| **First Author, Year****Study Name****AHI Cutpoints** | **All-Cause Mortality, n Events, Adjusted HR/OR (95% CI)** | **Cardiovascular Mortality, n Events, Adjusted HR/OR (95% CI)** | **Other Disease-Specific Mortality, n Events, Adjusted HR/OR (95% CI)** | **Covariates Included in the Final Adjusted Model (Other Covariates Considered in the Study that Were Not Included in the Final Model)** |
| --- | --- | --- | --- | --- |
| Ensrud, 2012220NoneSevere: ≥30 Not Severe: < 30 | 180 deathsBase ModelOR 1.88 (1.15, 3.08)Multivariate modelOR 1.74 (1.04, 2.89) | NR | NR | Base: age, race, clinic site, health status, and BMIMultivariate: age, race, site, health status, BMI, education, social support, alcohol intake, smoking, antidepressant, benzodiazepine, nonbenzodiazepine sedative hypnotic use, medical conditions, cognition, and baseline frailty status. |
| Gooneratne, 2011223NoneSDB+ (AHI ≥20)/EDS+SBD-/EDS+SDB+(AHI ≥20)/EDS-  | 160 deathsHR:SDB-/EDS- = RefSDB+/EDS+ = 2.28 (1.46, 3.57)SBD-/EDS+ = 1.11 (0.75, 1.63)SDB+/EDS- = 0.74 (0.39, 1.38) | NR | NR | Final model included age, male gender, African American race, history of angina, habitual self-reported sleep duration > 8.5 h (other covariates considered: smoking, alcohol intake, BMI, habitual sleep parameters [self-reported sleep duration, sleep latency, sleep ef­ficiency], polysomnography sleep parameters [sleep duration, sleep latency, wakefulness after sleep onset, sleep efficiency], oxyhemoglobin desaturation [nadir in REM and NREM sleep during polysomnography], and 22 medical conditions [diabetes, emphysema, high blood pressure, heart attack, stroke, heart failure, etc.]). |
| Marin, 200550Untreated mild to mod: AHI 5-30Untreated Severe: AHI >30Treated OSA with CPAP: Any AHI >5Snorers: AHI <5Healthy controls: AHI <5 | NR | 81 fatal CV events (due to MI or stroke): 47 in untreated OSA participants; 13 in treated OSA group; 13 in simple snorers; and 8 in healthy menPartial adjusted ORUntreated mild to mod: 1.16 (0.55 to 2.11)Untreated severe: 3.02 (1.44 to 7.33)CPAP treated: 1.05 (0.45 to 2.09)Snorers: 1.03 (0.41 to 1.46)Fully adjusted ORUntreated mild to mod: 1.15 (0.34 to 2.69)Untreated severe: 2.87 (1.17 to 7.3)CPAP treated: 1.05 (0.39 to 2.21)Snorers: 1.03 (0.31 to 1.84) | NR | Partial: Age, diagnostic group, diabetes, lipid disorders, smoking status, alcohol use, systolic and diastolic blood pressure, blood glucose, total cholesterol. Triglycerides, and current use of antihypertensive, lipid-lowering and antidiabetic drugsFull: above plus hypertension and presence of cardiovascular disease—i.e., ischemic heart disease, congestive heart disease, or cerebrovascular disease.Used matching for age and BMI |
| Marshall, 2008228Marshall, 2014229Busselton Health Study*For 14 year followup*RDINo OSA: 0 to 4Mild: 5 to <15Mod to severe: ≥15*For 20 year followup:*Normal: < 5Mild 5 to <15Mod to severe: ≥15 | *For 14 year followup:*33 deaths (by group: 22, 5, and 6, respectively)Partially Adjusted HRNo OSA: RefMild: 0.62 (0.23 to 1.69)Mod to severe: 4.40 (1.48 to 13.07), P=0.008Fully Adjusted HRNo OSA: RefMild: 0.47 (0.17 to 1.29)Mod to severe: 6.24 (2.01 to 19.39), P=0.002*For 20 year followup:*77 deaths G1: RefG2: 