

## Supplementary Material

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**Supplementary Table 1** Coordinates of each city air monitoring station in the study area

| City     | City code | Station code | Longitude, N | Latitude, E |
|----------|-----------|--------------|--------------|-------------|
| Xinxiang | 410700    | 2389A        | 113.836      | 35.310      |
|          |           | 2390A        | 113.884      | 35.272      |
|          |           | 2391A        | 113.883      | 35.303      |
|          |           | 3054A        | 113.919      | 35.285      |
|          |           | 3476A        | 113.914      | 35.333      |
|          |           | 3689A        | 113.900      | 35.372      |
| Nanyang  | 411300    | 2403A        | 112.519      | 32.992      |
|          |           | 2404A        | 112.522      | 33.012      |
|          |           | 2406A        | 112.557      | 33.027      |
|          |           | 2407A        | 112.550      | 32.968      |
| Anyang   | 410500    | 1818A        | 114.484      | 36.062      |
|          |           | 1819A        | 114.355      | 36.102      |
|          |           | 1820A        | 114.358      | 36.087      |
|          |           | 3141A        | 114.392      | 36.088      |
|          |           | 3669A        | 114.471      | 36.064      |
|          |           | 3703A        | 114.292      | 36.095      |
| Kaifeng  | 410200    | 1824A        | 114.339      | 34.778      |
|          |           | 1826A        | 114.289      | 34.797      |
|          |           | 3147A        | 114.344      | 34.811      |
|          |           | 3210A        | 114.364      | 34.796      |
|          |           | 3473A        | 114.249      | 34.831      |
|          |           | 3592A        | 114.464      | 34.756      |
| Luoyang  | 410300    | 1812A        | 112.394      | 34.651      |
|          |           | 1814A        | 112.466      | 34.687      |
|          |           | 1815A        | 112.494      | 34.689      |
|          |           | 1817A        | 112.428      | 34.626      |
|          |           | 3341A        | 112.495      | 34.633      |
|          |           | 3636A        | 112.439      | 34.678      |

**Supplementary Table 2** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021.

| pollutant         | group  | Lag00                     |        | Lag01                     |        | Lag02                     |        | Lag03                     |        | Lag04                     |        | Lag05                     |        | Lag06                     |        | Lag07                     |        |
|-------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|
|                   |        | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI |
| CO                | Male   | 0.995(0.977,1.014)        |        | 0.993(0.965,1.021)        |        | 0.991(0.959,1.024)        |        | 0.992(0.957,1.027)        |        | 0.993(0.957,1.031)        |        | 0.996(0.958,1.035)        |        | 1.000(0.963,1.038)        |        | 1.005(0.969,1.042)        |        |
|                   | Female | 0.988(0.970,1.007)        |        | 0.985(0.957,1.014)        |        | 0.989(0.957,1.023)        |        | 0.997(0.962,1.033)        |        | 1.006(0.968,1.045)        |        | 1.010(0.972,1.051)        |        | 1.009(0.971,1.048)        |        | 0.999(0.962,1.037)        |        |
|                   | Young  | 1.001(0.983,1.020)        |        | 0.996(0.968,1.024)        |        | 0.984(0.953,1.017)        |        | 0.969(0.936,1.003)        |        | <b>0.953(0.918,0.989)</b> |        | <b>0.939(0.904,0.975)</b> |        | <b>0.929(0.895,0.964)</b> |        | <b>0.923(0.891,0.957)</b> |        |
|                   | Old    | <b>0.981(0.963,0.999)</b> |        | 0.974(0.947,1.002)        |        | 0.979(0.947,1.012)        |        | 0.991(0.957,1.027)        |        | 1.007(0.969,1.046)        |        | 1.020(0.980,1.060)        |        | 1.026(0.988,1.066)        |        | 1.025(0.988,1.064)        |        |
| PM <sub>2.5</sub> | Male   | 0.995(0.983,1.007)        |        | 0.991(0.971,1.011)        |        | 0.987(0.964,1.012)        |        | 0.985(0.957,1.013)        |        | 0.983(0.951,1.015)        |        | 0.981(0.946,1.018)        |        | 0.980(0.943,1.019)        |        | 0.980(0.942,1.021)        |        |
|                   | Female | 0.989(0.977,1.002)        |        | 0.982(0.963,1.002)        |        | 0.978(0.954,1.003)        |        | 0.976(0.948,1.004)        |        | 0.975(0.943,1.008)        |        | 0.974(0.939,1.011)        |        | 0.972(0.935,1.011)        |        | 0.970(0.931,1.010)        |        |
|                   | Young  | 1.000(0.988,1.013)        |        | 0.997(0.977,1.018)        |        | 0.991(0.967,1.016)        |        | 0.983(0.956,1.012)        |        | 0.975(0.944,1.008)        |        | 0.969(0.935,1.005)        |        | 0.966(0.930,1.003)        |        | 0.965(0.928,1.005)        |        |
|                   | Old    | 0.989(0.977,1.001)        |        | 0.984(0.965,1.003)        |        | 0.984(0.960,1.008)        |        | 0.987(0.959,1.015)        |        | 0.992(0.960,1.025)        |        | 0.996(0.960,1.034)        |        | 0.998(0.960,1.038)        |        | 0.997(0.957,1.039)        |        |
