# Table of Supplemental Contents

## List of Study Committees and Investigators in the China Kadoorie Biobank Collaborative Group

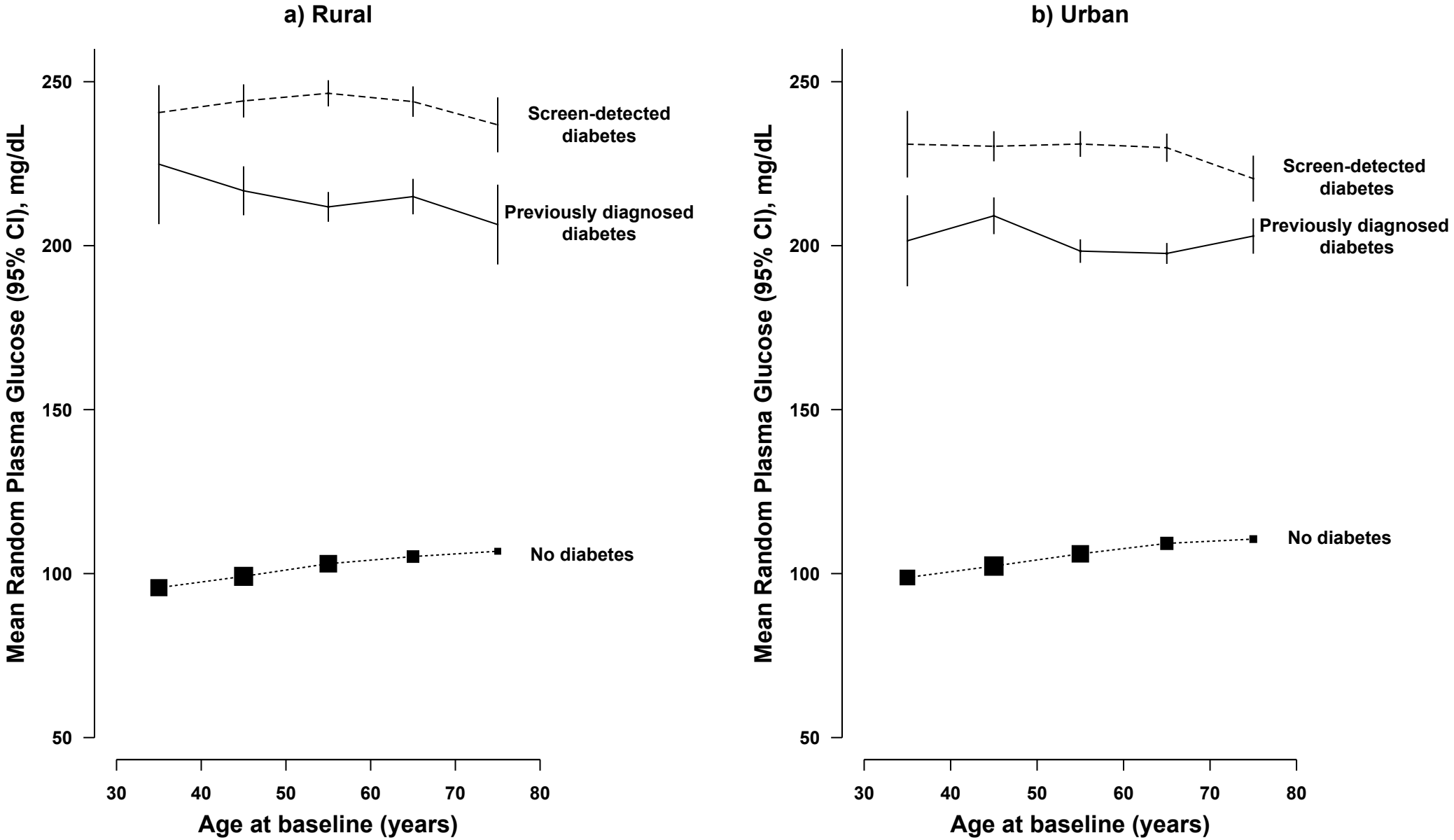
**International Steering Committee:** Junshi Chen, Zhengming Chen (PI), Rory Collins, Liming Li (PI), Richard Peto. **International Coordinating Centre, Oxford:** Daniel Avery, Derrick Bennett, Ruth Boxall, Yumei Chang, Yiping Chen, Zhengming Chen, Robert Clarke, Huaidong Du, Simon Gilbert, Michael Holmes, Andri Iona, Rene Kerosi, Ling Kong, Om Kurmi, Garry Lancaster, Sarah Lewington, Kuang Lin, John McDonnell, Winnie Mei, Iona Millwood, Qunhua Nie, Jayakrishnan Radhakrishnan, Paul Ryder, Sam Sansome, Dan Schmidt, Paul Sherliker, Rajani Sohoni, Iain Turnbull, Robin Walters, Jenny Wang, Lin Wang, Alex Williams, Ling Yang, Xiaoming Yang. **National Coordinating Centre, Beijing:** Zheng Bian, Ge Chen, Lei Guo, Yu Guo, Bingyang Han, Can Hou, Peng Liu, Jun Lv, Pei Pei, Shuzhen Qu, Yunlong Tan, Canqing Yu, Huiyan Zhou. **10 Regional Coordinating Centres: Qingdao** Qingdao CDC: Zengchang Pang, Shaojie Wang, Yun Zhang, Kui Zhang. Licang CDC: Silu Liu, Wei Hou. **Heilongjiang** Provincial CDC: Zhonghou Zhao, Shumei Liu, Zhigang Pang. Nangang CDC: Weijia Feng, Shuling Wu, Liqiu Yang, Huili Han, Hui He, Bo Yu. **Hainan** Provincial CDC: Xianhai Pan, Shanqing Wang, Hongmei Wang. Meilan CDC: Xinhua Hao, Chunxing Chen, Shuxiong Lin, Xiangyang Zheng. **Jiangsu** Provincial CDC: Xiaoshu Hu, Minghao Zhou, Ming Wu, Ran Tao. Suzhou CDC: Yeyuan Wang, Yihe Hu, Liangcai Ma, Renxian Zhou, Guanqun Xu, Yan Lu. **Guangxi** Provincial CDC: Baiqing Dong, Naying Chen, Ying Huang. Liuzhou CDC: Mingqiang Li, Jinhuai Meng, Zhigao Gan, Jiujiu Xu, Yun Liu, Jingxin Qing. **Sichuan** Provincial CDC: Xianping Wu, Yali Gao, Ningmei Zhang. Pengzhou CDC: Guojin Luo, Xiangsan Que, Xiaofang Chen. **Gansu** Provincial CDC: Pengfei Ge, Jian He, Xiaolan Ren. Maiji CDC: Hui Zhang, Enke Mao, Guanzhong Li, Zhongxiao Li, Jun He, Yulong Lei, Xiaoping Wang. **Henan** Provincial CDC: Guohua Liu, Baoyu Zhu, Gang Zhou, Shixian Feng. Huixian CDC: Yulian Gao, Tianyou He, Li Jiang, Jianhua Qin, Huarong Sun. **Zhejiang** Provincial CDC: Liqun Liu, Min Yu, Yaping Chen, Ruying Hu. Tongxiang CDC: Zhixiang Hu, Jianjin Hu, Yijian Qian, Zhiying Wu, Chunmei Wang, Lingli Chen. **Hunan** Provincial CDC: Wen Liu, Guangchun Li, Huilin Liu. Liuyang CDC: Xiangquan Long, Xin Xu, Youping Xiong, Zhongwen Tan, Xuqiu Xie, Yunfang Peng, Weifang Jia.

