40]	2003	US (High)	HF	HR	Education (Medium vs High)	0.51 (0.26, 1.02)	0	78	50	42	NA	33	NA

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(b) Cardiovascular events													
Sui[41]	2008	US (High)	HF	HR	Education (Medium vs High)	1.63 (0.94, 2.81)	0	63.7	78	27.52	NA	46.48	NA
			CVE	HR	Education (Medium vs High)	1.55 (1.05, 2.30)							
Rosvall[42]	2006	Sweden, Europe (High)	CVE	HR	Education (Medium vs High)	1.59 (0.89, 2.80)	2	59.18	44.41	8.14	30.28	18.16	25.4
					Education (Low vs High)	2.19 (1.29, 3.73)							
Engstrom[43]	2000	Sweden, Europe (High)	CVE	HR	Education (Medium vs High)	2.77 [b] (1.46, 5.27)	6	51	0	13	72	31	24.6
					Education (Low vs High)	2.86 [b] (0.91, 9.09)							
Notara[44]	2016	Greek, Europe (High)	CVE	HR	Education (Medium vs High)	1.61 (1.23, 2.08)	9	66.11	75.97	31.54	NA	53.64	NA
					Education (Low vs High)	1.25 (0.88, 1.78)							
(c) Strokes													
Weikert[18]	2008	Germany, Europe (High)	Stroke	RR	Education (Medium vs High)	1.66 (1.13, 2.45)	2	55.9	64.5	13.8	12.4	63.8	26.8
					Education (Low vs High)	1.63 (1.14, 2.33)							
Lapidus & Bengtsson [25]	1986	Sweden, Europe (High)	Stroke	RR	Education (Low vs High)	1.30 (0.40, 4.10)	1	NA	0	NA	NA	NA	NA

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(c) Strokes													
Avendano & Glymour[45]	2008	US (High)	Stroke	HR	Education (Medium vs High)	1.07 [b, c] (0.97, 1.18)	17	67.7	43	21	22	21	27
					Education (Low vs High)	0.96 [b, c] (0.86, 1.08)							
					Income (Medium vs High)	1.00 [b, c] (0.99, 1.01)							
					Income (Low vs High)	1.08 [b, c] (1.01, 1.16)							
Rawshani[5]	2015	Sweden, Europe (High)	Stroke	HR	Education (Medium vs High)	1.42 [b, c] (1.31, 1.55)	14	39.27	53.82	100	11.81	NA	25.61
					Education (Low vs High)	1.82 [b, c] (1.33, 2.50)							
					Income (Medium vs High)	1.29 [c] (0.88, 1.69)	14	39.19	53.78	100	12.25	NA	25.60
					Income (Low vs High)	2.09 [c] (1.62, 2.69)							
Li[46]	2008	Sweden, Europe (High)	Stroke	RR	Income (Medium vs High)	1.41 [c] (1.21, 1.63)	4	62.7	48.88	NA	NA	NA	NA
					Income (Low vs High)	1.45 [c] (1.24, 1.70)							
Rossum[47]	1999	Netherlands, Europe (High)	Stroke	RR	Education (Medium vs High)	0.90 [b] (0.83, 25.0)	12	71	0	4.5	18.7	35.8	26.8
					Education (Low vs High)	4.79 [b] (1.48, 15.5)							
					Income (Medium vs High)	1.42 [b] (1.04, 1.96)							
					Income (Low vs High)	1.75 [b] (0.81, 3.85)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(c) Strokes													
Gillum & Mussolino [48]	2003	US (High)	Stroke	RR	Education (Medium vs High) Education (Low vs High)	0.85 [b, c] (0.84, 0.86) 1.16 [b, c] (0.90, 1.49)	9	62	47.3	7.48	29.81	19.47	NA
Kuper[49]	2007	Sweden, Europe (High)	Stroke	HR	Education (Medium vs High) Education (Low vs High)	1.20 (0.90, 1.80) 1.5 (1.00, 2.20)	7	40.27	0	1.3	59.42	9.24	23.49
Jackson[50]	2014	Australia, Asia (High)	Stroke	OR	Education (Medium vs High) Education (Low vs High)	1.57 (0.95, 2.61) 1.52 (0.99, 2.33)	11	49.5	0	3.68	16.91	24.53	25.94
Honjo[12]	2010	Japan, Asia (High)	Stroke	HR	Education (Medium vs High) Education (Low vs High)	1.38 [b, c] (1.24, 1.54) 1.04 [b, c] (0.65, 1.67)	11	54.78	38.8	3.65	23.32	14.36	NA
Fujino[14]	2005	Japan, Asia (High)	Stroke	RR	Education (Medium vs High) Education (Low vs High)	1.14 [c] (0.98, 1.33) 1.22 [c] (1.01, 1.47)	5	66.08	NA	NA	21.72	NA	NA
Lee[17]	2000	Taiwan, Asia (High)	Stroke	OR	Education (Low vs High)	1.67 [b] (0.91, 2.50)	0	NA	47.28	8.55	31.62	28.4	23.84
Honjo[4]	2008	Japan, Asia (High)	Stroke	HR	Education (Medium vs High) Education (Low vs High)	0.74 [b] (0.51, 1.09) 1.10 [b] (0.96, 1.28)	11	NA	0	2.36	7.28	NA	NA

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(c) Strokes													
Arrich[1]	2005	Austria, Europe (High)	Stroke	RR	Education (Medium vs High)	1.90 [a] (1.56, 2.31)	0	66.71	54.28	25.27	26.46	66.98	NA
					Education (Low vs High)	2.07 [a] (1.68, 2.55)							
					Income (Medium vs High)	1.29 [a] (1.16, 1.42)	0	65.5	54.35	27.03	27.6	44.95	NA
					Income (Low vs High)	1.25 [a] (0.89, 1.76)							
Andersen[51]	2014	Denmark, Europe (High)	Stroke	RR	Education (Medium vs High)	1.17 [b] (1.15, 1.18)	4	71.9	52.5	12.48	27.43	46.9	NA
					Education (Low vs High)	1.17 [b] (1.15, 1.22)							
					Income (Medium vs High)	1.51 [b] (1.49, 1.52)							
					Income (Low vs High)	1.35 [b] (1.34, 1.37)							
Avendano [52]	2006	US (High)	Stroke	HR	Education (Medium vs High)	0.89 (0.54, 1.47)	12	NA	NA	NA	NA	NA	NA
					Education (Low vs High)	0.73 (0.51, 1.04)							
					Income (Medium vs High)	0.74 (0.44, 1.26)							
					Income (Low vs High)	0.70 (0.47, 1.06)							
(d) Cardiovascular deaths													
Lynch[16]	1996	Finland, Europe (High)	Death due to CVE	HR	Income (Medium vs High)	0.34 (0.13, 0.93)	23	NA	100	NA	NA	NA	NA
					Income (Low vs High)	0.72 (0.39, 1.34)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Jakovljevic [53]	2001	Finland, Europe (High)	Death due to stroke	HR	Education (Low vs High)	1.19 (1.05, 1.33)	4	NA	71.31	NA	NA	NA	NA
					Income (Medium vs High)	1.36 (1.13, 1.64)							
					Income (Low vs High)	1.72 (1.45, 2.05)							
Zhou[54]	2006	China, Asia (High)	Death due to stroke	HR	Education (Medium vs High)	1.02 (0.57, 1.83)	9	77.2	54.8	26.5	27.7	NA	NA
					Education (Low vs High)	0.88 (0.46, 1.68)							
					Income (Low vs High)	3.37 (2.34, 4.87)							
Beebe-Dimmer[55]	2004	US (High)	Death due to IHD or stroke	HR	Education (Medium vs High)	0.99 (0.80, 1.21)	7	44	0	NA	40.3	NA	NA
					Education (Low vs High)	1 (0.79, 1.28)							
					Income (Low vs High)	1.45 (1.20, 1.74)							
Jakobsen[27]	2012	Demark, Europe (High)	Death due to CVE	HR	Education (Medium vs High)	0.82 (0.57, 1.16)	25	NA	75	6.5	48.72	NA	NA
					Education (Low vs High)	0.74 (0.52, 1.04)							
					Income (Medium vs High)	1.05 (0.77, 1.44)	25	NA	73.19	9.5	47.25	NA	NA
					Income (Low vs High)	1.22 (0.88, 1.69)							
Kim[56]	2005	US (High)	Death due to CVE	OR	Education (Low vs High)	1.41 (1.28, 1.56)	3	45.03	0	NA	NA	NA	NA