| PM <sub>10</sub>  | Male   | <b>0.983(0.968,0.999)</b> |        | <b>0.962(0.938,0.988)</b> |        | <b>0.938(0.908,0.969)</b> |        | <b>0.912(0.878,0.948)</b> |        | <b>0.887(0.848,0.929)</b> |        | <b>0.866(0.823,0.911)</b> |        | <b>0.848(0.804,0.896)</b> |        | <b>0.836(0.790,0.885)</b> |        |
|                   | Female | <b>0.980(0.964,0.996)</b> |        | <b>0.960(0.935,0.986)</b> |        | <b>0.941(0.910,0.973)</b> |        | <b>0.922(0.886,0.959)</b> |        | <b>0.903(0.863,0.946)</b> |        | <b>0.885(0.840,0.932)</b> |        | <b>0.866(0.819,0.915)</b> |        | <b>0.847(0.799,0.897)</b> |        |
|                   | Young  | 0.993(0.976,1.010)        |        | 0.976(0.949,1.003)        |        | <b>0.950(0.919,0.983)</b> |        | <b>0.921(0.885,0.958)</b> |        | <b>0.891(0.850,0.933)</b> |        | <b>0.865(0.821,0.911)</b> |        | <b>0.845(0.800,0.893)</b> |        | <b>0.833(0.787,0.882)</b> |        |
|                   | Old    | <b>0.979(0.964,0.994)</b> |        | <b>0.961(0.937,0.986)</b> |        | <b>0.947(0.917,0.977)</b> |        | <b>0.935(0.900,0.971)</b> |        | <b>0.923(0.883,0.965)</b> |        | <b>0.911(0.867,0.958)</b> |        | <b>0.898(0.852,0.948)</b> |        | <b>0.884(0.835,0.935)</b> |        |
| SO <sub>2</sub>   | Male   | 1.004(0.988,1.019)        |        | 0.995(0.972,1.019)        |        | 0.976(0.950,1.004)        |        | <b>0.950(0.923,0.979)</b> |        | <b>0.922(0.893,0.951)</b> |        | <b>0.895(0.866,0.924)</b> |        | <b>0.871(0.845,0.899)</b> |        | <b>0.853(0.827,0.879)</b> |        |
|                   | Female | 1.000(0.984,1.016)        |        | 0.991(0.967,1.015)        |        | 0.974(0.947,1.002)        |        | <b>0.952(0.924,0.981)</b> |        | <b>0.927(0.898,0.957)</b> |        | <b>0.902(0.873,0.932)</b> |        | <b>0.879(0.852,0.907)</b> |        | <b>0.858(0.832,0.885)</b> |        |
|                   | Young  | 0.999(0.984,1.014)        |        | 0.984(0.961,1.007)        |        | <b>0.959(0.933,0.985)</b> |        | <b>0.926(0.900,0.953)</b> |        | <b>0.892(0.865,0.919)</b> |        | <b>0.860(0.834,0.887)</b> |        | <b>0.834(0.809,0.859)</b> |        | <b>0.814(0.790,0.838)</b> |        |
|                   | Old    | 1.009(0.993,1.025)        |        | 1.010(0.985,1.035)        |        | 1.004(0.975,1.033)        |        | 0.992(0.962,1.023)        |        | 0.976(0.945,1.009)        |        | <b>0.959(0.927,0.991)</b> |        | <b>0.941(0.911,0.972)</b> |        | <b>0.924(0.894,0.954)</b> |        |
| NO <sub>2</sub>   | Male   | 0.996(0.970,1.022)        |        | 0.978(0.939,1.020)        |        | <b>0.950(0.904,1.000)</b> |        | <b>0.915(0.864,0.970)</b> |        | <b>0.878(0.821,0.938)</b> |        | <b>0.842(0.782,0.906)</b> |        | <b>0.809(0.749,0.875)</b> |        | <b>0.782(0.721,0.847)</b> |        |
|                   | Female | 0.994(0.968,1.020)        |        | 0.978(0.937,1.020)        |        | 0.954(0.906,1.004)        |        | <b>0.924(0.871,0.980)</b> |        | <b>0.891(0.833,0.953)</b> |        | <b>0.858(0.796,0.924)</b> |        | <b>0.825(0.763,0.892)</b> |        | <b>0.795(0.732,0.862)</b> |        |
|                   | Young  | 1.002(0.976,1.029)        |        | 0.987(0.946,1.029)        |        | 0.957(0.909,1.007)        |        | <b>0.917(0.865,0.973)</b> |        | <b>0.874(0.817,0.934)</b> |        | <b>0.832(0.773,0.896)</b> |        | <b>0.795(0.735,0.859)</b> |        | <b>0.763(0.703,0.827)</b> |        |
|                   | Old    | 0.991(0.966,1.016)        |        | 0.974(0.935,1.014)        |        | <b>0.950(0.905,0.999)</b> |        | <b>0.922(0.871,0.977)</b> |        | <b>0.892(0.835,0.953)</b> |        | <b>0.862(0.801,0.927)</b> |        | <b>0.832(0.771,0.899)</b> |        | <b>0.805(0.742,0.872)</b> |        |
| O <sub>3</sub>    | Male   | <b>1.140(1.098,1.184)</b> |        | <b>1.303(1.227,1.384)</b> |        | <b>1.492(1.388,1.604)</b> |        | <b>1.706(1.572,1.852)</b> |        | <b>1.940(1.769,2.127)</b> |        | <b>2.183(1.973,2.415)</b> |        | <b>2.423(2.179,2.695)</b> |        | <b>2.651(2.371,2.963)</b> |        |
|                   | Female | <b>1.103(1.061,1.147)</b> |        | <b>1.242(1.168,1.321)</b> |        | <b>1.421(1.320,1.531)</b> |        | <b>1.641(1.508,1.784)</b> |        | <b>1.888(1.717,2.075)</b> |        | <b>2.140(1.929,2.374)</b> |        | <b>2.372(2.127,2.645)</b> |        | <b>2.560(2.285,2.869)</b> |        |
|                   | Young  | <b>1.130(1.086,1.175)</b> |        | <b>1.282(1.204,1.364)</b> |        | <b>1.458(1.354,1.571)</b> |        | <b>1.658(1.525,1.803)</b> |        | <b>1.875(1.707,2.059)</b> |        | <b>2.098(1.893,2.324)</b> |        | <b>2.315(2.079,2.577)</b> |        | <b>2.515(2.248,2.813)</b> |        |
|                   | Old    | <b>1.092(1.052,1.133)</b> |        | <b>1.209(1.140,1.283)</b> |        | <b>1.355(1.261,1.455)</b> |        | <b>1.526(1.407,1.656)</b> |        | <b>1.715(1.563,1.881)</b> |        | <b>1.904(1.720,2.108)</b> |        | <b>2.079(1.867,2.315)</b> |        | <b>2.224(1.987,2.489)</b> |        |