## eTable 1. ICD-10 codes for causes of death

| Cause of death | ICD-10 codes |
|---|---|
| **Cardiovascular disease** | |
| *Ischaemic heart disease (IHD)* | I20-I25 |
| *Stroke* | I60-I61, I63-I64 |
| *Other cardiovascular disease* | I00-I20, I28-I59, I62, I65-I88, I95-I99, E10.5, E11.5, E12.5, E13.5, E14.5 |
| **Respiratory disease** | |
| *Chronic obstructive pulmonary diseases (COPD)* | I26-I27, J41-J44 |
| *Other respiratory disease* | J00-J11,J19-J40, J45-J99 |
| **Cancer, by site** | |
| *Lung* | C33-C34 |
| *Liver* | C22 |
| *Stomach* | C16 |
| *Colorectal* | C18-C20 |
| *Oesophagus* | C15 |
| *Pancreas* | C25 |
| *Breast in women* | C50 |
| *Female reproductive system* | C53, C54.1, C56 |
| *Other cancer site* | C00-C14, C17, C21, C23-C24, C26-C32, C35-C50, C51-C52,C54.0, C54.2-C55, C57-C97 |
| **Chronic kidney disease (CKD)** | E10.2, E11.2, E12.2, E13.2, E14.2, I12.0, I12.9, I13.0-I13.2, I13.9, M10.3, M32.1, N02-N05, N08.3, N11-N13, N15, N18-N19, N25-N26, N27.1, N27.9, O10.2, O10.3, R94.4, T86.1, Z94.0 |
| **Diabetic ketoacidosis or coma** | |
| *Definite* | E10.0, E11.0, E12.0,E13.0, E14.0, E10.1, E11.1, E12.1,E13.1, E14.1 |
| *Probable (i.e. other unspecified diabetic deaths)* | E10.3, E11.3, E12.3,E13.3, E14.3, E10.4, E11.4, E12.4,E13.4, E14.4, E10.6, E11.6, E12.6, E13.6, E14.6, E10.7, E11.7, E12.7,E13.7, E14.7, E10.7, E11.7, E12.7,E13.7, E14.7,E10.8, E11.8, E12.8,E13.8, E14.8, E10.9, E11.9, E12.9, E13.9, E14.9, E10-E14 (without any decimal) |
| **Chronic liver disease** | |
| *Liver cirrhosis* | K70.3, K74 |
| *Viral hepatitis* | B18-B19, B25.1 |
| *Other chronic liver disease* | K70.0-K70.2, K70.4, K70.9, K72.1, K72.9, K73, K75.2-K75.4, K75.8-K75.9, P35.3, Z22.5 |
| **Infection** | |
| *Pneumonia* | J12-J18 |
| *Other infections* | A00-B17,B20-B24, B25.0, B25.2, B25.3, B25.4, B25.5, B25.6, B25.7, B25.8, B25.9, B26-B99, |
| **External causes (i.e. accident, suicide & violence)** | V01-Y98 |

# eFigure 1. Age-specific mean random plasma glucose levels by diabetic status in rural and urban areas

The size of each data marker is proportional to the number of participants at each age group and the error bars indicate the 95%CI. The point estimates on the x-axis represent the mean of each 10-year age group. The results were adjusted for sex and for geographic area




| | a) Rural | | | | |
|---|---|---|---|---|---|
| **No. of individuals:** | | | | | |
| **Screen-detected diabetes:** | 470 | 1481 | 2329 | 1547 | 410 |
| **Previously diagnosed diabetes:** | 187 | 964 | 2357 | 1638 | 348 |
| **No diabetes:** | 55085 | 80960 | 79239 | 41458 | 10450 |

| | b) Urban | | | | |
|---|---|---|---|---|---|
| **No. of individuals:** | | | | | |
| **Screen-detected diabetes:** | 420 | 1850 | 2747 | 2159 | 724 |
| **Previously diagnosed diabetes:** | 207 | 1495 | 3412 | 3936 | 1417 |
| **No diabetes:** | 35416 | 65088 | 59031 | 35888 | 11815 |

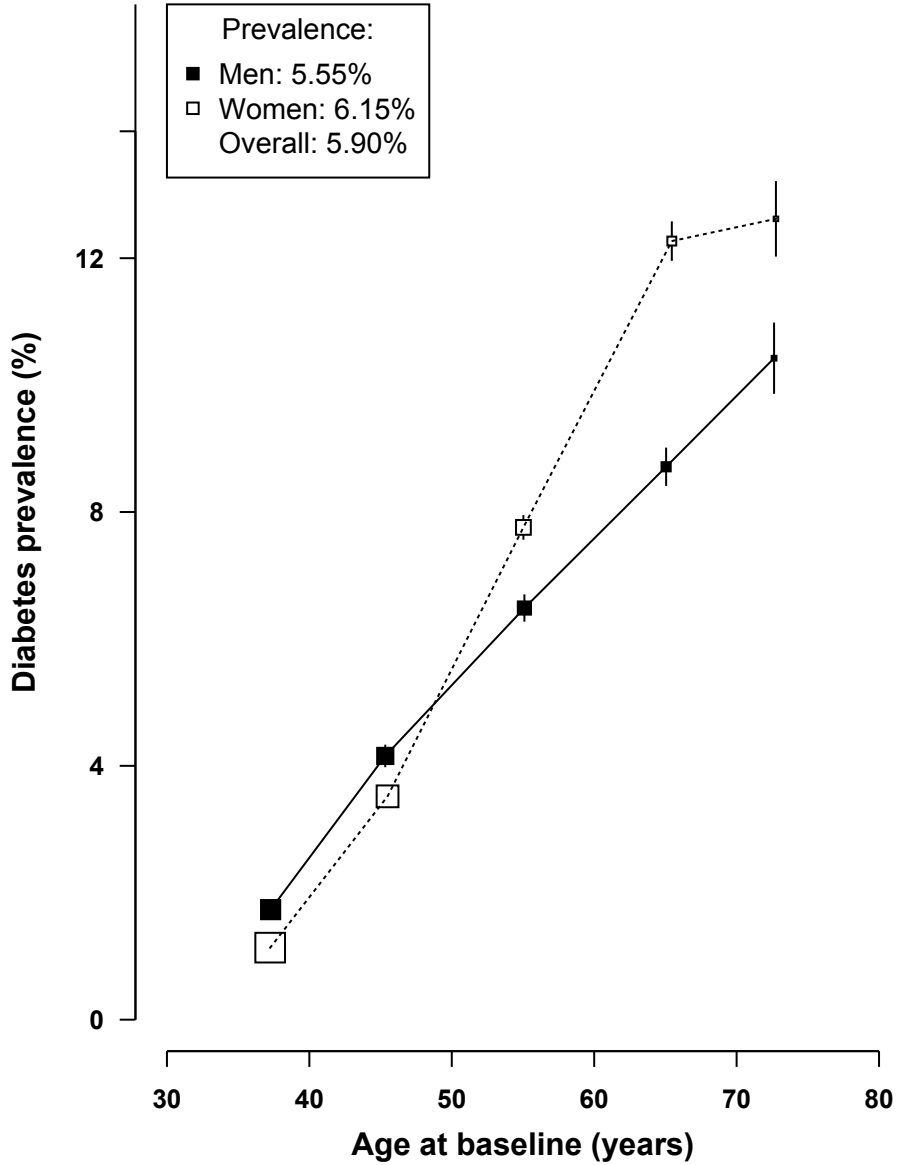
**eTable 2. Baseline characteristics by previously diagnosed and screen-detected diabetes**
(Standardised to distribution of total diabetes, hence not directly comparable to Table 1)