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Geyer[3]	2006	Sweden, Europe (High)	Death due to MI	RR	Education (Medium vs High)	1.22 (1.14, 1.30)	1	47.8	49.3	NA	NA	NA	NA
					Education (Low vs High)	1.41 (1.31, 1.50)							
					Income (Medium vs High)	1.38 (1.27, 1.51)							
					Income (Low vs High)	2.20 (2.09, 2.31)							
Qureshi[57]	2003	US (High)	Death due to stroke	RR	Education (Medium vs High)	1.37 [c] (1.09, 1.71)	9	50.73	42.4	3.98	26.45	NA	25.82
			Death due to MI	RR	Education (Medium vs High)	1.36 [c] (1.18, 1.57)							
Pednekar[58]	2011	India, Asia (Lower-middle)	Death due to CVE	HR	Education (Low vs High)	1.15 [b, c] (1.14, 1.17)	5	51.72	59.83	NA	9.93	NA	NA
			Death due to IHD	HR	Education (Low vs High)	1.05 [b, c] (1.04, 1.07)							
			Death due to stroke	HR	Education (Low vs High)	2.31 [b, c] (1.98, 2.68)							
Rawshani[5]	2015	Sweden, Europe (High)	Death due to CVE	HR	Education (Medium vs High)	1.54 [c] (1.41, 1.68)	11	39.27	53.82	100	11.81	NA	25.61
					Education (Low vs High)	1.27 [c] (0.94, 1.70)							
					Income (Medium vs High)	1.92 [c] (1.31, 2.81)	14	39.19	53.78	NA	12.25	NA	25.6
					Income (Low vs High)	3.40 [c] (2.64, 4.37)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Coady[59]	2014	US (High)	Death due to MI	HR	Education (Medium vs High)	1.04 [c] (0.96, 1.13)	9	78	49.64	28.31	NA	54.95	NA
					Education (Low vs High)	1.08 [c] (0.99, 1.17)							
Gallo[60]	2012	Europe (High)	Death due to CVE	HR	Education (Medium vs High)	1.21 [b, c] (1.20, 1.23)	7	51.97	35.9	NA	27.29	NA	NA
					Education (Low vs High)	1.63 [b, c] (1.46, 1.82)							
			Death due to IHD	HR	Education (Medium vs High)	1.24 [b, c] (1.22, 1.26)							
					Education (Low vs High)	1.87 [b, c] (1.60, 2.19)							
			Death due to stroke	HR	Education (Medium vs High)	1.16 [b, c] (1.12, 1.19)							
					Education (Low vs High)	1.43 [b, c] (1.12, 1.83)							
Rasmussen [61]	2006	Demark, Europe (High)	Death due to MI	RR	Education (Medium vs High)	1.10 [c] (1.02, 1.19)	6	61.02	70.87	3.6	NA	NA	NA
					Education (Low vs High)	1.15 [c] (1.06, 1.25)							
					Income (Medium vs High)	1.14 [c] (1.08, 1.20)	6	61	60.2	3.58	NA	NA	NA
					Income (Low vs High)	1.42 [c] (1.35, 1.50)							
Salomaa[7]	2000	Finland, Europe (High)	Death due to MI	RR	Education (Low vs High)	1.96 [c] (1.84, 2.08)	2	NA	NA	NA	NA	NA	NA
					Income (Low vs High)	2.61 [c] (2.47, 2.76)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Bucher & Ragland[62]	1995	US (High)	Death due to CHD	RR	Education (Medium vs High)	1.54 (1.13, 2.09)	5	46.2	100	NA	NA	NA	NA
					Income (Low vs High)	2.07 (0.94, 4.57)							
			Death due to stroke	RR	Education (Medium vs High)	1.27 (0.97, 1.66)							
					Income (Low vs High)	1.08 (0.56, 2.08)							
Tonne[63]	2005	US (High)	Death due to MI	RR	Education (Medium vs High)	1.21 (1.05, 1.39)	13	69	58.1	31	NA	63.5	NA
					Education (Low vs High)	1.32 (1.15, 1.52)							
					Income (Medium vs High)	1.25 (1.04, 1.52)							
					Income (Low vs High)	1.38 (1.14, 1.67)							
Chen[64]	2015	China, Asia (High)	Death due to stroke	HR	Education (Low vs High)	1.88 (1.05, 3.36)	14	73.4	46.1	10.2	22.6	72.5	NA
					Income (Low vs High)	1.64 (0.97, 2.78)							
Chaix[23]	2007	Sweden, Europe (High)	Death due to IHD	HR	Education (Low vs High)	1.46 (1.24, 1.73)	10	NA	NA	NA	NA	NA	NA
					Income (Medium vs High)	1.85 (1.43, 2.43)							
					Income (Low vs High)	2.83 (2.16, 3.82)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Ito[65]	2008	Japan, Asia (High)	Death due to CVE	HR	Education (Medium vs High)	1.15 [c] (0.77, 1.70)	14	NA	48.28	NA	28.75	NA	NA
					Education (Low vs High)	1.33 [c] (0.90, 1.97)							
Lee[17]	2000	Taiwan, Asia (High)	Death due to CVE	OR	Education (Low vs High)	1.25 [b] (0.83, 2.00)	0	NA	47.28	8.55	31.62	28.4	23.84
Minh[66]	2003	Vietnam, Asia (Lower-middle)	Death due to CVE	RR	Education (Low vs High)	1.00 (0.32, 3.13)	4	NA	75.2	NA	NA	NA	NA
Liu[67]	1982	Chicago, CHA, US (High)	Death due to CHD	RR	Education (Medium vs High)	2.12 (1.15, 3.89)	1	48.9	100	NA	40.2	NA	NA
					Education (Low vs High)	3.6 (1.99, 6.60)							
			Death due to CVE	RR	Education (Medium vs High)	2.49 (1.40, 4.44)							
					Education (Low vs High)	4.08 (2.31, 7.21)							
		Chicago, WEPG, US (High)	Death due to CHD	RR	Education (Medium vs High)	1.00 (0.63, 1.59)	1	48.56	100	NA	70.2	NA	NA
					Education (Low vs High)	1.62 (1.08, 2.44)							
			Death due to CVE	RR	Education (Medium vs High)	0.97 (0.62, 1.42)							
					Education (Low vs High)	1.52 (1.09, 2.11)							
Kilander[68]	2001	Sweden, Europe (High)	Death due to CVE and stroke	HR	Education (Medium vs High)	0.78 (0.48, 1.24)	17	NA	100	NA	50.59	NA	25.03
					Education (Low vs High)	1.01 (0.67, 1.52)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Schwarz & Elman[40]	2003	US (High)	Death due to HF	HR	Education (Medium vs High)	0.58 (0.10, 3.43)	0	78.67	61.9	NA	NA	NA	NA
Sui[41]	2008	US (High)	Death due to HF	HR	Education (Medium vs High)	1.58 (0.66, 3.78)	0	63.7	78	27.52	NA	46.48	NA
			Death due to CVE	HR	Education (Medium vs High)	1.60 (0.90, 2.84)							
Bosma[22]	1995	Lithuania, Europe (High)	Death due to CHD	RR	Education (Medium vs High)	1.06 (0.60, 1.90)	2	51.6	100	NA	72.64	NA	27.19
					Education (Low vs High)	1.08 (0.62, 1.88)							
			Death due to CVE	RR	Education (Medium vs High)	1.12 (0.67, 1.86)							
					Education (Low vs High)	1.16 (0.72, 1.88)							
		Netherlands, Europe (High)	Death due to CHD	RR	Education (Medium vs High)	1.78 (0.85, 3.70)	2	52.4	100	NA	92.23	NA	25.5
					Education (Low vs High)	1.06 (0.46, 2.43)							
			Death due to CVE	RR	Education (Medium vs High)	1.56 (0.88, 2.77)							
					Education (Low vs High)	1.40 (0.76, 2.58)							
Lapidus & Bengtsson [25]	1986	Sweden, Europe (High)	Death due to CVE	RR	Education (Low vs High)	1.2 (0.7, 2.0)	1	NA	0	NA	NA	NA	NA
Notara[44]	2016	Greece, Europe (High)	Death due to ACS	HR	Education (Medium vs High)	1.72 (1.35, 2.22)	9	66.11	75.97	31.54	NA	53.64	NA
					Education (Low vs High)	1.33 (0.93, 1.92)							