0.51 (0.27 to 0.99)G3: 4.2 (1.9 to 9.2) | NR | NR | *For 14 year followup:*Partially adjusted for age, gender, BMI, smoking status, total cholesterol, HDL cholesterol, diabetes (yes/no), doctor diagnoses anginaFully adjusted: Everything in the partially adjusted model plus mean arterial pressure*For 20 year followup:*Adjusted for age, gender, body mass index (normal, overweight, obese), smoking status (never, ex, current), total cholesterol, high density lipoprotein cholesterol, mean arterial pressure, diabetes (yes/no), doctor-diagnosed angina (yes/no), and in mortality, stroke, and CHD models a history of cardiovascular disease (via record linkage yes/no). |
| Nieto, 2012221WSCSNormal: <5Mild: 5 to <15:Mod: 15 to <30 Severe: ≥30 | 112 deathsHR:Normal: RefMild: 1.8 (1.1 to 2.8)Mod: 1.1 (0.5 to 2.5)Severe: 3.4 (1.7 to 6.7) |  | 50 cancer-related deathsHR:Mild: 1.1 (0.5 to 2.7)Mod: 2.0 (0.7 to 5.5)Severe: 4.8 (1.7 to 13.2) | age, sex, BMI, smoking (analyses also with stratification for sleepiness and obesity; additional adjustment for alcohol use, physical activity, educational status, diabetes, waist circumference, and sleep duration did not materially change results [data NR]; analyses removing those treated with CPAP resulted in slightly increased HRs [data NR]) |
| Punjabi, 2009227SHHSNo SDB: <5Mild: 5-<15Mod: 15 to <30Severe: ≥30 | 1047 deathsDeaths by AHI: No SDB: 477Mild: 319Mod: 165Severe: 86All participantsAdjusted HR: Model 1No SDB: refMild: 0.90 (0.78 to 1.04)Mod: 1.16 (0.97 to 1.39)Severe: 1.30 (1.03 to 1.64)Adjusted HR: Model 2No SDB: refMild: 0.93 (0.80 to 1.07)Mod: 1.20 (1.00 to 1.44)Severe: 1.38 (1.08 to 1.75)Adjusted HR: Model 3No SDB: refMild: 0.93 (0.80 to 1.08)Mod: 1.17 (0.97 to 1.42)Severe: 1.46 (1.14 to 1.86)Men- all agesAdjusted HR: Model 1No SDB: refMild: 0.94 (0.78 to 1.15)Mod: 1.23 (0.98 to 1.54)Severe: 1.30 (0.98 to 1.72)Adjusted HR: Model 2No SDB: refMild: 0.99 (0.81 to 1.20)Mod: 1.30 (1.03 to 1.64)Severe: 1.42 (1.06 to 1.90)Adjusted HR: Model 3No SDB: refMild: 1.01 (0.83 to 1.24)Mod: 1.27 (1.00 to 1.65)Severe: 1.54 (1.15 to 2.08)Men- ≤70 yrsAdjusted HR: Model 1No SDB: refMild: 1.10 (0.81 to 1.48)Mod: 1.37 (0.96 to 1.95)Severe: 1.67 (1.09 to 2.55)Adjusted HR: Model 2No SDB: refMild: 1.16 (0.85 to 1.58)Mod: 1.44 (1.00 to 2.08)Severe: 1.88 (1.19 to 2.95)Adjusted HR: Model 3No SDB: refMild: 1.24 (0.90 to 1.71)Mod: 1.45 (0.98 to 2.14)Severe: 2.09 (1.31 to 3.33)Men- >70 yrsAdjusted HR: Model 1No SDB: refMild: 0.86 (0.67 to 1.11)Mod: 1.18 (0.87 to 1.58)Severe: 1.16 (0.80 to 1.69)Adjusted HR: Model 2No SDB: refMild: 0.89 (0.69 to 1.16)Mod: 1.25 (0.92 to 1.70)Severe: 1.25 (0.85 to 1.83)Adjusted HR: Model 3No SDB: refMild: 0.92 (0.70 to 1.20)Mod: 1.23 (0.90 to 1.68)Severe: 1.27 (0.86 to 1.86)Women – all agesAdjusted HR: Model 1No SDB: refMild: 0.84 (0.68 to 1.04)Mod: 1.05 (0.77 to 1.42)Severe: 1.34 (0.86 to 2.07)Adjusted HR: Model 2No SDB: refMild: 0.85 (0.68 to 1.06)Mod: 1.06 (0.78 to 1.43)Severe: 1.37 (0.88 to 2.13)Adjusted HR: Model 3No SDB: refMild: 0.83 (0.66 to 1.04)Mod: 1.01 (0.73 to 1.38)Severe: 1.40 (0.89 to 2.22)Women- ≤70 yrsAdjusted HR: Model 1No SDB: refMild: 1.00 (0.68 to 1.45)Mod: 1.11 (0.63 to 1.96)Severe: 1.73 (0.84 to 