**Supplementary Table 3** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021.

| pollutant         | group  | Lag00                     |        | Lag01                     |        | Lag02                     |        | Lag03                     |        | Lag04                     |        | Lag05                     |        | Lag06                     |        | Lag07                     |        |
|-------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|
|                   |        | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI |
| CO                | Male   | 1.022(0.938,1.112)        |        | 1.036(0.907,1.182)        |        | 1.042(0.894,1.214)        |        | 1.040(0.883,1.225)        |        | 1.033(0.867,1.230)        |        | 1.019(0.851,1.220)        |        | 1.001(0.841,1.191)        |        | 0.978(0.824,1.160)        |        |
|                   | Female | 1.056(0.968,1.151)        |        | 1.071(0.937,1.225)        |        | 1.052(0.901,1.228)        |        | 1.013(0.858,1.195)        |        | 0.973(0.815,1.162)        |        | 0.953(0.793,1.144)        |        | 0.961(0.805,1.147)        |        | 1.006(0.846,1.196)        |        |
|                   | Young  | 0.993(0.913,1.081)        |        | 1.019(0.894,1.162)        |        | 1.076(0.925,1.253)        |        | 1.158(0.985,1.362)        |        | <b>1.252(1.053,1.488)</b> |        | <b>1.342(1.123,1.603)</b> |        | <b>1.411(1.188,1.675)</b> |        | <b>1.450(1.225,1.716)</b> |        |
|                   | Old    | <b>1.096(1.006,1.193)</b> |        | 1.130(0.990,1.289)        |        | 1.104(0.948,1.287)        |        | 1.041(0.883,1.227)        |        | 0.969(0.812,1.156)        |        | 0.913(0.761,1.097)        |        | 0.885(0.742,1.057)        |        | 0.890(0.748,1.060)        |        |
| PM <sub>2.5</sub> | Male   | 1.030(0.958,1.107)        |        | 1.055(0.940,1.185)        |        | 1.077(0.934,1.243)        |        | 1.095(0.928,1.293)        |        | 1.109(0.915,1.343)        |        | 1.118(0.903,1.383)        |        | 1.123(0.896,1.407)        |        | 1.123(0.886,1.423)        |        |
|                   | Female | 1.064(0.989,1.145)        |        | 1.110(0.987,1.249)        |        | 1.139(0.985,1.316)        |        | 1.153(0.975,1.364)        |        | 1.160(0.956,1.407)        |        | 1.166(0.940,1.447)        |        | 1.178(0.938,1.480)        |        | 1.197(0.943,1.520)        |        |
|                   | Young  | 0.998(0.926,1.074)        |        | 1.016(0.903,1.144)        |        | 1.054(0.912,1.218)        |        | 1.104(0.935,1.305)        |        | 1.158(0.957,1.402)        |        | 1.202(0.973,1.485)        |        | 1.228(0.982,1.534)        |        | 1.229(0.973,1.551)        |        |
|                   | Old    | 1.067(0.994,1.145)        |        | 1.100(0.982,1.234)        |        | 1.102(0.956,1.270)        |        | 1.080(0.914,1.276)        |        | 1.049(0.865,1.273)        |        | 1.024(0.824,1.271)        |        | 1.011(0.803,1.273)        |        | 1.016(0.798,1.293)        |        |
| PM <sub>10</sub>  | Male   | <b>1.062(1.002,1.125)</b> |        | <b>1.148(1.045,1.260)</b> |        | <b>1.258(1.119,1.414)</b> |        | <b>1.390(1.210,1.597)</b> |        | <b>1.535(1.305,1.806)</b> |        | <b>1.677(1.398,2.013)</b> |        | <b>1.803(1.485,2.188)</b> |        | <b>1.900(1.549,2.330)</b> |        |
|                   | Female | <b>1.076(1.014,1.142)</b> |        | <b>1.158(1.052,1.274)</b> |        | <b>1.245(1.104,1.402)</b> |        | <b>1.338(1.161,1.542)</b> |        | <b>1.439(1.219,1.700)</b> |        | <b>1.551(1.287,1.869)</b> |        | <b>1.676(1.375,2.044)</b> |        | <b>1.816(1.474,2.237)</b> |        |
|                   | Young  | 1.026(0.965,1.091)        |        | 1.092(0.989,1.205)        |        | <b>1.200(1.062,1.355)</b> |        | <b>1.346(1.166,1.553)</b> |        | <b>1.515(1.283,1.789)</b> |        | <b>1.684(1.399,2.026)</b> |        | <b>1.827(1.502,2.222)</b> |        | <b>1.924(1.566,2.364)</b> |        |
|                   | Old    | <b>1.080(1.021,1.142)</b> |        | <b>1.152(1.052,1.261)</b> |        | <b>1.216(1.085,1.362)</b> |        | <b>1.274(1.113,1.460)</b> |        | <b>1.332(1.135,1.564)</b> |        | <b>1.395(1.166,1.671)</b> |        | <b>1.469(1.213,1.780)</b> |        | <b>1.557(1.273,1.906)</b> |        |
| SO <sub>2</sub>   | Male   | 0.974(0.871,1.089)        |        | 1.035(0.871,1.231)        |        | 1.188(0.973,1.451)        |        | <b>1.443(1.166,1.786)</b> |        | <b>1.798(1.435,2.253)</b> |        | <b>2.229(1.770,2.807)</b> |        | <b>2.694(2.159,3.362)</b> |        | <b>3.139(2.521,3.910)</b> |        |
|                   | Female | 1.001(0.894,1.121)        |        | 1.068(0.896,1.273)        |        | 1.207(0.985,1.478)        |        | <b>1.426(1.148,1.770)</b> |        | <b>1.726(1.373,2.169)</b> |        | <b>2.099(1.661,2.652)</b> |        | <b>2.531(2.022,3.168)</b> |        | <b>3.004(2.406,3.752)</b> |        |
|                   | Young  | 1.009(0.906,1.125)        |        | 1.121(0.948,1.327)        |        | <b>1.355(1.116,1.645)</b> |        | <b>1.736(1.412,2.135)</b> |        | <b>2.279(1.831,2.837)</b> |        | <b>2.956(2.362,3.698)</b> |        | <b>3.697(2.982,4.583)</b> |        | <b>4.405(3.562,5.448)</b> |        |
|                   | Old    | 0.938(0.836,1.520)        |        | 0.931(0.779,1.114)        |        | 0.973(0.791,1.197)        |        | 1.061(0.850,1.325)        |        | 1.190(0.941,1.506)        |        | <b>1.354(1.064,1.724)</b> |        | <b>1.549(1.227,1.956)</b> |        | <b>1.773(1.406,2.236)</b> |        |
| NO <sub>2</sub>   | Male   | 1.010(0.951,1.073)        |        | 1.052(0.956,1.159)        |        | <b>1.126(1.001,1.267)</b> |        | <b>1.229(1.073,1.408)</b> |        | <b>1.355(1.160,1.583)</b> |        | <b>1.494(1.259,1.774)</b> |        | <b>1.637(1.367,1.962)</b> |        | <b>1.777(1.471,2.146)</b> |        |
|                   | Female | 1.015(0.955,1.080)        |        | 1.054(0.955,1.163)        |        | 1.117(0.991,1.258)        |        | <b>1.202(1.048,1.380)</b> |        | <b>1.308(1.118,1.531)</b> |        | <b>1.430(1.202,1.702)</b> |        | <b>1.565(1.304,1.879)</b> |        | <b>1.710(1.414,2.070)</b> |        |
|                   | Young  | 0.996(0.936,1.059)        |        | 1.032(0.935,1.139)        |        | 1.108(0.983,1.249)        |        | <b>1.224(1.066,1.404)</b> |        | <b>1.370(1.171,1.603)</b> |        | <b>1.536(1.293,1.826)</b> |        | <b>1.710(1.427,2.050)</b> |        | <b>1.882(1.558,2.272)</b> |        |
|                   | Old    | 1.022(0.964,1.084)        |        | 1.064(0.968,1.169)        |        | <b>1.126(1.003,1.263)</b> |        | <b>1.207(1.056,1.380)</b> |        | <b>1.305(1.119,1.521)</b> |        | <b>1.415(1.194,1.677)</b> |        | <b>1.535(1.283,1.836)</b> |        | <b>1.661(1.377,2.003)</b> |        |
| O <sub>3</sub>    | Male   | <b>0.817(0.771,0.866)</b> |        | <b>0.664(0.605,0.729)</b> |        | <b>0.538(0.481,0.602)</b> |        | <b>0.438(0.386,0.497)</b> |        | <b>0.359(0.311,0.414)</b> |        | <b>0.299(0.256,0.350)</b> |        | <b>0.254(0.216,0.300)</b> |        | <b>0.221(0.186,0.263)</b> |        |
|                   | Female | <b>0.859(0.809,0.912)</b> |        | <b>0.715(0.650,0.787)</b> |        | <b>0.581(0.518,0.651)</b> |        | <b>0.465(0.408,0.530)</b> |        | <b>0.374(0.323,0.433)</b> |        | <b>0.308(0.263,0.362)</b> |        | <b>0.263(0.222,0.311)</b> |        | <b>0.234(0.196,0.279)</b> |        |
|                   | Young  | <b>0.828(0.779,0.880)</b> |        | <b>0.681(0.619,0.750)</b> |        | <b>0.558(0.497,0.626)</b> |        | <b>0.457(0.402,0.521)</b> |        | <b>0.378(0.327,0.437)</b> |        | <b>0.318(0.271,0.373)</b> |        | <b>0.273(0.231,0.322)</b> |        | <b>0.240(0.202,0.286)</b> |        |
|                   | Old    | <b>0.873(0.825,0.924)</b> |        | <b>0.746(0.681,0.817)</b> |        | <b>0.625(0.560,0.699)</b> |        | <b>0.520(0.458,0.590)</b> |        | <b>0.434(0.377,0.501)</b> |        | <b>0.369(0.316,0.432)</b> |        | <b>0.322(0.273–0.381)</b> |        | <b>0.291(0.244,0.346)</b> |        |