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Rawshani[69]	2016	Sweden, Europe (High)	Death due to CVE	HR	Education (Medium vs High)	1.08 [b] (1.04, 1.10)	16	58.25	60.38	100	17.16	NA	30.33
					Education (Low vs High)	1.19 [b] (1.10, 1.28)							
					Income (Medium vs High)	1.54 (1.42, 1.68)							
					Income (Low vs High)	1.87 (1.76, 1.99)							
Lammintausta[11]	2012	Finland, Europe (High)	Death due to MI	RR	Income (Medium vs High)	2.68 [c] (2.12, 3.24)	2	56.74	44.94	NA	NA	NA	NA
					Income (Low vs High)	4.78 [c] (4.13, 5.54)							
Li[46]	2008	Sweden, Europe (High)	Death due to stroke	RR	Income (Medium vs High)	1.32 [c] (0.90, 1.93)	4	62.7	48.88	NA	NA	NA	NA
					Income (Low vs High)	1.90 [c] (1.32, 2.72)							
Rosvall[70]	2008	Sweden, Europe (High)	Death due to MI	HR	Income (Medium vs High)	1.09 [b, c] (1.05, 1.14)	1	70.39	65.43	7.38	NA	8.04	NA
					Income (Low vs High)	1.26 [b, c] (1.22, 1.30)							
Khang[71]	2007	South Korea, Asia (High)	Death due to CVE	RR	Income (Low vs High)	1.35 [c] (1.25, 1.45)	5	43.14	100	NA	57.19	NA	NA
			Death due to IHD	RR	Income (Low vs High)	1.20 [c] (1.05, 1.36)							
Rosvall[72]	2008	Sweden, Europe (High)	Death due to MI	OR	Income (Low vs High)	1.23 [c] (1.18, 1.28)	2	63.8	70.54	NA	NA	NA	NA

Supplement Table 1. Characteristics of included studied (continued)

Author	Year	Country, Setting (income level)	Outcome	Risk measure	Study factors (Categories)	Relative Risks (95%CI)	NC	Mean Age (years)	Male (%)	DM (%)	Smoking (%)	HT (%)	Mean BMI (kg/m^2)
(d) Cardiovascular deaths													
Arrich[1]	2005	Austria, Europe (High)	Death due to stroke	HR	Education (Medium vs High)	0.85 (0.60, 1.19)	9	66.71	54.28	25.27	26.46	66.98	NA
					Education (Low vs High)	0.86 (0.56, 1.32)							
					Income (Medium vs High)	1.64 (1.23, 2.17)	0	65.5	54.35	27.03	27.6	44.95	NA
					Income (Low vs High)	1.07 (0.26, 4.39)							

RR, Relative risk, OR, Odds ratio; HR, Hazard ratio; NC; Number of controlled variable; DM, Diabetes Mellitus; HT, Hypertension; BMI, Body Mass Index; IHD, Ischemic Heart Disease; MI, Myocardial infarction; CHD, Coronary heart disease; CAD, Coronary artery disease; CVE, Cardiovascular events; RV, Revascularization; HF, Heart failure; ACS, Acute coronary syndrome; US, United States; CHA, Chicago Heart Association Detection Project; WEPG, Chicago Western Electric Company Study and Peoples Gas Company Studies; NA, Not available (or) not reported;

[a], RR (95%CI) was recalculated based on raw/frequency data reported in original article;

[b], RR (95%CI) was recalculated by reversing original RR if the medium or lowest category of education or income was used as a reference group;

[c], RR (95%CI) was recalculated by pooling separate subgroup RRs (weighted by inverse of their variance) to obtain a single estimate from each study

Supplement Table 2. Risk of bias assessment of included studies

Authors	Year	Selection			Comparability	Outcome				Total stars
		Representativeness of cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest	Comparability of cohorts	Assessment of outcome	Adequate duration of follow up	Adequate follow up of cohort	
Andersen *et al.*[8]	2003	a(*)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	c	8
Andersen *et al.*[15]	2005	a(*)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Andersen *et al.*[51]	2014	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Arrich *et al.*[1]	2005	b(*)	a(*)	b(*)	b	a(*), b(*)	b(*)	b	c	6
Avendano *et al.*[52]	2006	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Avendano & Glymour[45]	2008	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Beebe-Dimmer *et al.*[55]	2004	c (women)	a(*)	c	b	a(*), b(*)	b(*)	a(*)	b(*)	6
Borné *et al.*[38]	2011	a(*)	a(*)	c	a(*)	a(*)	b(*)	a(*)	b(*)	7
Bosma *et al.*[22]	1995	c (men)	a(*)	a(*)	b	a(*)	b(*)	a(*)	b(*)	6
Bosma *et al.*[31]	2005	a(*)	a(*)	c	a(*)	a(*), b(*)	b(*)	a(*)	d	7
Braig *et al.*[26]	2011	a(*)	a(*)	c	a(*)	a(*), b(*)	c	b	b(*)	6
Bucher & Ragland[62]	1995	c (men)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	d	6
Chaix *et al.*[23]	2007	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	c	7
Chen *et al.*[64]	2015	a(*)	a(*)	b(*)	b	a(*), b(*)	c	a(*)	b(*)	7

Supplement Table 2. Risk of bias assessment of included studies (continued)