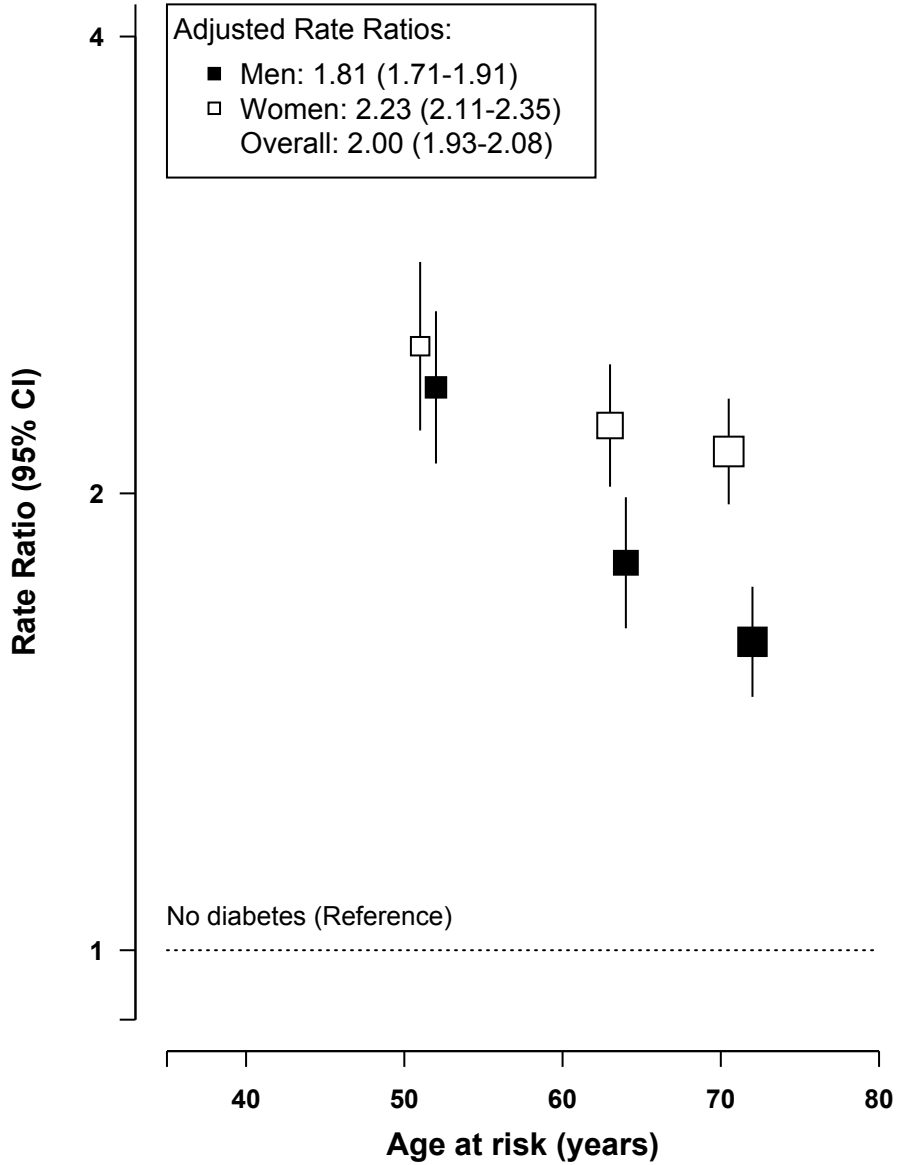
| Characteristic [a] | Diabetes | |
|---|---|---|
| | Previously diagnosed (n=16,142) | Screen-detected (n=14,138) |
| **Age and socioeconomic factors** | | |
| Mean age (SD), years | 59.1 (8.9) | 56.1 (9.9) |
| Female, % | 62.1 | 60.7 |
| Urban area, % | 65.2 | 55.9 |
| ≥6 years of education, % | 48.3 | 44.5 |
| **Lifestyle factors** | | |
| Ever regular smoker, % | 70.2 | 68.1 |
| Ever regular alcohol drinker, % | 86.8 | 81.9 |
| Mean physical activity (SD), MET-h/day | 13.7 (9.1) | 17.3 (10.7) |
| **Anthropometry and blood pressure** | | |
| Mean standing height (SD), m | 1.58 (0.08) | 1.58 (0.08) |
| Mean BMI (SD), kg/m$^2$ | 24.9 (3.3) | 25.2 (3.5) |
| Mean waist circumference (SD), cm | 85.8 (9.2) | 85.9 (9.8) |
| Mean waist-to-hip ratio (SD) | 0.92 (0.07) | 0.92 (0.07) |
| Mean SBP (SD), mmHg | 141.8 (21.6) | 141.8 (21.8) |
| Mean DBP (SD), mmHg | 78.8 (10.8) | 80.9 (11.3) |
| Mean RPG (SD), mg/dL | 212.8 (208.0) | 240.3 (114.9) |
| **Medical history and medications** | | |
| Prior diseases, % | | |
| Hypertension | 36.4 | 20.9 |
| CVD | 12.7 | 4.6 |
| Chronic kidney | 2.7 | 1.5 |
| Chronic liver | 1.4 | 1.2 |
| CVD medications [b], % | | |
| Statin | 1.1 | 1.9 |
| Aspirin | 4.1 | 8.2 |
| Blood pressure lowering [c] | 14.5 | 30.0 |
| Anti-diabetic medication, % | | |
| Chlorpropamide or metformin | 65.1 | - |
| Insulin | 14.5 | - |
| Both | 3.6 | - |
| Any | 76.9 | - |
| **Family history of diabetes,** % | 25.6 | 13.1 |

[a] Adjusted for age, gender and region as appropriate; [b] Among participants with hypertension, CVD or diabetes at baseline (n= 9,965); [c] Blood pressure lowering drugs: ACE-I, β-blocker, diuretics, CA-antagonist; BMI=body mass index, SBP=systolic blood pressure, DBP=diastolic blood pressure, RPG=random plasma glucose, CVD=cardiovascular disease.

# eFigure 2. Age-specific prevalence of total diabetes (left panel) and all-cause mortality rate ratios (right panel) in men and women

Left panel: The size of each box is proportional to the number of participants with diabetes and the error bars indicate the 95%CI. Right panel: Shows adjusted all-cause mortality rate ratios (RRs) by age -at-risk in three groups (35-59, 60-69, 70-70) and sex; The size of each box is proportional to the inverse of the variance of the log RR; RRs are adjusted for age, area, education, smoking, alcohol drinking, physical activity and BMI; The analyses were restricted to those who died at age-at-risk 35-79 years, excluding 5 deaths at age <35 and 1014 deaths at age ≥80 years. The point estimates on the x-axis represent the mean of each age group




**No. of individuals:**

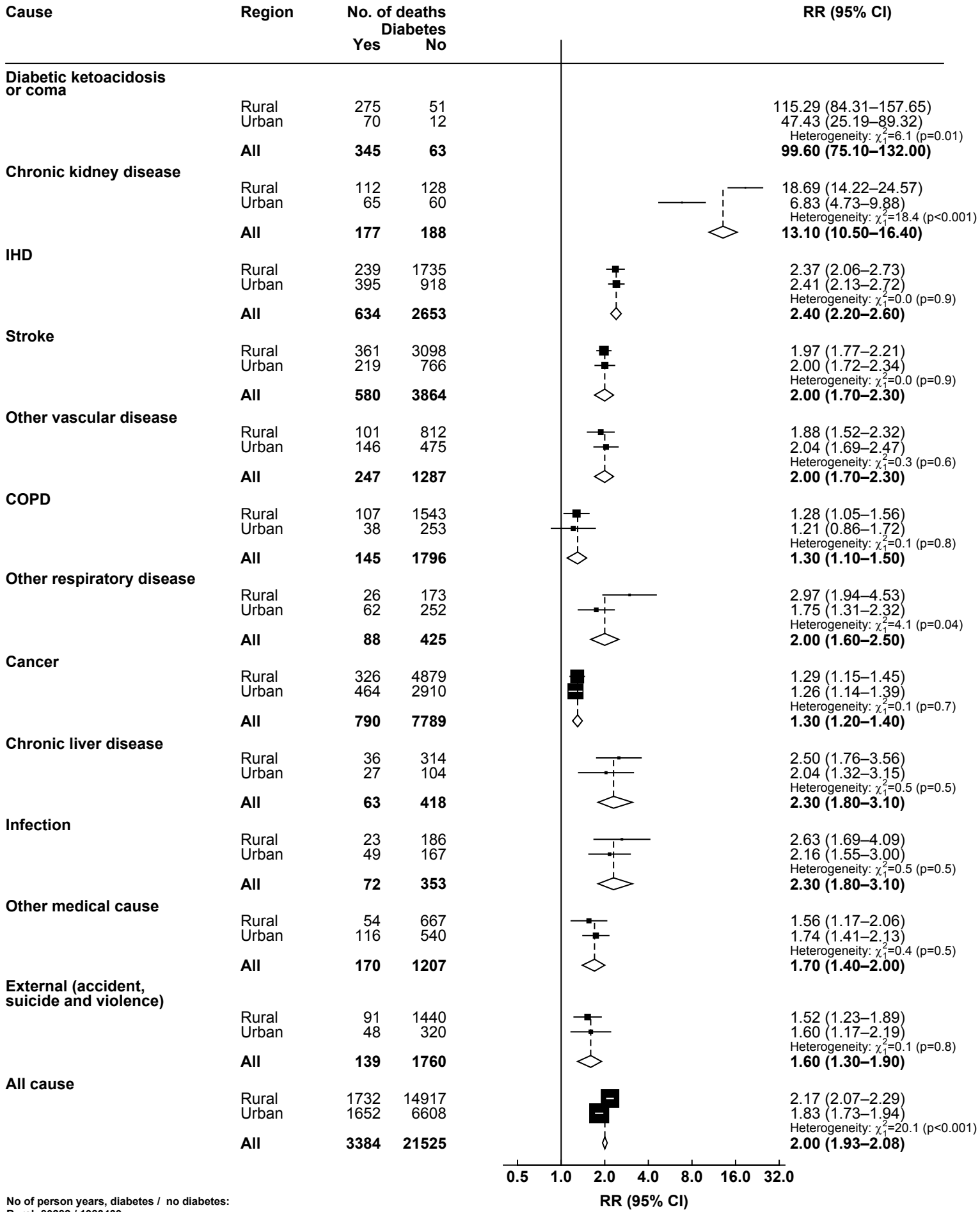
| | | | | | |
|---|---|---|---|---|---|
| **Men:** | 35616 | 60138 | 61732 | 40042 | 12723 |
| **Women:** | 58011 | 94182 | 89851 | 47851 | 12723 |