**Supplementary Table 4** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021

| pollutant         | group  | Lag0                      |        | Lag1                      |        | Lag2                      |        | Lag3                      |        | Lag4                      |        | Lag5                      |        | Lag6                      |        | Lag7                      |        |
|-------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|
|                   |        | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI |
| CO                | Male   | 0.995(0.977,1.014)        |        | 0.997(0.986,1.008)        |        | 0.999(0.990,1.007)        |        | 1.000(0.990,1.011)        |        | 1.002(0.991,1.013)        |        | 1.003(0.994,1.012)        |        | 1.004(0.994,1.014)        |        | 1.005(0.988,1.022)        |        |
|                   | Female | 0.988(0.970,1.007)        |        | 0.997(0.986,1.008)        |        | 1.004(0.995,1.013)        |        | 1.008(0.997,1.019)        |        | 1.008(0.997,1.020)        |        | 1.005(0.995,1.014)        |        | 0.998(0.988,1.009)        |        | 0.990(0.974,1.007)        |        |
|                   | Young  | 1.001(0.983,1.020)        |        | 0.994(0.984,1.005)        |        | <b>0.988(0.980,0.997)</b> |        | <b>0.984(0.974,0.995)</b> |        | <b>0.983(0.973,0.994)</b> |        | <b>0.985(0.976,0.994)</b> |        | <b>0.989(0.979,0.999)</b> |        | 0.994(0.978,1.011)        |        |
|                   | Old    | <b>0.981(0.963,0.999)</b> |        | 0.994(0.983,1.004)        |        | 1.005(0.996,1.014)        |        | <b>1.013(1.002,1.024)</b> |        | <b>1.015(1.004,1.027)</b> |        | <b>1.013(1.004,1.022)</b> |        | 1.007(0.996,1.017)        |        | 0.999(0.982,1.016)        |        |
| PM <sub>2.5</sub> | Male   | 0.995(0.983,1.007)        |        | 0.996(0.988,1.004)        |        | 0.996(0.989,1.004)        |        | 0.997(0.989,1.006)        |        | 0.998(0.989,1.007)        |        | 0.999(0.991,1.006)        |        | 0.999(0.991,1.007)        |        | 1.000(0.989,1.011)        |        |
|                   | Female | 0.989(0.977,1.002)        |        | 0.993(0.985,1.001)        |        | 0.996(0.988,1.003)        |        | 0.998(0.989,1.007)        |        | 0.999(0.990,1.008)        |        | 0.999(0.991,1.007)        |        | 0.998(0.99,1.006)         |        | 0.997(0.986,1.009)        |        |
|                   | Young  | 1.000(0.988,1.013)        |        | 0.997(0.989,1.005)        |        | 0.994(0.987,1.001)        |        | 0.992(0.983,1.001)        |        | 0.992(0.983,1.001)        |        | 0.994(0.986,1.001)        |        | 0.996(0.989,1.004)        |        | 1.000(0.988,1.011)        |        |
|                   | Old    | 0.989(0.977,1.001)        |        | 0.995(0.987,1.003)        |        | 1.000(0.992,1.007)        |        | 1.003(0.995,1.012)        |        | 1.005(0.996,1.014)        |        | 1.004(0.996,1.012)        |        | 1.002(0.994,1.010)        |        | 0.999(0.988,1.010)        |        |
| PM <sub>10</sub>  | Male   | <b>0.983(0.968,0.999)</b> |        | <b>0.979(0.968,0.989)</b> |        | <b>0.975(0.965,0.985)</b> |        | <b>0.973(0.961,0.984)</b> |        | <b>0.973(0.961,0.985)</b> |        | <b>0.976(0.966,0.986)</b> |        | <b>0.980(0.969,0.991)</b> |        | 0.985(0.970,1.002)        |        |
|                   | Female | <b>0.980(0.964,0.996)</b> |        | <b>0.980(0.969,0.991)</b> |        | <b>0.980(0.970,0.990)</b> |        | <b>0.980(0.968,0.992)</b> |        | <b>0.980(0.968,0.992)</b> |        | <b>0.979(0.969,0.990)</b> |        | <b>0.979(0.968,0.990)</b> |        | <b>0.978(0.962,0.994)</b> |        |
|                   | Young  | 0.993(0.976,1.010)        |        | <b>0.983(0.972,0.994)</b> |        | <b>0.974(0.964,0.984)</b> |        | <b>0.969(0.957,0.981)</b> |        | <b>0.968(0.956,0.980)</b> |        | <b>0.971(0.961,0.981)</b> |        | <b>0.977(0.967,0.989)</b> |        | 0.986(0.969,1.002)        |        |
|                   | Old    | <b>0.979(0.964,0.994)</b> |        | <b>0.982(0.972,0.993)</b> |        | <b>0.985(0.975,0.995)</b> |        | <b>0.987(0.975,0.999)</b> |        | <b>0.988(0.976,1.000)</b> |        | <b>0.987(0.977,0.997)</b> |        | <b>0.986(0.975,0.996)</b> |        | <b>0.984(0.968,1.000)</b> |        |
| SO <sub>2</sub>   | Male   | 1.004(0.988,1.019)        |        | 0.992(0.983,1.001)        |        | <b>0.981(0.974,0.988)</b> |        | <b>0.973(0.965,0.982)</b> |        | <b>0.970(0.961,0.979)</b> |        | <b>0.971(0.963,0.978)</b> |        | <b>0.974(0.965,0.983)</b> |        | <b>0.979(0.965,0.993)</b> |        |
|                   | Female | 1.000(0.984,1.016)        |        | <b>0.991(0.982,1.000)</b> |        | <b>0.983(0.976,0.990)</b> |        | <b>0.977(0.968,0.986)</b> |        | <b>0.974(0.965,0.983)</b> |        | <b>0.973(0.966,0.981)</b> |        | <b>0.974(0.966,0.983)</b> |        | <b>0.976(0.962,0.991)</b> |        |
|                   | Young  | 0.999(0.984,1.014)        |        | <b>0.985(0.977,0.994)</b> |        | <b>0.974(0.967,0.981)</b> |        | <b>0.966(0.958,0.975)</b> |        | <b>0.963(0.954,0.972)</b> |        | <b>0.965(0.957,0.972)</b> |        | <b>0.969(0.961,0.978)</b> |        | <b>0.976(0.962,0.990)</b> |        |
|                   | Old    | 1.009(0.993,1.025)        |        | 1.001(0.992,1.011)        |        | 0.994(0.986,1.001)        |        | <b>0.988(0.979,0.997)</b> |        | <b>0.984(0.975,0.993)</b> |        | <b>0.982(0.974,0.990)</b> |        | <b>0.981(0.973,0.991)</b> |        | <b>0.981(0.967,0.996)</b> |        |
| NO <sub>2</sub>   | Male   | 0.996(0.970,1.022)        |        | <b>0.983(0.966,0.999)</b> |        | <b>0.972(0.957,0.986)</b> |        | <b>0.963(0.946,0.981)</b> |        | <b>0.959(0.942,0.977)</b> |        | <b>0.959(0.944,0.974)</b> |        | <b>0.962(0.946,0.978)</b> |        | <b>0.966(0.943,0.989)</b> |        |
|                   | Female | 0.994(0.968,1.020)        |        | 0.984(0.968,1.001)        |        | <b>0.976(0.961,0.991)</b> |        | <b>0.969(0.951,0.986)</b> |        | <b>0.964(0.947,0.982)</b> |        | <b>0.962(0.947,0.978)</b> |        | <b>0.962(0.946,0.978)</b> |        | <b>0.963(0.939,0.987)</b> |        |
|                   | Young  | 1.002(0.976,1.029)        |        | 0.985(0.968,1.002)        |        | <b>0.970(0.955,0.985)</b> |        | <b>0.959(0.941,0.976)</b> |        | <b>0.953(0.935,0.970)</b> |        | <b>0.952(0.937,0.967)</b> |        | <b>0.955(0.939,0.971)</b> |        | <b>0.960(0.936,0.984)</b> |        |
|                   | Old    | 0.991(0.966,1.016)        |        | <b>0.983(0.967,0.999)</b> |        | <b>0.976(0.962,0.991)</b> |        | <b>0.971(0.954,0.988)</b> |        | <b>0.967(0.950,0.985)</b> |        | <b>0.966(0.951,0.981)</b> |        | <b>0.966(0.950,0.982)</b> |        | <b>0.967(0.944,0.990)</b> |        |
| O <sub>3</sub>    | Male   | <b>1.140(1.098,1.184)</b> |        | <b>1.143(1.116,1.171)</b> |        | <b>1.145(1.122,1.169)</b> |        | <b>1.144(1.116,1.172)</b> |        | <b>1.137(1.109,1.166)</b> |        | <b>1.125(1.101,1.150)</b> |        | <b>1.110(1.086,1.135)</b> |        | <b>1.094(1.059,1.130)</b> |        |
|                   | Female | <b>1.103(1.061,1.147)</b> |        | <b>1.126(1.099,1.154)</b> |        | <b>1.144(1.120,1.169)</b> |        | <b>1.154(1.126,1.183)</b> |        | <b>1.151(1.121,1.181)</b> |        | <b>1.134(1.109,1.159)</b> |        | <b>1.108(1.083,1.134)</b> |        | <b>1.079(1.044,1.116)</b> |        |
|                   | Young  | <b>1.130(1.086,1.175)</b> |        | <b>1.135(1.107,1.163)</b> |        | <b>1.138(1.114,1.162)</b> |        | <b>1.137(1.109,1.166)</b> |        | <b>1.131(1.102,1.160)</b> |        | <b>1.119(1.094,1.144)</b> |        | <b>1.103(1.078,1.129)</b> |        | <b>1.086(1.050,1.124)</b> |        |
|                   | Old    | <b>1.092(1.052,1.133)</b> |        | <b>1.108(1.082,1.134)</b> |        | <b>1.120(1.098,1.144)</b> |        | <b>1.127(1.100,1.154)</b> |        | <b>1.123(1.096,1.152)</b> |        | <b>1.111(1.087,1.135)</b> |        | <b>1.092(1.068,1.116)</b> |        | <b>1.070(1.036,1.105)</b> |        |