Authors	Year	Selection				Comparability	Outcome			Total stars
		Representativeness of cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest	Comparability of cohorts	Assessment of outcome	Adequate duration of follow up	Adequate follow up of cohort	
Christensen *et al.*[37]	2011	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Coady *et al.*[59]	2014	a(*)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Eaker *et al.*[21]	1992	c (women)	a(*)	b(*)	b	a(*), b(*)	a(*)	a(*)	b(*)	7
Engström *et al.*[43]	2000	c (women)	a(*)	a(*)	b	a(*), b(*)	b(*)	a(*)	d	6
Fujino *et al.*[14]	2005	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	c	7
Gallo *et al.*[60]	2012	a(*)	a(*)	b(*)	b	a(*), b(*)	b(*)	a(*)	b(*)	8
Geyer *et al.*[3]	2006	a(*)	a(*)	a(*)	b	a(*)	b(*)	a(*)	d	6
Gillum & Mussolino[48]	2003	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
He *et al.*[36]	2001	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Hetemaa *et al.*[9]	2006	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	b	d	6
Hippe *et al.*[19]	1999	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Hirokawa *et al.*[34]	2006	a(*)	a(*)	c	a(*)	a(*), b(*)	b(*)	a(*)	c	7
Honjo *et al.*[4]	2008	c (women)	a(*)	c	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	7
Honjo *et al.*[12]	2010	a(*)	a(*)	c	a(*)	a(*), b(*)	a(*)	a(*)	c	7
Huisman *et al.*[20]	2008	a(*)	a(*)	c	a(*)	a(*)	b(*)	a(*)	c	6

Supplement Table 2. Risk of bias assessment of included studies (continued)

Authors	Year	Selection			Comparability	Outcome				Total stars
		Representativeness of cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest	Comparability of cohorts	Assessment of outcome	Adequate duration of follow up	Adequate follow up of cohort	
Ito *et al.*[65]	2008	a(*)	a(*)	c	a(*)	a(*), b(*)	b(*)	a(*)	c	7
Jackson *et al.*[50]	2014	c (women)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	b	c	6
Jakobsen *et al.*[27]	2012	a(*)	a(*)	a(*)	b	a(*), b(*)	b(*)	a(*)	b(*)	8
Jakovljević *et al.*[53]	2001	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	a(*)	8
Khang *et al.*[71]	2007	c (men)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	8
Kilander *et al.*[68]	2001	c (men)	a(*)	b(*)	b	a(*), b(*)	b(*)	a(*)	b(*)	7
Kim *et al.*[56]	2005	c (women)	a(*)	b(*)	b	a(*)	b(*)	a(*)	b(*)	6
Kuper *et al.*[24]	2006	c (women)	a(*)	c	b	a(*), b(*)	b(*)	a(*)	b(*)	6
Kuper *et al.*[49]	2007	c (women)	a(*)	c	a(*)	a(*), b(*)	b(*)	a(*)	c	6
Lammintausta *et al.*[11]	2012	a(*)	a(*)	a(*)	a(*)	-	a(*)	a(*)	d	6
Lapidus & Bengtsson[25]	1986	c (women)	a(*)	b(*)	a(*)	a(*)	a(*)	a(*)	b(*)	7
Lee *et al.*[17]	2000	a(*)	a(*)	b(*)	b	-	a(*)	a(*)	b(*)	6
Li *et al.*[46]	2008	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Liu *et al.*[67]	1982	c (men)	a(*)	b(*)	b	a(*)	b(*)	a(*)	b(*)	6

Supplement Table 2. Risk of bias assessment of included studies (continued)

Authors	Year	Selection				Comparability	Outcome			Total stars
		Representativeness of cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest	Comparability of cohorts	Assessment of outcome	Adequate duration of follow up	Adequate follow up of cohort	
Lynch *et al.*[16]	1996	c (men)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	c	7
Masoudkabir *et al.*[32]	2012	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	a(*)	a(*)	b(*)	9
Minh *et al.*[66]	2003	a(*)	a(*)	b(*)	b	a(*)	a(*)	b	d	5
Minh *et al.*[33]	2006	a(*)	a(*)	b(*)	b	a(*)	a(*)	a(*)	d	6
Notara *et al.*[44]	2016	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	a(*)	a(*)	b(*)	9
Panagiotakos *et al.*[28]	2016	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	c	8
Pednekar *et al.*[58]	2011	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Peter *et al.*[10]	2007	a(*)	a(*)	a(*)	a(*)	-	b(*)	b	d	5
Philbin *et al.*[39]	2001	a(*)	a(*)	a(*)	b	a(*)	b(*)	b	b(*)	6
Qureshi *et al.*[57]	2003	a(*)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Rasmussen *et al.*[61]	2006	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Rasmussen *et al.*[29]	2007	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Rawshani *et al.*[5]	2015	c (dm)	a(*)	a(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	8
Rawshani *et al.*[69]	2016	c (dm)	a(*)	a(*)	d	a(*)	b(*)	a(*)	b(*)	6

Supplement Table 2. Risk of bias assessment of included studies (continued)

Authors	Year	Selection				Comparability	Outcome			Total stars
		Representativeness of cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest	Comparability of cohorts	Assessment of outcome	Adequate duration of follow up	Adequate follow up of cohort	
Rehkopf *et al.*[2]	2015	b(*)	a(*)	a(*)	b	a(*), b(*)	b(*)	a(*)	d	7
Rossum *et al.*[47]	1999	c (women)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	b	c	6
Rosvall *et al.*[42]	2006	a(*)	a(*)	c	a(*)	a(*)	b(*)	a(*)	b(*)	7
Rosvall *et al.*[70]	2008	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	d	7
Rosvall *et al.*[72]	2008	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	d	7
Roux *et al.*[13]	2001	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	c	7
Salomaa *et al.*[7]	2000	a(*)	a(*)	a(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Schwarz & Elman[40]	2003	a(*)	a(*)	b(*)	b	-	b(*)	b	b(*)	5
Senan & Petrosyan[30]	2014	b(*)	a(*)	c	a(*)	a(*)	c	a(*)	b(*)	6
Siegel *et al.*[35]	1987	c (elderly)	a(*)	b(*)	a(*)	a(*), b(*)	a(*)	b	d	6
Sui *et al.*[41]	2008	a(*)	a(*)	a(*)	b	-	b(*)	b	b(*)	5
Thurston *et al.*[6]	2005	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	b(*)	a(*)	b(*)	9
Tonne *et al.*[63]	2005	a(*)	a(*)	a(*)	b	a(*)	a(*)	a(*)	d	6
Weikert *et al.*[18]	2008	a(*)	a(*)	b(*)	a(*)	a(*)	b(*)	a(*)	b(*)	8
Zhou *et al.*[54]	2006	a(*)	a(*)	b(*)	a(*)	a(*), b(*)	a(*)	b	a(*)	8

Supplement Table 3

Pooled education and income effect on coronary artery diseases (subgroup analyses)