**No. of person years, no diabetes / diabetes:**

| | | | |
|---|---|---|---|
| **Men:** | 910574/36791 | 313601/23956 | 173036/16586 |
| **Women:** | 1438980/54422 | 413503/45771 | 190226/27179 |

## eFigure 3. Adjusted diabetes versus no diabetes RRs for cause-specific mortality by region

RRs were adjusted for age, geographic area, sex, education, smoking, alcohol drinking, physical activity and BMI. Each box has an area inversely proportional to the effective variance of the log RR and the horizontal lines denote 95%CI

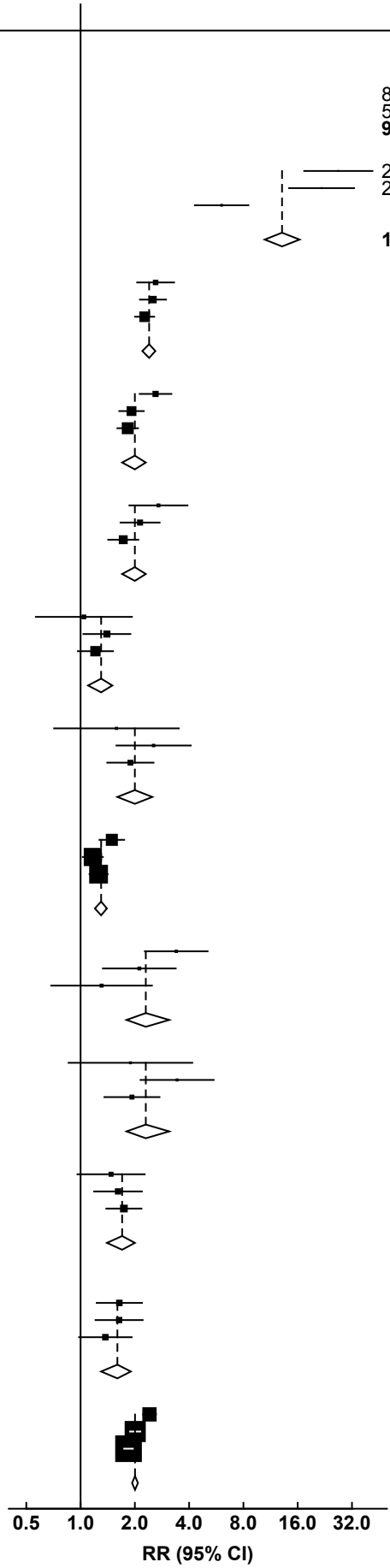



**No of person years, diabetes / no diabetes:**
**Rural: 80282 / 1983439**
**Urban: 124421 / 1456481**

# eFigure 4. Adjusted diabetes vs no diabetes RRs for cause-specific mortality by age at risk

RRs were adjusted for age, area, sex, education, smoking, alcohol drinking, physical activity and BMI. Each box has an area inversely proportional to the effective variance of the log RR and the horizontal lines denote 95%CI