**Supplementary Table 5** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021

| pollutant         | group  | Lag0                      |        | Lag1                      |        | Lag2                      |        | Lag3                      |        | Lag4                      |        | Lag5                      |        | Lag6                      |        | Lag7                      |        |
|-------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|
|                   |        | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI | RR                        | 95% CI |
| CO                | Male   | 1.022(0.938,1.112)        |        | 1.014(0.964,1.066)        |        | 1.006(0.966,1.048)        |        | 0.999(0.950,1.050)        |        | 0.992(0.943,1.044)        |        | 0.987(0.946,1.030)        |        | 0.982(0.936,1.030)        |        | 0.977(0.904,1.056)        |        |
|                   | Female | 1.056(0.968,1.151)        |        | 1.015(0.964,1.068)        |        | 0.982(0.942,1.023)        |        | 0.963(0.915,1.013)        |        | 0.961(0.913,1.013)        |        | 0.978(0.937,1.022)        |        | 1.009(0.961,1.059)        |        | 1.047(0.967,1.132)        |        |
|                   | Young  | 0.993(0.913,1.081)        |        | 1.026(0.977,1.079)        |        | <b>1.056(1.014,1.099)</b> |        | <b>1.076(1.024,1.130)</b> |        | <b>1.081(1.028,1.137)</b> |        | <b>1.071(1.027,1.118)</b> |        | <b>1.052(1.003,1.103)</b> |        | 1.028(0.952,1.110)        |        |
|                   | Old    | <b>1.096(1.006,1.193)</b> |        | 1.031(0.980,1.084)        |        | 0.978(0.938,1.019)        |        | 0.943(0.896,0.991)        |        | <b>0.931(0.884,0.980)</b> |        | <b>0.942(0.903,0.984)</b> |        | 0.969(0.924,1.017)        |        | 1.005(0.930,1.087)        |        |
| PM <sub>2.5</sub> | Male   | 1.030(0.958,1.107)        |        | 1.025(0.978,1.075)        |        | 1.021(0.978,1.066)        |        | 1.017(0.966,1.070)        |        | 1.012(0.961,1.066)        |        | 1.008(0.964,1.055)        |        | 1.004(0.959,1.052)        |        | 1.000(0.936,1.069)        |        |
|                   | Female | 1.064(0.989,1.145)        |        | 1.043(0.995,1.095)        |        | 1.026(0.982,1.071)        |        | 1.013(0.962,1.066)        |        | 1.006(0.954,1.060)        |        | 1.006(0.961,1.053)        |        | 1.010(0.964,1.058)        |        | 1.016(0.950,1.087)        |        |
|                   | Young  | 0.998(0.926,1.074)        |        | 1.019(0.971,1.069)        |        | 1.037(0.993,1.082)        |        | 1.048(0.996,1.103)        |        | 1.048(0.995,1.105)        |        | 1.038(0.992,1.086)        |        | 1.021(0.975,1.07)         |        | 1.001(0.935,1.071)        |        |
|                   | Old    | 1.067(0.994,1.145)        |        | 1.031(0.984,1.081)        |        | 1.001(0.958,1.046)        |        | 0.980(0.931,1.032)        |        | 0.972(0.922,1.024)        |        | 0.976(0.932,1.021)        |        | 0.988(0.943,1.034)        |        | 1.004(0.941,1.072)        |        |
| PM <sub>10</sub>  | Male   | <b>1.062(1.002,1.125)</b> |        | <b>1.081(1.040,1.123)</b> |        | <b>1.096(1.056,1.138)</b> |        | <b>1.105(1.058,1.154)</b> |        | <b>1.104(1.057,1.153)</b> |        | <b>1.093(1.053,1.134)</b> |        | <b>1.075(1.034,1.118)</b> |        | 1.054(0.994,1.117)        |        |
|                   | Female | <b>1.076(1.014,1.142)</b> |        | <b>1.076(1.034,1.119)</b> |        | <b>1.075(1.035,1.116)</b> |        | <b>1.075(1.028,1.124)</b> |        | <b>1.076(1.029,1.125)</b> |        | <b>1.078(1.038,1.120)</b> |        | <b>1.080(1.038,1.124)</b> |        | <b>1.083(1.021,1.150)</b> |        |
|                   | Young  | 1.026(0.965,1.091)        |        | <b>1.065(1.022,1.109)</b> |        | <b>1.099(1.058,1.141)</b> |        | <b>1.121(1.073,1.173)</b> |        | <b>1.126(1.077,1.177)</b> |        | <b>1.111(1.070,1.155)</b> |        | <b>1.085(1.042,1.130)</b> |        | 1.053(0.992,1.119)        |        |
|                   | Old    | <b>1.080(1.021,1.142)</b> |        | <b>1.067(1.027,1.108)</b> |        | <b>1.056(1.018,1.095)</b> |        | <b>1.048(1.004,1.094)</b> |        | <b>1.045(1.001,1.091)</b> |        | <b>1.047(1.010,1.087)</b> |        | <b>1.053(1.013,1.094)</b> |        | <b>1.060(1.001,1.122)</b> |        |
| SO <sub>2</sub>   | Male   | 0.974(0.871,1.089)        |        | 1.063(0.995,1.135)        |        | <b>1.148(1.090,1.209)</b> |        | <b>1.215(1.140,1.294)</b> |        | <b>1.246(1.167,1.330)</b> |        | <b>1.240(1.173,1.310)</b> |        | <b>1.208(1.134,1.288)</b> |        | <b>1.165(1.051,1.292)</b> |        |
|                   | Female | 1.001(0.894,1.121)        |        | 1.067(0.998,1.141)        |        | <b>1.130(1.072,1.192)</b> |        | <b>1.181(1.107,1.260)</b> |        | <b>1.211(1.133,1.293)</b> |        | <b>1.216(1.150,1.286)</b> |        | <b>1.206(1.130,1.286)</b> |        | <b>1.187(1.069,1.318)</b> |        |
|                   | Young  | 1.009(0.906,1.125)        |        | <b>1.111(1.042,1.184)</b> |        | <b>1.208(1.148,1.271)</b> |        | <b>1.282(1.204,1.364)</b> |        | <b>1.313(1.231,1.399)</b> |        | <b>1.297(1.229,1.369)</b> |        | <b>1.251(1.175,1.331)</b> |        | <b>1.192(1.077,1.319)</b> |        |
|                   | Old    | 0.938(0.836,1.520)        |        | 0.993(0.927,1.063)        |        | 1.045(0.990,1.103)        |        | <b>1.090(1.021,1.164)</b> |        | <b>1.122(1.049,1.200)</b> |        | <b>1.138(1.075,1.205)</b> |        | <b>1.144(1.071,1.222)</b> |        | <b>1.144(1.030,1.272)</b> |        |
| NO <sub>2</sub>   | Male   | 1.010(0.951,1.073)        |        | <b>1.041(1.002,1.083)</b> |        | <b>1.070(1.033,1.108)</b> |        | <b>1.092(1.047,1.138)</b> |        | <b>1.103(1.057,1.150)</b> |        | <b>1.103(1.063,1.144)</b> |        | <b>1.096(1.054,1.139)</b> |        | <b>1.085(1.025,1.148)</b> |        |
|                   | Female | 1.015(0.955,1.080)        |        | 1.038(0.998,1.080)        |        | <b>1.059(1.022,1.098)</b> |        | <b>1.077(1.032,1.123)</b> |        | <b>1.088(1.042,1.136)</b> |        | <b>1.093(1.053,1.135)</b> |        | <b>1.094(1.052,1.138)</b> |        | <b>1.093(1.032,1.157)</b> |        |
|                   | Young  | 0.996(0.936,1.059)        |        | 1.036(0.996,1.078)        |        | <b>1.074(1.037,1.113)</b> |        | <b>1.104(1.058,1.152)</b> |        | <b>1.120(1.073,1.169)</b> |        | <b>1.121(1.080,1.164)</b> |        | <b>1.113(1.071,1.157)</b> |        | <b>1.100(1.039,1.166)</b> |        |
|                   | Old    | 1.022(0.964,1.084)        |        | <b>1.041(1.002,1.081)</b> |        | <b>1.058(1.022,1.096)</b> |        | <b>1.072(1.029,1.117)</b> |        | <b>1.081(1.037,1.127)</b> |        | <b>1.084(1.046,1.125)</b> |        | <b>1.084(1.044,1.126)</b> |        | <b>1.082(1.024,1.144)</b> |        |
| O <sub>3</sub>    | Male   | <b>0.817(0.771,0.866)</b> |        | <b>0.813(0.783,0.844)</b> |        | <b>0.811(0.786,0.837)</b> |        | <b>0.813(0.783,0.844)</b> |        | <b>0.820(0.789,0.852)</b> |        | <b>0.833(0.800,0.862)</b> |        | <b>0.851(0.822,0.881)</b> |        | <b>0.870(0.828,0.915)</b> |        |
|                   | Female | <b>0.859(0.809,0.912)</b> |        | <b>0.833(0.802,0.865)</b> |        | <b>0.812(0.786,0.839)</b> |        | <b>0.801(0.771,0.833)</b> |        | <b>0.805(0.774,0.838)</b> |        | <b>0.824(0.796,0.852)</b> |        | <b>0.853(0.823,0.884)</b> |        | <b>0.888(0.843,0.936)</b> |        |
|                   | Young  | <b>0.828(0.779,0.880)</b> |        | <b>0.823(0.792,0.854)</b> |        | <b>0.819(0.793,0.846)</b> |        | <b>0.820(0.789,0.852)</b> |        | <b>0.827(0.795,0.860)</b> |        | <b>0.841(0.812,0.870)</b> |        | <b>0.859(0.829,0.890)</b> |        | <b>0.880(0.835,0.927)</b> |        |
|                   | Old    | <b>0.873(0.825,0.924)</b> |        | <b>0.854(0.823,0.886)</b> |        | <b>0.839(0.813,0.866)</b> |        | <b>0.832(0.801,0.863)</b> |        | <b>0.835(0.804,0.868)</b> |        | <b>0.850(0.822,0.879)</b> |        | <b>0.873(0.844,0.904)</b> |        | <b>0.901(0.857,0.947)</b> |        |