		Education				Income			
		n	RR (95% CI)	Q p-value	I^2	n	RR (95% CI)	Q p-value	I^2
Number of adjusted variables									
≤ 5	Medium vs High	10	0.97 (0.65, 1.45)	0.888	97	6	1.57 (1.30, 1.91)	<0.001	87
	Low vs High	12	1.22 (0.94, 1.57)	0.130	93	6	2.12 (1.52, 2.96)	<0.001	98
> 5	Medium vs High	8	1.14 (0.98, 1.32)	0.085	95	8	1.14 (0.99, 1.31)	0.059	92
	Low vs High	9	1.28 (1.02, 1.61)	0.035	89	7	1.29 (0.98, 1.68)	0.066	95
Age (years)									
≤ 60	Medium vs High	12	1.05 (0.70, 1.57)	0.817	99	9	1.42 (1.32, 1.52)	<0.001	95
	Low vs High	12	1.28 (0.99, 1.65)	0.058	85	8	1.83 (1.82, 1.84)	<0.001	97
> 60	Medium vs High	4	1.00 (0.77, 1.30)	0.999	92	2	0.94 (0.73, 1.20)	0.600	89
	Low vs High	4	1.05 (0.69, 1.59)	0.821	95	2	0.72 (0.51, 1.01)	0.060	18
Male percentage									
≤ 60	Medium vs High	10	0.94 (0.64, 1.38)	0.759	99	8	1.43 (1.16, 1.76)	0.001	91
	Low vs High	12	1.25 (0.99, 1.58)	0.060	85	8	1.82 (1.30, 2.56)	<0.001	96
> 60	Medium vs High	6	1.26 (0.85, 1.86)	0.246	97	4	1.16 (0.85, 1.59)	0.356	98
	Low vs High	6	1.25 (0.78, 2.01)	0.359	92	3	1.28 (0.70, 2.32)	0.419	99
Diabetes percentage									
≤ 8	Medium vs High	5	1.16 (0.95, 1.42)	0.136	83	2	NA	NA	NA
	Low vs High	4	1.25 (0.83, 1.88)	0.295	64	1	NA	NA	NA
> 8	Medium vs High	4	1.03 (0.87, 1.22)	0.733	87	2	0.94 (0.73, 1.20)	0.600	89
	Low vs High	5	1.11 (0.84, 1.46)	0.465	89	2	0.72 (0.51, 1.01)	0.060	18
BMI (kg/m^2)									
< 25	Medium vs High	1	NA	NA	NA	1	NA	NA	NA
	Low vs High	2	NA	NA	NA	1	NA	NA	NA
≥ 25	Medium vs High	5	1.16 (1.10, 1.23)	<0.001	0	2	1.31 (1.07, 1.59)	0.007	29
	Low vs High	5	1.30 (1.15, 1.47)	<0.001	0	2	1.50 (1.00, 2.26)	0.050	91
Smoking percentage									
< 30	Medium vs High	6	1.07 (0.97, 1.19)	0.166	48	2	1.21 (0.90, 1.62)	0.203	69
	Low vs High	6	1.13 (0.94, 1.37)	0.192	58	2	1.26 (0.53, 2.98)	0.600	85
≥ 30	Medium vs High	4	1.21 (0.89, 1.63)	0.225	61	3	1.17 (1.07, 1.29)	0.001	0
	Low vs High	5	1.32 (0.98, 1.77)	0.066	68	3	1.32 (1.14, 1.53)	<0.001	51

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%);BMI, Body Mass Index; NA, Not available or insufficient data;

Supplement Table 4

Pooled education and income effect on cardiovascular events (subgroup analyses)

		Education				Income			
		n	RR (95% CI)	Q p-value	I^2	n	RR (95% CI)	Q p-value	I^2
Number of adjusted variables									
≤ 5	Medium vs High	7	1.25 (1.03, 1.52)	0.027	71	5	1.05 (0.97, 1.13)	0.249	99
	Low vs High	6	1.69 (1.07, 2.68)	0.025	99	5	1.31 (1.01, 1.69)	0.039	98
> 5	Medium vs High	8	1.28 (1.03, 1.60)	0.028	74	3	1.11 (1.00, 1.23)	0.052	9
	Low vs High	7	1.22 (0.98, 1.51)	0.074	72	3	1.16 (1.05, 1.28)	0.004	7
Age (years)									
≤ 60	Medium vs High	7	1.35 (1.06, 1.70)	0.014	61	2	1.09 (1.01, 1.16)	0.018	68
	Low vs High	8	1.93 (1.35, 2.76)	<0.001	92	3	1.34 (1.10, 1.64)	0.004	38
> 60	Medium vs High	7	1.17 (0.90, 1.53)	0.248	79	4	1.01 (0.93, 1.09)	0.900	99
	Low vs High	3	1.09 (0.90, 1.31)	0.393	65	4	1.21 (0.92, 1.58)	0.167	99
Male percentage									
≤ 60	Medium vs High	9	1.21 (0.95, 1.55)	0.128	79	5	1.07 (1.00, 1.14)	0.054	89
	Low vs High	8	1.61 (1.10, 2.37)	0.015	95	6	1.35 (1.18, 1.55)	<0.001	88
> 60	Medium vs High	6	1.31 (1.17, 1.48)	<0.001	81	3	1.08 (0.94, 1.23)	0.282	99
	Low vs High	5	1.17 (1.00, 1.38)	0.047	94	2	0.99 (0.83, 1.19)	0.955	65
Diabetes percentage									
≤ 8	Medium vs High	6	1.11 (1.02, 1.21)	0.020	51	3	1.05 (0.94, 1.17)	0.394	95
	Low vs High	6	1.23 (0.99, 1.53)	0.058	95	3	1.18 (0.86, 1.63)	0.308	92
> 8	Medium vs High	7	1.46 (1.07, 1.99)	0.016	74	3	1.07 (1.02, 1.12)	0.005	0
	Low vs High	4	1.35 (0.83, 2.19)	0.231	72	3	1.17 (1.10, 1.24)	<0.001	0
BMI (kg/m^2)									
< 25	Medium vs High	2	2.14 (1.26, 3.63)	0.005	29	0	NA	NA	NA
	Low vs High	2	2.26 (1.17, 4.37)	0.016	8	0	NA	NA	NA
≥ 25	Medium vs High	5	1.20 (1.06, 1.35)	0.003	5	2	1.09 (1.01, 1.18)	0.025	73
	Low vs High	5	1.50 (1.16, 1.93)	0.002	74	2	1.35 (1.01, 1.81)	0.043	54
Smoking percentage									
< 30	Medium vs High	4	1.18 (0.98, 1.42)	0.078	8	1	NA	NA	NA
	Low vs High	3	1.61 (1.06, 2.47)	0.027	44	1	NA	NA	NA
≥ 30	Medium vs High	5	1.29 (0.95, 1.75)	0.099	77	1	NA	NA	NA
	Low vs High	5	1.39 (0.93, 2.09)	0.109	88	1	NA	NA	NA

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%);BMI, Body Mass Index; NA, Not available or insufficient data;

Supplement Table 5

Pooled education and income effect on strokes (subgroup analyses)