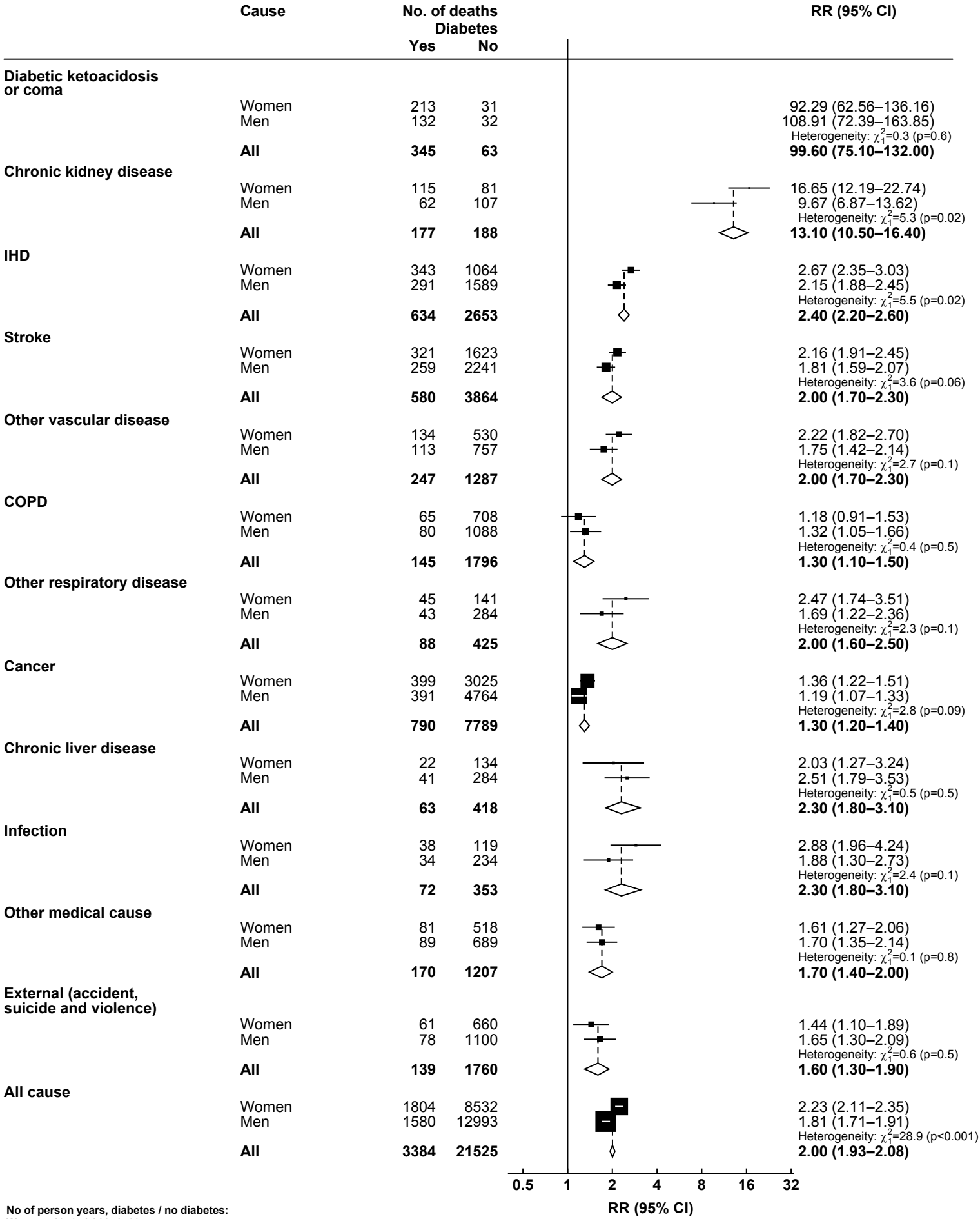
| Cause | Age at risk (years) | No. of deaths Diabetes Yes | No | RR (95% CI) |
|---|---|---|---|---|
| **Diabetic ketoacidosis or coma** | | | | |
| | 35-59 | 84 | 11 | |
| | 60-69 | 126 | 21 | 89.54 (55.75–143.82) |
| | 70-79 | 135 | 31 | 59.59 (39.56–89.76) |
| | **All** | **345** | **63** | **99.60 (75.10–132.00)** |
| **Chronic kidney disease** | | | | |
| | 35-59 | 44 | 55 | 26.88 (17.38–41.56) |
| | 60-69 | 69 | 40 | 21.72 (14.34–32.89) |
| | 70-79 | 64 | 93 | 6.06 (4.30–8.53) |
| | | | | Trend: $\chi^2_1$=31.3 (p=<0.001) |
| | **All** | **177** | **188** | **13.10 (10.50–16.40)** |
| **IHD** | | | | |
| | 35-59 | 87 | 542 | 2.61 (2.06–3.30) |
| | 60-69 | 188 | 741 | 2.52 (2.13–2.98) |
| | 70-79 | 359 | 1370 | 2.27 (2.01–2.56) |
| | | | | Trend: $\chi^2_1$=1.5 (p=0.2) |
| | **All** | **634** | **2653** | **2.40 (2.20–2.60)** |
| **Stroke** | | | | |
| | 35-59 | 113 | 866 | 2.61 (2.13–3.19) |
| | 60-69 | 191 | 1239 | 1.92 (1.64–2.24) |
| | 70-79 | 276 | 1759 | 1.83 (1.60–2.08) |
| | | | | Trend: $\chi^2_1$=7.0 (p=0.008) |
| | **All** | **580** | **3864** | **2.00 (1.70–2.30)** |
| **Other vascular disease** | | | | |
| | 35-59 | 34 | 237 | 2.70 (1.86–3.92) |
| | 60-69 | 80 | 365 | 2.14 (1.66–2.74) |
| | 70-79 | 133 | 685 | 1.72 (1.42–2.09) |
| | | | | Trend: $\chi^2_1$=5.0 (p=0.02) |
| | **All** | **247** | **1287** | **2.00 (1.70–2.30)** |
| **COPD** | | | | |
| | 35-59 | 11 | 216 | 1.04 (0.56–1.93) |
| | 60-69 | 45 | 536 | 1.40 (1.04–1.89) |
| | 70-79 | 86 | 1044 | 1.21 (0.97–1.51) |
| | | | | Trend: $\chi^2_1$=0.0 (p=0.9) |
| | **All** | **142** | **1796** | **1.30 (1.10–1.50)** |
| **Other respiratory disease** | | | | |
| | 35-59 | 7 | 76 | 1.58 (0.71–3.51) |
| | 60-69 | 23 | 91 | 2.54 (1.58–4.08) |
| | 70-79 | 58 | 258 | 1.89 (1.41–2.54) |
| | | | | Trend: $\chi^2_1$=0.0 (p=0.8) |
| | **All** | **88** | **425** | **2.00 (1.60–2.50)** |
| **Cancer** | | | | |
| | 35-59 | 173 | 2379 | 1.49 (1.27–1.75) |
| | 60-69 | 269 | 2720 | 1.17 (1.03–1.33) |
| | 70-79 | 348 | 2690 | 1.26 (1.12–1.41) |
| | | | | Trend: $\chi^2_1$=1.9 (p=0.2) |
| | **All** | **790** | **7789** | **1.30 (1.20–1.40)** |
| **Chronic liver disease** | | | | |
| | 35-59 | 30 | 197 | 3.39 (2.27–5.06) |
| | 60-69 | 22 | 130 | 2.12 (1.33–3.37) |
| | 70-79 | 11 | 91 | 1.31 (0.69–2.49) |
| | | | | Trend: $\chi^2_1$=6.6 (p=0.01) |
| | **All** | **63** | **418** | **2.30 (1.80–3.10)** |
| **Infection** | | | | |
| | 35-59 | 7 | 85 | 1.89 (0.86–4.16) |
| | 60-69 | 24 | 92 | 3.43 (2.15–5.47) |
| | 70-79 | 41 | 176 | 1.93 (1.35–2.74) |
| | | | | Trend: $\chi^2_1$=0.8 (p=0.4) |
| | **All** | **72** | **353** | **2.30 (1.80–3.10)** |
| **Other medical cause** | | | | |
| | 35-59 | 23 | 372 | 1.48 (0.96–2.27) |
| | 60-69 | 50 | 319 | 1.61 (1.19–2.19) |
| | 70-79 | 97 | 516 | 1.74 (1.39–2.18) |
| | | | | Trend: $\chi^2_1$=0.5 (p=0.5) |
| | **All** | **170** | **1207** | **1.70 (1.40–2.00)** |
| **External (accident, suicide and violence)** | | | | |
| | 35-59 | 50 | 947 | 1.64 (1.23–2.19) |
| | 60-69 | 49 | 454 | 1.64 (1.21–2.21) |
| | 70-79 | 40 | 359 | 1.37 (0.98–1.92) |
| | | | | Trend: $\chi^2_1$=0.6 (p=0.5) |
| | **All** | **139** | **1760** | **1.60 (1.30–1.90)** |
| **All cause** | | | | |
| | 35-59 | 659 | 5941 | 2.41 (2.22–2.62) |
| | 60-69 | 1121 | 6691 | 2.01 (1.88–2.14) |
| | 70-79 | 1604 | 8893 | 1.84 (1.75–1.95) |
| | | | | Trend: $\chi^2_1$=26.2 (p=<0.001) |
| | **All** | **3384** | **21525** | **2.00 (1.93–2.08)** |




**No of person years, diabetes / no diabetes:**
**Age at risk:**
**35-59: 91212 / 234245**
**60-69: 69727 / 727104**
**70-79: 43764 / 363262**

## eFigure 5. Adjusted diabetes versus no diabetes RRs for cause-specific mortality by gender

RRs were adjusted for age, area, education, smoking, alcohol drinking, physical activity and BMI. Each box has an area inversely proportional to the effective variance of the log RR and the horizontal lines denote 95%CI