3.58)Adjusted HR: Model 2No SDB: refMild: 0.99 (0.66 to 1.47)Mod: 1.12 (0.62 to 2.02)Severe: 1.75 (0.82 to 3.74)Adjusted HR: Model 3No SDB: refMild: 0.97 (0.64 to 1.48)Mod: 1.15 (0.63 to 2.11)Severe: 1.76 (0.77 to 3.95)Women- >70 yrsAdjusted HR: Model 1No SDB: refMild: 0.77 (0.60 to 1.00)Mod: 0.98 (0.68 to 1.40)Severe: 1.09 (0.62 to 1.89)Adjusted HR: Model 2No SDB: refMild: 0.78 (0.60 to 1.02)Mod: 0.99 (0.69 to 1.42)Severe: 1.10 (0.63 to 1.92)Adjusted HR: Model 3No SDB: refMild: 0.77 (0.58 to 1.00)Mod: 0.89 (0.61 to 1.31)Severe: 1.14 (0.65 to 2.01) | CAD-specific mortality220 deathsLimited data reported. In men, AHI ≥15 had a fully adjusted HR 1.69 (1.13 to 2.52). In women, an association was not identified between SDB and CAD-related deaths | NR | Sex was included in all models that used all participantsModel 1: Age (continuous) and raceModel 2: Age (continuous), race, BMIModel 3: Age (continuous), race, BMI, smoking status (current, never, former), systolic and diastolic blood pressure, prevalent hypertension, diabetes, and CV disease |
| Young, 2008226WSCSNo SDB:<5Mild: 5 to <15Mod: 15 to <30Severe: ≥30 | 80 deathsAdjusted HR:No SDB: refMild: 1.6 (0.9 to 2.8)Mod: 1.4 (0.6 to 3.3)Severe: 3.0 (1.4 to 6.3)Adjusted HR accounting for comorbidity:No SDB: refMild: 1.5 (0.8 to 2.8)Mod: 1.3 (0.5 to 3.2)Severe: 2.7 (1.3 to 5.7)Adjusted HR excluding those treated with CPAP (n=1396):No SDB: refMild: 1.4 (0.7 to 2.6)Mod: 1.7 (0.7 to 4.1)Severe: 3.8 (1.6 to 9.0) | 25 deathsAdjusted HR:No SDB: refMild: 1.8 (0.7 to 4.9)Mod: 1.2 (0.3 to 5.8)Severe: 2.9 (0.8 to 10.0)Fully adjusted HR:Severe: 5.9 (2.6 to 13.3)Adjusted HR excluding those treated with CPAP (n=1396):No SDB: refMild: 1.3 (0.4 to 4.1)Mod: 1.5 (0.3 to 7.3)Severe: 5.2 (1.4 to 19.2) |  | Adjusted HRs: Age, age-squared, sex, BMI, BMI-squaredFully adjusted HR: Age, age-squared, sex, BMI, BMI-squared, smoking, alcohol use, general health status, educational status, neck girth, waist-hip ratio, sleep duration, and total cholesterol (authors did not consider this model robust for several reasons, including multicollinearity and potential model instability due to outliers and influential points which was of concern with a small number of outcomes; they just show this model to show that the adjusted HRs did not overestimate the HRs—if anything, they seem to underestimate them)Adjusted HRs also accounting for comorbidity: Age, age-squared, sex, BMI, BMI-squared, hypertension/use of HTN meds, self-reported diabetes, coronary artery disease, cardiovascular disease, heart failure, myocardial infarction, cardiac surgery, and stroke  |

**Abbreviations:** AHI=apnea-hypopnea index; BMI=body mass index; CAD=coronary artery disease; CI=confidence interval; CPAP=continuous positive airway pressure; CV=cardiovascular; EDS=excessive daytime sleepiness; HDL=high-density lipoprotein; HR=hazard ratio; HTN=hypertension; mod=moderate; MI=myocardial infarction; Mod=moderate; n=number; NR=not reported; NREM=non-rapid eye movement; OR=odds ratio; OSA=obstructive sleep apnea; RDI=respiratory disturbance index; Ref=reference; REM=rapid eye movement; SDB=sleep disordered breathing; SHHS=Sleep Heart Health Study; WSCS=Wisconsin Sleep Cohort Study.