		Education				Income			
		n	RR (95% CI)	Q p-value	I^2	n	RR (95% CI)	Q p-value	I^2
Number of adjusted variables									
≤ 5	Medium vs High	4	1.43 (1.15, 1.77)	0.001	90	3	1.41 (1.27, 1.56)	<0.001	76
	Low vs High	6	1.48 (1.17, 1.87)	0.001	85	3	1.38 (1.24, 1.52)	<0.001	5
> 5	Medium vs High	9	1.13 (0.93, 1.36)	0.221	95	4	1.10 (0.86, 1.40)	0.463	78
	Low vs High	9	1.23 (0.99, 1.53)	0.055	80	4	1.32 (0.79, 2.20)	0.292	93
Age (years)									
≤ 60	Medium vs High	5	1.41 (1.32, 1.50)	<0.001	0	1	NA	NA	NA
	Low vs High	5	1.54 (1.30, 1.83)	<0.001	0	1	NA	NA	NA
> 60	Medium vs High	6	1.23 (0.93, 1.63)	0.147	99	5	1.31 (1.19, 1.45)	<0.001	99
	Low vs High	6	1.31 (0.97, 1.75)	0.073	95	5	1.26 (1.19, 1.33)	<0.001	83
Male percentage									
≤ 60	Medium vs High	10	1.26 (1.05, 1.50)	0.011	99	6	1.32 (1.14, 1.53)	<0.001	99
	Low vs High	12	1.37 (1.15, 1.63)	<0.001	87	6	1.40 (1.16, 1.68)	<0.001	94
> 60	Medium vs High	1	NA	NA	NA	0	NA	NA	NA
	Low vs High	1	NA	NA	NA	0	NA	NA	NA
Diabetes percentage									
≤ 8	Medium vs High	6	1.12 (0.83, 1.51)	0.445	93	1	NA	NA	NA
	Low vs High	6	1.28 (1.05, 1.57)	0.014	33	1	NA	NA	NA
> 8	Medium vs High	5	1.37 (1.15, 1.63)	<0.001	95	4	1.25 (1.06, 1.47)	0.008	99
	Low vs High	6	1.48 (1.15, 1.89)	0.002	93	4	1.31 (1.30, 1.31)	<0.001	98
BMI (kg/m^2)									
< 25	Medium vs High	1	NA	NA	NA	0	NA	NA	NA
	Low vs High	2	NA	NA	NA	0	NA	NA	NA
≥ 25	Medium vs High	5	1.35 (1.12, 1.64)	0.002	76	3	1.19 (0.94, 1.51)	0.139	72
	Low vs High	5	1.55 (1.07, 2.23)	0.019	80	3	1.61 (1.01, 2.55)	0.044	90
Smoking percentage									
< 30	Medium vs High	11	1.26 (1.07, 1.50)	0.007	99	5	1.29 (1.09, 1.54)	0.003	99
	Low vs High	11	1.35 (1.13, 1.60)	0.001	89	5	1.41 (1.11, 1.79)	0.006	96
≥ 30	Medium vs High	1	NA	NA	NA	0	NA	NA	NA
	Low vs High	2	NA	NA	NA	0	NA	NA	NA

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%);BMI, Body Mass Index; NA, Not available or insufficient data;

Supplement Table 6

Pooled education and income effect on cardiovascular deaths (subgroup analyses)

		Education				Income			
		n	RR (95% CI)	Q p-value	I^2	n	RR (95% CI)	Q p-value	I^2
Number of adjusted variables									
≤ 5	Medium vs High	14	1.29 (1.15, 1.44)	<0.001	51	6	1.34 (1.13, 1.60)	0.001	95
	Low vs High	18	1.53 (1.31, 1.79)	<0.001	99	12	1.81 (1.40, 2.34)	<0.001	99
> 5	Medium vs High	17	1.16 (1.07, 1.26)	0.001	98	7	1.37 (1.07, 1.76)	0.013	96
	Low vs High	17	1.28 (1.14, 1.44)	<0.001	88	10	1.73 (1.30, 2.30)	<0.001	97
Age (years)									
≤ 60	Medium vs High	18	1.26 (1.16, 1.38)	<0.001	98	4	1.43 (1.10, 1.87)	0.008	96
	Low vs High	18	1.53 (1.31, 1.78)	<0.001	99	9	1.94 (1.40, 2.71)	<0.001	99
> 60	Medium vs High	9	1.18 (1.00, 1.39)	0.047	81	5	1.26 (1.08, 1.47)	0.004	93
	Low vs High	7	1.21 (1.05, 1.40)	0.009	78	8	1.65 (1.30, 2.09)	<0.001	98
Male percentage									
≤ 60	Medium vs High	13	1.19 (1.00, 1.29)	<0.001	98	6	1.55 (1.25, 1.92)	<0.001	88
	Low vs High	18	1.35 (1.20, 1.53)	<0.001	99	9	2.31 (1.72, 3.10)	<0.001	95
> 60	Medium vs High	18	1.25 (1.08, 1.45)	0.002	88	6	1.14 (1.01, 1.28)	0.028	93
	Low vs High	15	1.41 (1.17, 1.69)	<0.001	91	11	1.35 (1.19, 1.54)	<0.001	96
Diabetes percentage									
≤ 8	Medium vs High	4	1.15 (0.93, 1.42)	0.205	85	2	1.12 (1.06, 1.18)	<0.001	61
	Low vs High	2	1.22 (0.78, 1.90)	0.375	89	2	1.33 (1.18, 1.50)	<0.001	93
> 8	Medium vs High	9	1.23 (1.05, 1.45)	0.012	94	4	1.47 (1.20, 1.81)	<0.001	83
	Low vs High	9	1.24 (1.11, 1.40)	<0.001	65	6	1.76 (1.32, 2.36)	<0.001	88
BMI (kg/m^2)									
< 25	Medium vs High	0	NA	NA	NA	0	NA	NA	NA
	Low vs High	1	NA	NA	NA	0	NA	NA	NA
≥ 25	Medium vs High	9	1.27 (1.09, 1.47)	0.002	84	2	1.71 (1.29, 2.27)	<0.001	54
	Low vs High	7	1.21 (1.07, 1.36)	0.002	2	2	2.49 (1.39, 4.47)	0.002	95
Smoking percentage									
< 30	Medium vs High	10	1.21 (1.10, 1.33)	<0.001	99	3	1.65 (1.39, 1.97)	<0.001	34
	Low vs High	12	1.39 (1.18, 1.65)	<0.001	99	5	2.38 (1.71, 3.33)	<0.001	83
≥ 30	Medium vs High	11	1.18 (0.95, 1.47)	0.129	64	0	NA	NA	NA
	Low vs High	12	1.42 (1.06, 1.89)	0.018	81	3	1.32 (1.21, 1.44)	<0.001	38

n, Number of studies; RR, Relative risk; CI, Confidence Interval; Q p-value, P-value for Q test for heterogeneity, I^2, I^2 statistics (%);BMI, Body Mass Index; NA, Not available or insufficient data;

References

1. Arrich J, Lalouschek W and Müllner M. Influence of socioeconomic status on mortality after stroke: Retrospective cohort study. *Stroke*. 2005; 36: 310-4.
2. Rehkopf DH, Eisen EA, Modrek S, et al. Early-Life State-of-Residence Characteristics and Later Life Hypertension, Diabetes, and Ischemic Heart Disease. *Am J Public Health*. 2015; 105: 1689-95.
3. Geyer S, Hemström Ö, Peter R and Vågerö D. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. *Journal of epidemiology and community health*. 2006; 60: 804-10.
4. Honjo K, Iso H, Inoue M, Tsugane S and Group JS. Education, Social Roles, and the Risk of Cardiovascular Disease Among Middle-Aged Japanese Women The JPHC Study Cohort I. *Stroke*. 2008; 39: 2886-90.
5. Rawshani A, Svensson AM, Rosengren A, Eliasson B and Gudbjörnsdottir S. Impact of socioeconomic status on cardiovascular disease and mortality in 24,947 individuals with type 1 diabetes. *Diabetes Care*. 2015; 38: 1518-27.
6. Thurston RC, Kubzansky LD, Kawachi I and Berkman LF. Is the association between socioeconomic position and coronary heart disease stronger in women than in men? *American Journal of Epidemiology*. 2005; 162: 57-65.
7. Salomaa V, Niemelä M, Miettinen H, et al. Relationship of socioeconomic status to the incidence and prehospital, 28-day, and 1-year mortality rates of acute coronary events in the FINMONICA myocardial infarction register study. *Circulation*. 2000; 101: 1913-8.
8. Andersen I, Osler M, Petersen L, Grønbæk M and Prescott E. Income and risk of ischaemic heart disease in men and women in a Nordic welfare country. *International Journal of Epidemiology*. 2003; 32: 367-74.