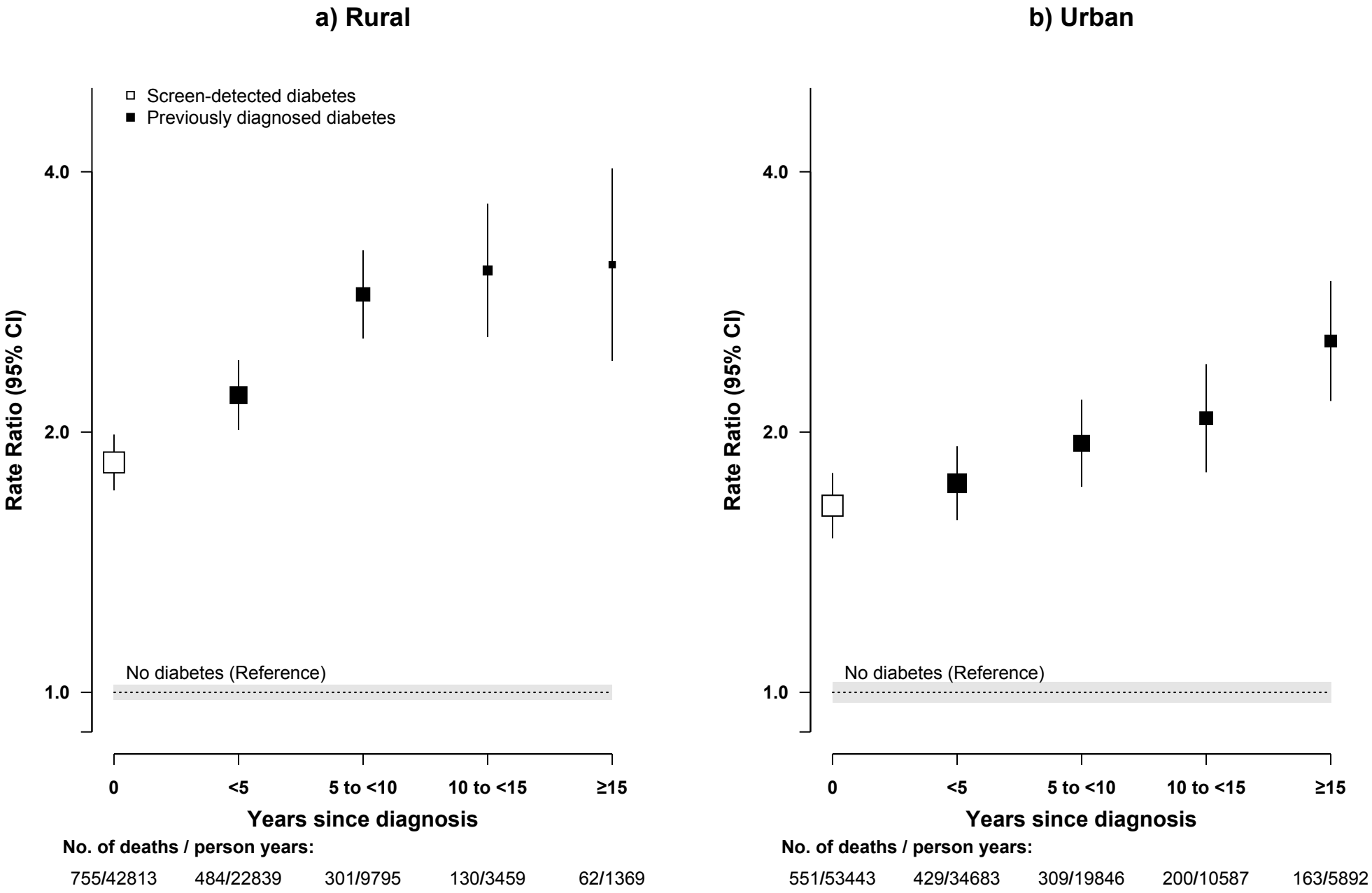

**No of person years, diabetes / no diabetes:**
**Women: 127371 / 2042709**
**Men: 77332 / 1397211**

**eTable 3. Number of deaths and adjusted rate ratios for cause-specific mortality by diabetic status at baseline**

| Cause of deaths | No diabetes [a] (n=482589) | Previously diagnosed diabetes (n=16142) | | Screen detected diabetes (n=14138) | |
|---|---|---|---|---|---|
| | No. of deaths | No. of deaths | Rate ratio[b] (95% CI) | No. of deaths | Rate ratio[b] (95% CI) |
| **Diabetic ketoacidosis or coma** | 63 | 270 | 164.35 (143.02-188.86) | 75 | 46.33 (36.99-58.03) |
| Definite | 15 | 102 | 313.83 (250.62-392.99) | 26 | 76.46 (52.13-112.14) |
| Probable | 48 | 168 | 122.10 (102.28-145.77) | 49 | 37.38 (28.30-49.37) |
| **Chronic renal disease** | 188 | 142 | 18.88 (15.78-22.59) | 35 | 6.31 (4.54-8.78) |
| **Cardiovascular disease** | 7804 | 911 | 2.37 (2.22-2.53) | 550 | 1.85 (1.70-2.01) |
| IHD | 2653 | 426 | 2.76 (2.51-3.05) | 208 | 1.91 (1.67-2.18) |
| Stroke | 3864 | 336 | 2.16 (1.93-2.41) | 244 | 1.79 (1.58-2.03) |
| Other cardiovascular disease | 1287 | 98 | 2.02 (1.71-2.38) | 98 | 1.89 (1.55-2.30) |
| **Respiratory disease** | 1943 | 66 | 0.95 (0.74-1.21) | 101 | 1.66 (1.37-2.02) |
| COPD | 1796 | 53 | 0.87 (0.67-1.15) | 92 | 1.68 (1.37-2.06) |
| Other respiratory disease | 425 | 63 | 2.37 (1.84-3.05) | 25 | 1.46 (0.99-2.16) |
| **Cancer** | 7789 | 428 | 1.22 (1.11-1.34) | 362 | 1.33 (1.20-1.48) |
| Lung | 1897 | 113 | 1.17 (0.97-1.41) | 85 | 1.23 (1.00-1.53) |
| Liver | 1192 | 65 | 1.35 (1.05-1.72) | 68 | 1.79 (1.41-2.27) |
| Pancreas | 307 | 37 | 2.43 (1.75-3.37) | 13 | 1.10 (0.64-1.90) |
| Oesophagus | 936 | 18 | 0.65 (0.41-1.03) | 33 | 1.19 (0.85-1.67) |
| Stomach | 1105 | 52 | 1.13 (0.86-1.49) | 46 | 1.20 (0.90-1.61) |
| Colorectal | 540 | 25 | 0.82 (0.55-1.21) | 32 | 1.52 (1.07-2.14) |
| Female breast | 186 | 21 | 2.23 (1.44-3.45) | 10 | 1.36 (0.73-2.52) |
| Female reproductive system | 182 | 12 | 1.37 (0.77-2.43) | 16 | 2.36 (1.45-3.85) |
| Other cancers | 1444 | 85 | 1.26 (1.02-1.57) | 59 | 1.14 (0.88-1.47) |
| **Chronic liver disease** | 418 | 32 | 2.20 (1.55-3.14) | 31 | 2.45 (1.73-3.49) |
| Liver cirrhosis | 189 | 18 | 2.35 (1.46-3.76) | 15 | 2.37 (1.43-3.93) |
| Viral hepatitis | 169 | 9 | 1.70 (0.88-3.31) | 12 | 2.52 (1.43-4.43) |
| Other chronic liver disease | 60 | 5 | 3.18 (1.30-7.78) | 4 | 2.60 (0.98-6.93) |
| **Infection** | 353 | 54 | 2.88 (2.19-3.79) | 18 | 1.45 (0.91-2.30) |
| Pneumonia | 190 | 43 | 3.15 (2.32-4.29) | 12 | 1.42 (0.81-2.50) |
| Infection excluding pneumonia | 163 | 11 | 2.14 (1.17-3.90) | 6 | 1.45 (0.65-3.22) |
| **External** | 1760 | 77 | 1.68 (1.34-2.11) | 62 | 1.42 (1.11-1.82) |
| **Other medical cause** | 1207 | 98 | 1.62 (1.32-1.98) | 72 | 1.72 (1.37-2.17) |
| **All-cause mortality** | 21525 | 2078 | 2.20 (2.11-2.30) | 1306 | 1.76 (1.67-1.86) |