**Supplementary Table 6** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 5)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.994(0.976,1.012) |        | 0.998(0.971,1.025) |        | 1.007(0.976,1.040) |        | 1.016(0.981,1.052) |        | 1.016(0.981,1.053) |        | 1.005(0.970,1.041) |        |
|                         | Female | 0.984(0.967,1.003) |        | 0.987(0.960,1.015) |        | 1.002(0.970,1.035) |        | 1.017(0.982,1.054) |        | 1.021(0.985,1.058) |        | 1.006(0.971,1.043) |        |
|                         | Young  | 0.996(0.978,1.014) |        | 0.991(0.964,1.018) |        | 0.983(0.953,1.015) |        | 0.972(0.939,1.006) |        | 0.956(0.923,0.990) |        | 0.933(0.901,0.966) |        |
|                         | Old    | 0.980(0.962,0.997) |        | 0.983(0.957,1.010) |        | 1.003(0.972,1.036) |        | 1.026(0.991,1.063) |        | 1.036(0.999,1.074) |        | 1.025(0.989,1.063) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.994(0.982,1.007) |        | 0.992(0.973,1.012) |        | 0.992(0.967,1.018) |        | 0.992(0.962,1.023) |        | 0.990(0.957,1.025) |        | 0.985(0.949,1.022) |        |
|                         | Female | 0.988(0.976,1.000) |        | 0.982(0.963,1.002) |        | 0.982(0.957,1.007) |        | 0.982(0.953,1.013) |        | 0.981(0.948,1.016) |        | 0.977(0.941,1.014) |        |
|                         | Young  | 0.999(0.986,1.011) |        | 0.996(0.976,1.016) |        | 0.992(0.967,1.018) |        | 0.987(0.958,1.018) |        | 0.981(0.948,1.015) |        | 0.974(0.939,1.010) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.987(0.968,1.007) |        | 0.992(0.967,1.017) |        | 0.999(0.968,1.030) |        | 1.001(0.967,1.037) |        | 0.998(0.961,1.036) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.981(0.965,0.997) |        | 0.956(0.932,0.981) |        | 0.928(0.897,0.961) |        | 0.901(0.864,0.940) |        | 0.879(0.838,0.923) |        | 0.864(0.821,0.910) |        |
|                         | Female | 0.977(0.961,0.993) |        | 0.952(0.927,0.978) |        | 0.929(0.897,0.962) |        | 0.908(0.870,0.948) |        | 0.892(0.849,0.937) |        | 0.881(0.836,0.929) |        |
|                         | Young  | 0.989(0.972,1.006) |        | 0.966(0.940,0.993) |        | 0.936(0.904,0.970) |        | 0.906(0.867,0.946) |        | 0.881(0.839,0.925) |        | 0.865(0.821,0.911) |        |
|                         | Old    | 0.978(0.962,0.993) |        | 0.958(0.934,0.983) |        | 0.942(0.911,0.974) |        | 0.928(0.890,0.968) |        | 0.917(0.874,0.961) |        | 0.907(0.862,0.954) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.998(0.983,1.014) |        | 0.978(0.956,1.001) |        | 0.946(0.921,0.971) |        | 0.912(0.886,0.938) |        | 0.885(0.859,0.911) |        | 0.869(0.844,0.894) |        |
|                         | Female | 0.996(0.980,1.012) |        | 0.973(0.951,0.996) |        | 0.940(0.915,0.965) |        | 0.906(0.880,0.933) |        | 0.883(0.857,0.909) |        | 0.874(0.849,0.900) |        |
|                         | Young  | 0.993(0.978,1.008) |        | 0.964(0.943,0.985) |        | 0.921(0.898,0.945) |        | 0.879(0.855,0.904) |        | 0.848(0.824,0.872) |        | 0.832(0.809,0.856) |        |
|                         | Old    | 1.005(0.990,1.021) |        | 0.997(0.974,1.021) |        | 0.980(0.953,1.007) |        | 0.960(0.931,0.989) |        | 0.944(0.915,0.973) |        | 0.935(0.907,0.964) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.987(0.962,1.013) |        | 0.957(0.919,0.997) |        | 0.917(0.871,0.967) |        | 0.877(0.824,0.934) |        | 0.846(0.790,0.907) |        | 0.827(0.768,0.891) |        |
|                         | Female | 0.983(0.957,1.009) |        | 0.957(0.918,0.997) |        | 0.925(0.878,0.976) |        | 0.894(0.839,0.953) |        | 0.867(0.808,0.930) |        | 0.847(0.786,0.913) |        |
|                         | Young  | 0.990(0.964,1.017) |        | 0.957(0.918,0.998) |        | 0.911(0.864,0.960) |        | 0.865(0.812,0.922) |        | 0.833(0.777,0.893) |        | 0.818(0.760,0.881) |        |
|                         | Old    | 0.983(0.959,1.008) |        | 0.960(0.922,0.999) |        | 0.933(0.886,0.982) |        | 0.904(0.850,0.962) |        | 0.876(0.818,0.938) |        | 0.849(0.789,0.914) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.168(1.124,1.213) |        | 1.363(1.285,1.445) |        | 1.584(1.473,1.703) |        | 1.823(1.673,1.985) |        | 2.062(1.875,2.267) |        | 2.285(2.064,2.531) |        |
|                         | Female | 1.126(1.083,1.171) |        | 1.291(1.215,1.371) |        | 1.497(1.390,1.612) |        | 1.737(1.591,1.895) |        | 1.995(1.810,2.198) |        | 2.255(2.031,2.503) |        |
|                         | Young  | 1.153(1.109,1.200) |        | 1.337(1.259,1.421) |        | 1.551(1.440,1.671) |        | 1.781(1.633,1.944) |        | 2.006(1.822,2.209) |        | 2.204(1.988,2.443) |        |
|                         | Old    | 1.114(1.073,1.157) |        | 1.247(1.177,1.321) |        | 1.399(1.303,1.504) |        | 1.573(1.444,1.712) |        | 1.765(1.605,1.942) |        | 1.978(1.785,2.192) |        |