9. Hetemaa T, Manderbacka K, Reunanen A, Koskinen S and Keskimäki I. Socioeconomic inequities in invasive cardiac procedures among patients with incident angina pectoris or myocardial infarction. *Scandinavian Journal of Public Health*. 2006; 34: 116-23.

10. Peter R, Gässler H and Geyer S. Socioeconomic status, status inconsistency and risk of ischaemic heart disease: A prospective study among members of a statutory health insurance company. *Journal of Epidemiology and Community Health*. 2007; 61: 605-11.

11. Lammintausta A, Immonen-Räihä P, Airaksinen JKE, et al. Socioeconomic Inequalities in the Morbidity and Mortality of Acute Coronary Events in Finland: 1988 to 2002. *Annals of Epidemiology*. 2012; 22: 87-93.

12. Honjo K, Tsutsumi A, Kayaba K and Group JMSCS. Socioeconomic indicators and cardiovascular disease incidence among Japanese community residents: the Jichi Medical School Cohort Study. *International journal of behavioral medicine*. 2010; 17: 58-66.

13. Roux AVD, Merkin SS, Arnett D, et al. Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine*. 2001; 345: 99-106.

14. Fujino Y, Tamakoshi A, Iso H, et al. A nationwide cohort study of educational background and major causes of death among the elderly population in Japan. *Preventive medicine*. 2005; 40: 444-51.

15. Andersen I, Gamborg M, Osler M, Prescott E and Diderichsen F. Income as mediator of the effect of occupation on the risk of myocardial infarction: does the income measurement matter? *Journal of epidemiology and community health*. 2005; 59: 1080-5.

16. Lynch JW, Kaplan GA, Cohen RD, Tuomilehto J and Salonen JT. Do cardiovascular risk factors explain the relation between socioeconomic status, risk of all-cause mortality,

cardiovascular mortality, and acute myocardial infarction? *American journal of epidemiology*. 1996; 144: 934-42.

17. Lee Y-T, Lin RS, Sung FC, et al. Chin-Shan Community Cardiovascular Cohort in Taiwan–baseline data and five-year follow-up morbidity and mortality. *Journal of clinical epidemiology*. 2000; 53: 838-46.
18. Weikert C, Stefan N, Schulze MB, et al. Plasma fetuin-a levels and the risk of myocardial infarction and ischemic stroke. *Circulation*. 2008; 118: 2555-62.
19. Hippe M, Vestbo J, Hein HO, Borch-Johnsen K, Jensen G and Sørensen T. Familial predisposition and susceptibility to the effect of other risk factors for myocardial infarction. *Journal of epidemiology and community health*. 1999; 53: 269-76.
20. Huisman M, Van Lenthe F, Avendano M and Mackenbach J. The contribution of job characteristics to socioeconomic inequalities in incidence of myocardial infarction. *Social science & medicine*. 2008; 66: 2240-52.
21. Eaker ED, Pinsky J and Castelli WP. Myocardial infarction and coronary death among women: psychosocial predictors from a 20-year follow-up of women in the Framingham Study. *American Journal of Epidemiology*. 1992; 135: 854-64.
22. Bosma H, Appels A, Sturmans F, Grabauskas V and Gostautas A. Educational level of spouses and risk of mortality: the WHO Kaunas-Rotterdam Intervention Study (KRIS). *International Journal of Epidemiology*. 1995; 24: 119-26.
23. Chaix B, Rosvall M and Merlo J. Neighborhood socioeconomic deprivation and residential instability: effects on incidence of ischemic heart disease and survival after myocardial infarction. *Epidemiology*. 2007; 18: 104-11.

24. Kuper H, Adami H-O, Theorell T and Weiderpass E. Psychosocial determinants of coronary heart disease in middle-aged women: a prospective study in Sweden. *American Journal of Epidemiology*. 2006; 164: 349-57.

25. Lapidus L and Bengtsson C. Socioeconomic factors and physical activity in relation to cardiovascular disease and death. A 12 year follow up of participants in a population study of women in Gothenburg, Sweden. *British heart journal*. 1986; 55: 295-301.

26. Braig S, Peter R, Nagel G, Hermann S, Rohrmann S and Linseisen J. The impact of social status inconsistency on cardiovascular risk factors, myocardial infarction and stroke in the EPIC-Heidelberg cohort. *BMC Public Health*. 2011; 11.

27. Jakobsen L, Niemann T, Thorsgaard N, et al. Dimensions of socioeconomic status and clinical outcome after primary percutaneous coronary intervention. *Circulation Cardiovascular interventions*. 2012; 5: 641-8.

28. Panagiotakos D, Georgousopoulou E, Notara V, et al. Education status determines 10-year (2002-2012) survival from cardiovascular disease in Athens metropolitan area: the ATTICA study, Greece. *Health & social care in the community*. 2016; 24: 334-44.

29. Rasmussen JN, Rasmussen S, Gislason GH, et al. Persistent socio-economic differences in revascularization after acute myocardial infarction despite a universal health care system - A Danish study. *Cardiovascular Drugs and Therapy*. 2007; 21: 449-57.

30. Senan M and Petrosyan A. The relationship between socioeconomic status and cardiovascular events. *Georgian medical news*. 2014: 42-7.

31. Bosma H, Van Jaarsveld C, Tuinstra J, et al. Low control beliefs, classical coronary risk factors, and socio-economic differences in heart disease in older persons. *Social science & medicine*. 2005; 60: 737-45.

32. Masoudkabir F, Toghianifar N, Talaie M, et al. Socioeconomic status and incident cardiovascular disease in a developing country: Findings from the Isfahan cohort study (ICS). *International Journal of Public Health*. 2012; 57: 561-8.

33. Van Minh H, Huong DL, Wall S, Byass P and Chuc NTK. Peer Reviewed: Cardiovascular Disease Mortality and Its Association With Socioeconomic Status: Findings From a Population-based Cohort Study in Rural Vietnam, 1999–2003. *Preventing chronic disease*. 2006; 3.

34. Hirokawa K, Tsutusmi A and Kayaba K. Impacts of educational level and employment status on mortality for Japanese women and men: the Jichi Medical School cohort study. *European journal of epidemiology*. 2006; 21: 641-51.

35. SIEGEL D, KULLER L, LAZARUS NB, et al. Predictors of cardiovascular events and mortality in the Systolic Hypertension in the Elderly Program pilot project. *American journal of epidemiology*. 1987; 126: 385-99.

36. He J, Ogden LG, Bazzano LA, Vupputuri S, Loria C and Whelton PK. Risk factors for congestive heart failure in US men and women: NHANES I epidemiologic follow-up study. *Archives of internal medicine*. 2001; 161: 996-1002.

37. Christensen S, Mogelvang R, Heitmann M and Prescott E. Level of education and risk of heart failure: a prospective cohort study with echocardiography evaluation. *European heart journal*. 2011; 32: 450-8.

38. Borné Y, Engström G, Essén B, Sundquist J and Hedblad B. Country of birth and risk of hospitalization due to heart failure: a Swedish population-based cohort study. *European journal of epidemiology*. 2011; 26: 275-83.

39. Philbin EF, Dec GW, Jenkins PL and DiSalvo TG. Socioeconomic status as an independent risk factor for hospital readmission for heart failure. *The American journal of cardiology*. 2001; 87: 1367-71.