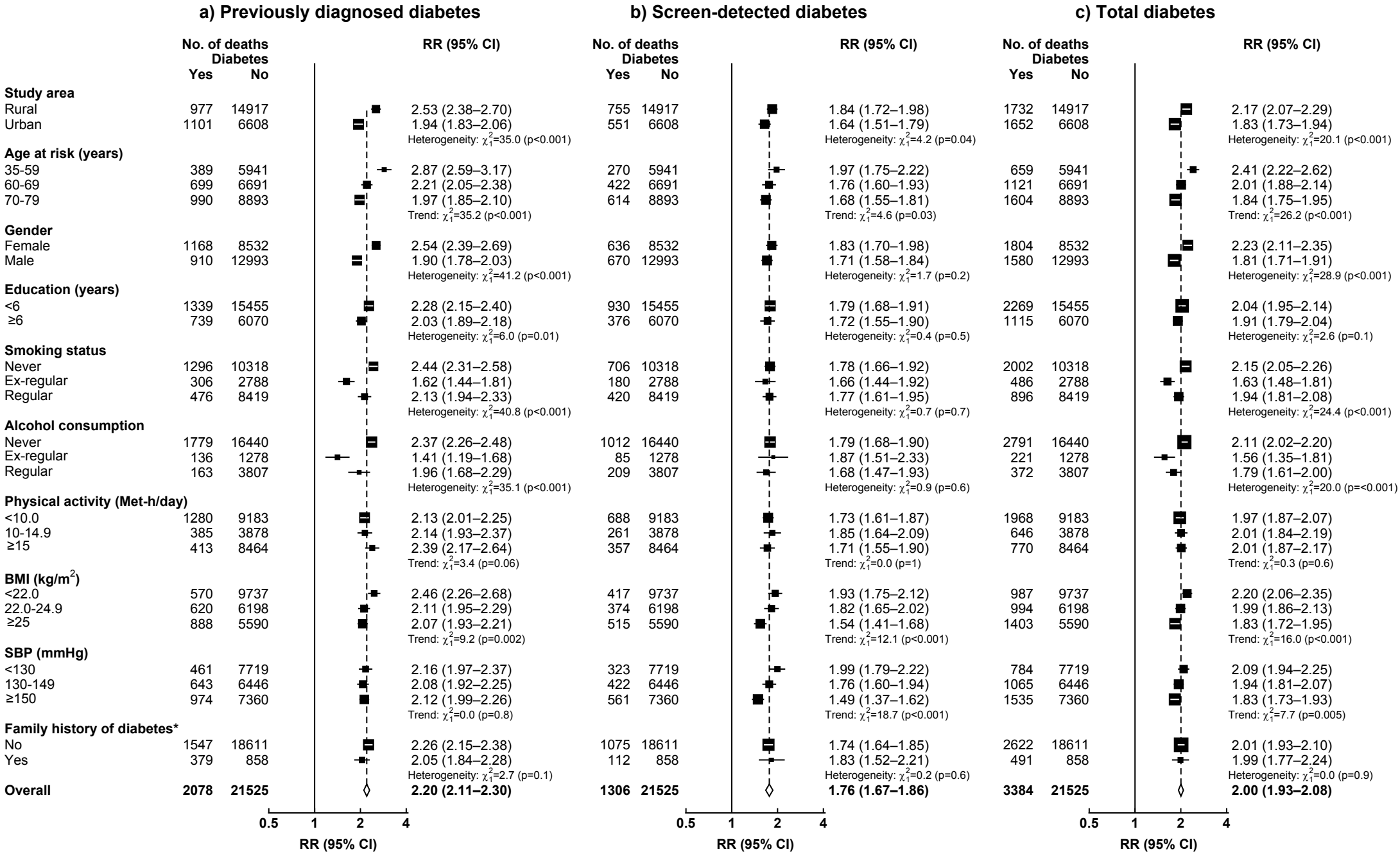
[a] No diabetes is used as the reference group for previously diagnosed and screen detected diabetes; [b] Stratified by age sex and study area and adjusted for education, smoking alcohol, physical activity and BMI.

## eFigure 6. Adjusted rate ratio for all-cause mortality by duration of diabetes since diagnosis in rural and urban areas




RRs are plotted on a floating absolute scale. Each RR has a group-specific CI that reflects the variance of the log risk in that one group, taking into account the variance of the log risk in the non-diabetic reference group (dotted line, with shading indicating 95% group-specific CI) and has a vertical solid line represents the 95%CI. Each box has an area inversely proportional to the effective variance of the log RR

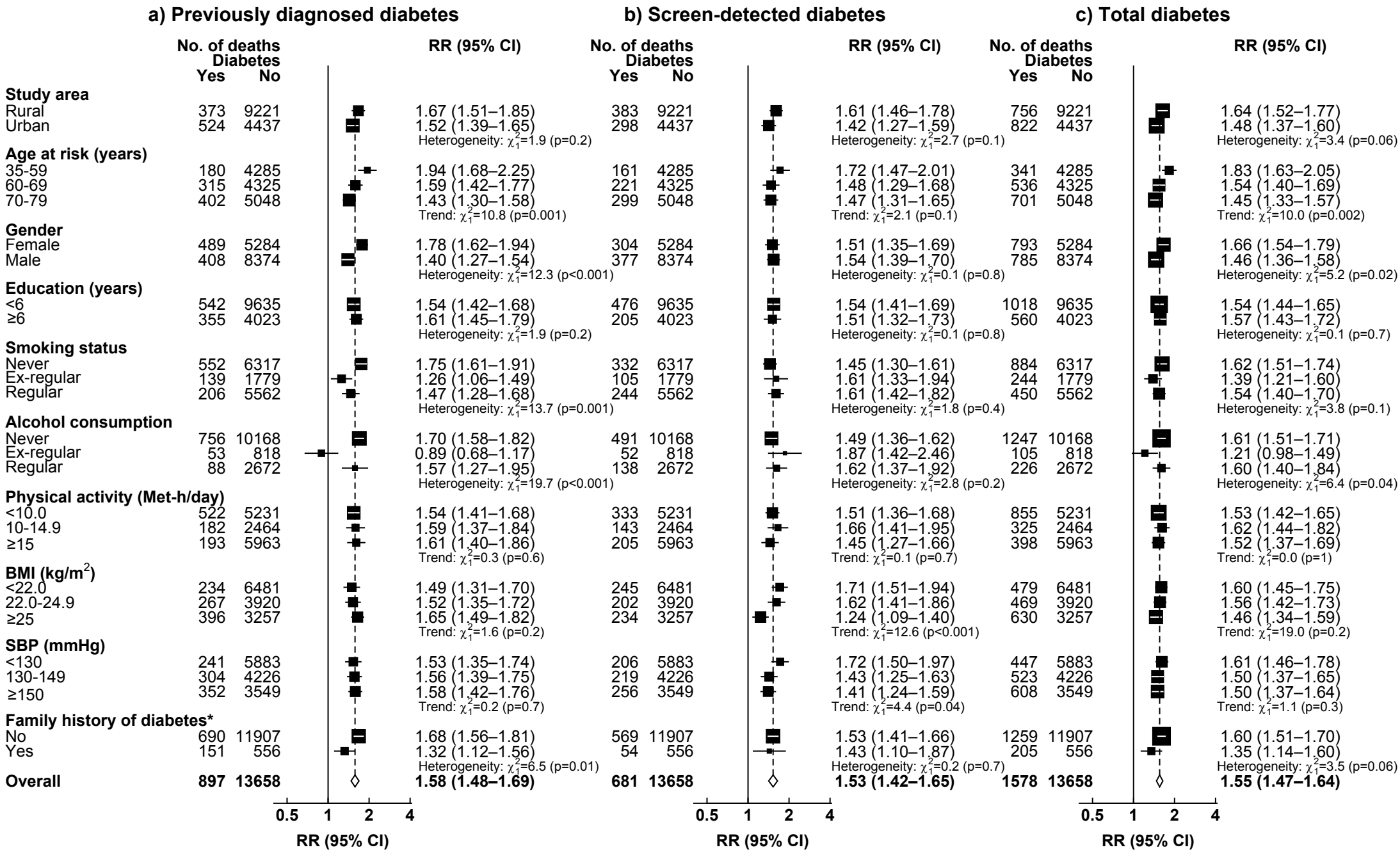
**eFigure 7. Adjusted RRs for all-cause mortality by certain baseline characteristics associated with previously diagnosed, screen-detected or total diabetes**