**Supplementary Table 7** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 5)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.994(0.976,1.012) |        | 1.004(0.993,1.014) |        | 1.010(0.999,1.020) |        | 1.008(0.997,1.020) |        | 1.000(0.990,1.011) |        | 0.989(0.972,1.005) |        |
|                   | Female | 0.984(0.967,1.003) |        | 1.003(0.992,1.014) |        | 1.015(1.004,1.027) |        | 1.015(1.004,1.027) |        | 1.003(0.993,1.014) |        | 0.986(0.969,1.002) |        |
|                   | Young  | 0.996(0.978,1.014) |        | 0.995(0.984,1.005) |        | 0.993(0.982,1.003) |        | 0.989(0.978,1.000) |        | 0.983(0.973,0.993) |        | 0.976(0.960,0.993) |        |
|                   | Old    | 0.980(0.962,0.997) |        | 1.004(0.993,1.014) |        | 1.021(1.009,1.032) |        | 1.023(1.011,1.034) |        | 1.010(0.999,1.020) |        | 0.989(0.973,1.006) |        |
| PM <sub>2.5</sub> | Male   | 0.994(0.982,1.007) |        | 0.998(0.989,1.006) |        | 1.000(0.991,1.009) |        | 1.000(0.991,1.009) |        | 0.998(0.989,1.006) |        | 0.995(0.983,1.006) |        |
|                   | Female | 0.988(0.976,1.000) |        | 0.994(0.986,1.003) |        | 0.999(0.990,1.009) |        | 1.001(0.991,1.010) |        | 0.999(0.990,1.008) |        | 0.995(0.984,1.007) |        |
|                   | Young  | 0.999(0.986,1.011) |        | 0.997(0.989,1.006) |        | 0.996(0.987,1.006) |        | 0.995(0.986,1.004) |        | 0.994(0.985,1.002) |        | 0.993(0.981,1.004) |        |
|                   | Old    | 0.989(0.977,1.001) |        | 0.998(0.990,1.007) |        | 1.005(0.996,1.014) |        | 1.006(0.997,1.016) |        | 1.003(0.994,1.011) |        | 0.996(0.985,1.008) |        |
| PM <sub>10</sub>  | Male   | 0.981(0.965,0.997) |        | 0.975(0.963,0.986) |        | 0.971(0.958,0.983) |        | 0.971(0.958,0.984) |        | 0.976(0.964,0.987) |        | 0.983(0.967,0.998) |        |
|                   | Female | 0.997(0.961,0.993) |        | 0.975(0.964,0.987) |        | 0.975(0.962,0.989) |        | 0.978(0.964,0.991) |        | 0.982(0.970,0.994) |        | 0.988(0.972,1.004) |        |
|                   | Young  | 0.989(0.972,1.006) |        | 0.977(0.965,0.989) |        | 0.969(0.956,0.982) |        | 0.968(0.955,0.981) |        | 0.973(0.961,0.984) |        | 0.981(0.965,0.997) |        |
|                   | Old    | 0.978(0.962,0.993) |        | 0.980(0.969,0.992) |        | 0.983(0.970,0.996) |        | 0.985(0.973,0.998) |        | 0.987(0.976,0.999) |        | 0.989(0.974,1.005) |        |
| SO <sub>2</sub>   | Male   | 0.998(0.983,1.014) |        | 0.980(0.971,0.989) |        | 0.967(0.958,0.976) |        | 0.964(0.955,0.973) |        | 0.970(0.962,0.979) |        | 0.982(0.968,0.996) |        |
|                   | Female | 0.996(0.980,1.012) |        | 0.978(0.969,0.986) |        | 0.965(0.956,0.974) |        | 0.964(0.955,0.973) |        | 0.974(0.966,0.983) |        | 0.990(0.976,1.005) |        |
|                   | Young  | 0.993(0.978,1.008) |        | 0.971(0.963,0.979) |        | 0.956(0.948,0.965) |        | 0.954(0.945,0.963) |        | 0.965(0.956,0.973) |        | 0.982(0.968,0.996) |        |
|                   | Old    | 1.005(0.990,1.021) |        | 0.992(0.983,1.001) |        | 0.982(0.973,0.992) |        | 0.980(0.970,0.989) |        | 0.983(0.975,0.992) |        | 0.991(0.976,1.006) |        |
| NO <sub>2</sub>   | Male   | 0.987(0.962,1.013) |        | 0.970(0.953,0.987) |        | 0.958(0.940,0.977) |        | 0.956(0.938,0.975) |        | 0.964(0.948,0.982) |        | 0.978(0.954,1.002) |        |
|                   | Female | 0.983(0.957,1.009) |        | 0.974(0.956,0.991) |        | 0.967(0.949,0.986) |        | 0.966(0.947,0.985) |        | 0.970(0.953,0.988) |        | 0.977(0.952,1.002) |        |
|                   | Young  | 0.990(0.964,1.017) |        | 0.967(0.950,0.984) |        | 0.951(0.933,0.970) |        | 0.950(0.932,0.969) |        | 0.963(0.946,0.980) |        | 0.983(0.958,1.008) |        |
|                   | Old    | 0.983(0.959,1.008) |        | 0.977(0.960,0.994) |        | 0.972(0.954,0.991) |        | 0.969(0.951,0.988) |        | 0.969(0.952,0.986) |        | 0.969(0.946,0.993) |        |
| O <sub>3</sub>    | Male   | 1.168(1.124,1.213) |        | 1.167(1.139,1.196) |        | 1.163(1.133,1.193) |        | 1.151(1.120,1.182) |        | 1.131(1.105,1.158) |        | 1.108(1.073,1.146) |        |
|                   | Female | 1.126(1.083,1.171) |        | 1.146(1.118,1.175) |        | 1.160(1.129,1.191) |        | 1.160(1.129,1.193) |        | 1.149(1.121,1.177) |        | 1.130(1.093,1.169) |        |
|                   | Young  | 1.153(1.109,1.200) |        | 1.160(1.131,1.189) |        | 1.160(1.129,1.191) |        | 1.148(1.117,1.181) |        | 1.126(1.099,1.154) |        | 1.099(1.062,1.137) |        |
|                   | Old    | 1.114(1.073,1.157) |        | 1.119(1.092,1.146) |        | 1.122(1.094,1.152) |        | 1.124(1.094,1.154) |        | 1.123(1.096,1.150) |        | 1.120(1.085,1.157) |        |