40. Schwarz KA and Elman CS. Identification of factors predictive of hospital readmissions for patients with heart failure. *Heart & Lung: The Journal of Acute and Critical Care*. 2003; 32: 88-99.

41. Sui X, Gheorghiade M, Zannad F, Young JB and Ahmed A. A propensity matched study of the association of education and outcomes in chronic heart failure. *International journal of cardiology*. 2008; 129: 93-9.

42. Rosvall M, Engström G, Hedblad B, Janzon L and Göran B. The role of preclinical atherosclerosis in the explanation of educational differences in incidence of coronary events. *Atherosclerosis*. 2006; 187: 251-6.

43. Engström G, Tydén P, Berglund G, Hansen O, Hedblad B and Janzon L. Incidence of myocardial infarction in women. A cohort study of risk factors and modifiers of effect. *Journal of epidemiology and community health*. 2000; 54: 104-7.

44. Notara V, Panagiotakos D, Kogias Y, et al. The impact of education status on the 10-year (2004-2014) cardiovascular disease incidence and all cause mortality, among Acute Coronary Syndrome patients: the GREECS longitudinal study. *Journal of Preventive Medicine and Public Health*. 2016.

45. Avendano M and Glymour MM. Stroke disparities in older Americans: is wealth a more powerful indicator of risk than income and education? *Stroke*. 2008; 39: 1533-40.

46. Li C, Hedblad B, Rosvall M, Buchwald F, Khan FA and Engström G. Stroke incidence, recurrence, and case-fatality in relation to socioeconomic position a population-based study of middle-aged swedish men and women. *Stroke*. 2008; 39: 2191-6.

47. van Rossum CT, van de Mheen H, Breteler MM, Grobbee DE and Mackenbach JP. Socioeconomic differences in stroke among Dutch elderly women the Rotterdam Study. *Stroke*. 1999; 30: 357-62.

48. Gillum R and Mussolino ME. Education, poverty, and stroke incidence in whites and blacks: the NHANES I Epidemiologic Follow-up Study. *Journal of clinical epidemiology*. 2003; 56: 188-95.

49. Kuper H, Adami H-O, Theorell T and Weiderpass E. The socioeconomic gradient in the incidence of stroke a prospective study in middle-aged women in Sweden. *Stroke*. 2007; 38: 27-33.

50. Jackson CA, Jones M and Mishra GD. Educational and homeownership inequalities in stroke incidence: a population-based longitudinal study of mid-aged women. *The European Journal of Public Health*. 2014; 24: 231-6.

51. Andersen KK, Steding-Jessen M, Dalton SO and Olsen TS. Socioeconomic position and incidence of ischemic stroke in denmark 2003-2012. A nationwide hospital-based study. *Journal of the American Heart Association*. 2014; 3.

52. Avendano M, Kawachi I, Van Lenthe F, et al. Socioeconomic status and stroke incidence in the US elderly: the role of risk factors in the EPESE study. *Stroke*. 2006; 37: 1368-73.

53. Jakovljević D, Sarti C, Sivenius J, et al. Socioeconomic status and ischemic stroke: The FINMONICA stroke register. *Stroke*. 2001; 32: 1492-8.

54. Zhou G, Liu X, Xu G, Liu X, Zhang R and Zhu W. The effect of socioeconomic status on three-year mortality after first-ever ischemic stroke in Nanjing, China. *BMC Public Health*. 2006; 6.

55. Beebe-Dimmer J, Lynch JW, Turrell G, Lustgarten S, Raghunathan T and Kaplan GA. Childhood and Adult Socioeconomic Conditions and 31-Year Mortality Risk in Women. *American Journal of Epidemiology*. 2004; 159: 481-90.

56. Kim C, Eby E and Piette JD. Is education associated with mortality for breast cancer and cardiovascular disease among black and white women? *Gender Medicine*. 2005; 2: 13-8.

57. Qureshi AI, Suri MFK, Saad M and Hopkins LN. Educational attainment and risk of stroke and myocardial infarction. *Medical Science Monitor*. 2003; 9: CR466-CR73.

58. Pednekar MS, Gupta R and Gupta PC. Illiteracy, low educational status, and cardiovascular mortality in India. *BMC Public Health*. 2011; 11: 1.

59. Coady SA, Johnson NJ, Hakes JK and Sorlie PD. Individual education, area income, and mortality and recurrence of myocardial infarction in a Medicare cohort: the National Longitudinal Mortality Study. *BMC Public Health*. 2014; 14: 705.

60. Gallo V, Mackenbach JP, Ezzati M, et al. Social inequalities and mortality in Europe–results from a large multi-national cohort. *PLoS One*. 2012; 7: e39013.

61. Rasmussen JN, Rasmussen S, Gislason GH, et al. Mortality after acute myocardial infarction according to income and education. *J Epidemiol Community Health*. 2006; 60: 351-6.

62. Bucher HC and Ragland DR. Socioeconomic indicators and mortality from coronary heart disease and cancer: a 22-year follow-up of middle-aged men. *Am J Public Health*. 1995; 85: 1231-6.

63. Tonne C, Schwartz J, Mittleman M, Melly S, Suh H and Goldberg R. Long-term survival after acute myocardial infarction is lower in more deprived neighborhoods. *Circulation*. 2005; 111: 3063-70.

64. Chen R, Hu Z, Chen R-L, et al. Socioeconomic deprivation and survival after stroke in China: a systematic literature review and a new population-based cohort study. *BMJ open*. 2015; 5: e005688.

65. Ito S, Takachi R, Inoue M, et al. Education in relation to incidence of and mortality from cancer and cardiovascular disease in Japan. *The European Journal of Public Health*. 2008; 18: 466-72.

66. Van Minh H, Byass P and Wall S. Mortality from cardiovascular diseases in Bavi District, Vietnam. *Scandinavian Journal of Public Health*. 2003; 31: 26-31.

67. Liu K, Cedres LB, Stamler J, et al. Relationship of education to major risk factors and death from coronary heart disease, cardiovascular diseases and all causes, Findings of three Chicago epidemiologic studies. *Circulation*. 1982; 66: 1308.

68. Kilander L, Berglund L, Boberg M, Vessby B and Lithell H. Education, lifestyle factors and mortality from cardiovascular disease and cancer. A 25-year follow-up of Swedish 50-year-old men. *International Journal of Epidemiology*. 2001; 30: 1119-26.

69. Rawshani A, Svensson A-M, Zethelius B, Eliasson B, Rosengren A and Gudbjörnsdottir S. Association Between Socioeconomic Status and Mortality, Cardiovascular Disease, and Cancer in Patients With Type 2 Diabetes. *JAMA Internal Medicine*. 2016.

70. Rosvall M, Chaix B, Lynch J, Lindström M and Merlo J. The association between socioeconomic position, use of revascularization procedures and five-year survival after recovery from acute myocardial infarction. *BMC Public Health*. 2008; 8: 1.

71. Khang Y-H, Lynch J, Jung-Choi K and Cho H-J. Explaining age specific inequalities in mortality from all causes, cardiovascular disease and ischaemic heart disease among South Korean male public servants: relative and absolute perspectives. *Heart*. 2007.

72. Rosvall M, Gerward S, Engström G and Hedblad B. Income and short-term case fatality after myocardial infarction in the whole middle-aged population of Malmö, Sweden. *The European Journal of Public Health*. 2008; 18: 533-8.