*Missing data for 24821 participants

Conventions for symbols same as in eFigure 3

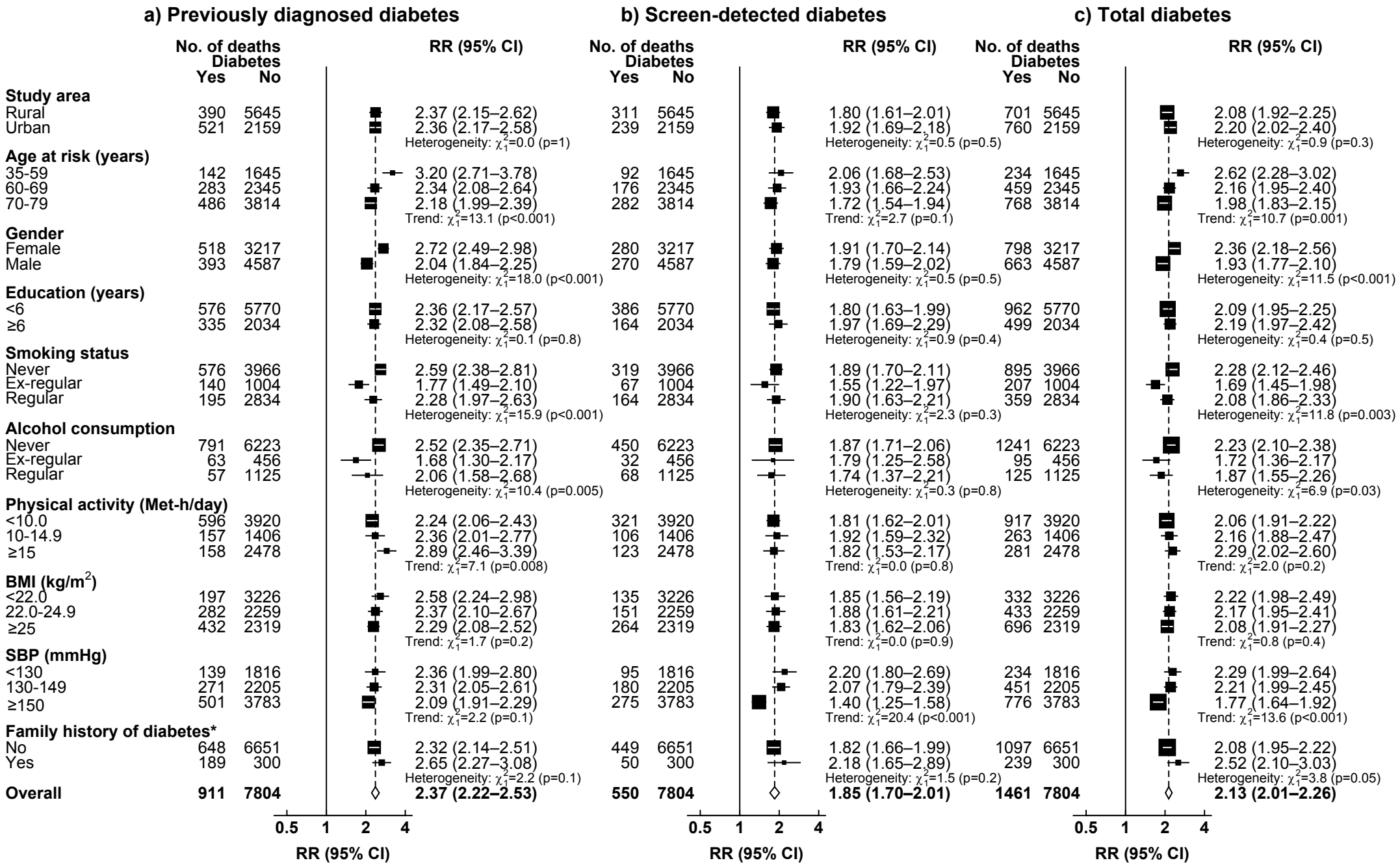
**eFigure 8. Adjusted RRs for non-vascular mortality by certain baseline characteristics associated with previously diagnosed, screen-detected or total diabetes**




*Missing data for 24821 participants

Conventions for symbols same as in eFigure 3

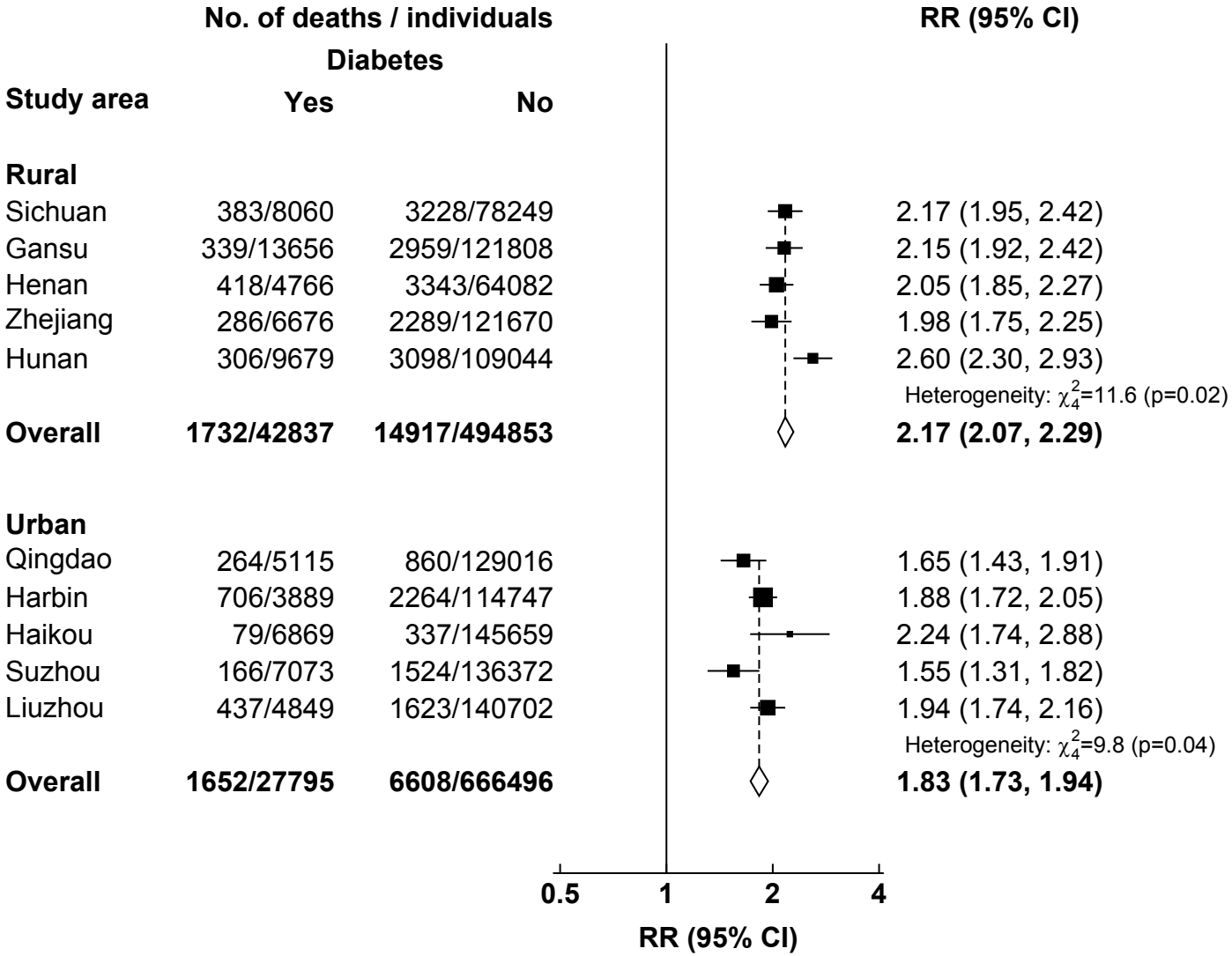
**eFigure 9. Adjusted RRs for vascular mortality by certain baseline characteristics associated with previously diagnosed, screen-detected or total diabetes**




*Missing data for 24821 participants

Conventions for symbols same as in eFigure 3

# eFigure 10. Adjusted RRs for all-cause mortality by 10 study areas




Conventions for symbols same as in eFigure 3

## eFigure 11. Cumulative survival rates of adults with and without diabetes in China, at 2010 death rates

Data modeled for individuals with diabetes diagnosed at age 50 years versus otherwise similar individuals who remain free from diabetes at age 75 years. Age-specific death rates for Chinese adults in 2010 at ages 50-75 were combined with estimated age-specific RRs in this study, taking into consideration the effects of diabetes duration. The horizontal dotted lines indicate median survival in both groups, corresponding a difference of 9 years (rural 10, urban 8) between two groups.