**Supplementary Table 8** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 5)

| pollutant         | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.027(0.945,1.117) |        | 1.010(0.890,1.146) |        | 0.966(0.834,1.120) |        | 0.929(0.790,1.093) |        | 0.928(0.787,1.095) |        | 0.979(0.830,1.154) |        |
|                   | Female | 1.076(0.988,1.172) |        | 1.062(0.935,1.207) |        | 0.990(0.853,1.150) |        | 0.922(0.782,1.088) |        | 0.908(0.768,1.074) |        | 0.972(0.822,1.149) |        |
|                   | Young  | 1.019(0.937,1.108) |        | 1.045(0.922,1.185) |        | 1.082(0.934,1.253) |        | 1.141(0.971,1.341) |        | 1.236(1.050,1.456) |        | 1.382(1.175,1.625) |        |
|                   | Old    | 1.101(1.012,1.197) |        | 1.082(0.954,1.228) |        | 0.984(0.849,1.141) |        | 0.887(0.753,1.045) |        | 0.848(0.717,1.002) |        | 0.891(0.753,1.053) |        |
| PM <sub>2.5</sub> | Male   | 1.033(0.961,1.110) |        | 1.047(0.933,1.174) |        | 1.047(0.903,1.214) |        | 1.047(0.876,1.253) |        | 1.060(0.868,1.296) |        | 1.094(0.882,1.356) |        |
|                   | Female | 1.073(0.998,1.154) |        | 1.109(0.987,1.246) |        | 1.114(0.959,1.294) |        | 1.109(0.925,1.329) |        | 1.116(0.911,1.367) |        | 1.146(0.922,1.424) |        |
|                   | Young  | 1.008(0.936,1.085) |        | 1.023(0.910,1.150) |        | 1.046(0.901,1.215) |        | 1.078(0.901,1.289) |        | 1.118(0.916,1.365) |        | 1.168(0.944,1.445) |        |
|                   | Old    | 1.067(0.994,1.144) |        | 1.078(0.962,1.207) |        | 1.047(0.904,1.214) |        | 1.009(0.843,1.208) |        | 0.993(0.810,1.216) |        | 1.014(0.815,1.261) |        |
| PM <sub>10</sub>  | Male   | 1.071(1.011,1.135) |        | 1.174(1.069,1.289) |        | 1.307(1.155,1.478) |        | 1.453(1.248,1.691) |        | 1.586(1.335,1.885) |        | 1.688(1.403,2.031) |        |
|                   | Female | 1.089(1.026,1.155) |        | 1.191(1.082,1.310) |        | 1.303(1.149,1.477) |        | 1.413(1.210,1.650) |        | 1.508(1.265,1.798) |        | 1.576(1.305,1.905) |        |
|                   | Young  | 1.041(0.979,1.107) |        | 1.131(1.025,1.247) |        | 1.266(1.114,1.438) |        | 1.425(1.219,1.666) |        | 1.574(1.321,1.876) |        | 1.685(1.397,2.032) |        |
|                   | Old    | 1.085(1.026,1.147) |        | 1.165(1.064,1.275) |        | 1.239(1.099,1.397) |        | 1.306(1.125,1.516) |        | 1.367(1.154,1.620) |        | 1.421(1.184,1.706) |        |
| SO <sub>2</sub>   | Male   | 1.014(0.908,1.133) |        | 1.174(0.996,1.383) |        | 1.494(1.237,1.805) |        | 1.947(1.584,2.393) |        | 2.417(1.962,2.979) |        | 2.756(2.235,3.399) |        |
|                   | Female | 1.031(0.921,1.154) |        | 1.213(1.027,1.434) |        | 1.564(1.292,1.895) |        | 2.033(1.650,2.505) |        | 2.453(1.986,3.029) |        | 2.633(2.129,3.256) |        |
|                   | Young  | 1.055(0.946,1.176) |        | 1.305(1.112,1.531) |        | 1.803(1.500,2.166) |        | 2.530(2.071,3.091) |        | 3.281(2.681,4.015) |        | 3.744(3.057,4.586) |        |
|                   | Old    | 0.962(0.859,1.079) |        | 1.020(0.861,1.208) |        | 1.159(0.953,1.410) |        | 1.345(1.085,1.668) |        | 1.517(1.219,1.889) |        | 1.621(1.299,2.022) |        |
| NO <sub>2</sub>   | Male   | 1.031(0.971,1.095) |        | 1.107(1.006,1.218) |        | 1.223(1.082,1.381) |        | 1.357(1.172,1.570) |        | 1.476(1.255,1.736) |        | 1.556(1.310,1.849) |        |
|                   | Female | 1.042(0.980,1.107) |        | 1.109(1.006,1.222) |        | 1.198(1.059,1.356) |        | 1.299(1.120,1.506) |        | 1.394(1.183,1.642) |        | 1.473(1.237,1.753) |        |
|                   | Young  | 1.024(0.962,1.089) |        | 1.108(1.004,1.221) |        | 1.244(1.099,1.408) |        | 1.402(1.210,1.625) |        | 1.533(1.302,1.804) |        | 1.596(1.343,1.897) |        |
|                   | Old    | 1.041(0.982,1.104) |        | 1.100(1.002,1.207) |        | 1.175(1.043,1.325) |        | 1.264(1.095,1.460) |        | 1.361(1.160,1.598) |        | 1.464(1.234,1.736) |        |
| O <sub>3</sub>    | Male   | 0.787(0.742,0.835) |        | 0.620(0.566,0.679) |        | 0.491(0.439,0.549) |        | 0.395(0.346,0.451) |        | 0.327(0.282,0.378) |        | 0.279(0.238,0.326) |        |
|                   | Female | 0.832(0.783,0.884) |        | 0.674(0.614,0.740) |        | 0.536(0.478,0.601) |        | 0.426(0.372,0.488) |        | 0.344(0.296,0.399) |        | 0.284(0.242,0.334) |        |
|                   | Young  | 0.802(0.754,0.853) |        | 0.638(0.581,0.701) |        | 0.507(0.452,0.569) |        | 0.409(0.358,0.469) |        | 0.341(0.294,0.395) |        | 0.295(0.251,0.346) |        |
|                   | Old    | 0.846(0.798,0.896) |        | 0.711(0.650,0.778) |        | 0.595(0.532,0.664) |        | 0.497(0.435,0.566) |        | 0.415(0.358,0.481) |        | 0.348(0.297,0.408) |        |

**Supplementary Table 9** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 5)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.027(0.945,1.117) |        | 0.983(0.935,1.033) |        | 0.957(0.909,1.007) |        | 0.962(0.913,1.013) |        | 0.999(0.951,1.049) |        | 1.055(0.975,1.140) |        |
|                   | Female | 1.076(0.988,1.172) |        | 0.987(0.939,1.038) |        | 0.932(0.885,0.982) |        | 0.931(0.883,0.982) |        | 0.984(0.936,1.035) |        | 1.070(0.989,1.158) |        |
|                   | Young  | 1.019(0.937,1.108) |        | 1.025(0.976,1.077) |        | 1.035(0.984,1.089) |        | 1.055(1.002,1.111) |        | 1.083(1.032,1.137) |        | 1.118(1.035,1.208) |        |
|                   | Old    | 1.101(1.012,1.197) |        | 0.983(0.935,1.033) |        | 0.909(0.864,0.958) |        | 0.901(0.855,0.950) |        | 0.956(0.910,1.005) |        | 1.051(0.972,1.136) |        |
| PM <sub>2.5</sub> | Male   | 1.033(0.961,1.110) |        | 1.013(0.964,1.066) |        | 1.000(0.947,1.057) |        | 1.000(0.947,1.057) |        | 1.012(0.963,1.064) |        | 1.031(0.964,1.103) |        |
|                   | Female | 1.073(0.998,1.154) |        | 1.033(0.982,1.087) |        | 1.004(0.951,1.061) |        | 0.996(0.942,1.053) |        | 1.006(0.957,1.058) |        | 1.027(0.960,1.099) |        |
|                   | Young  | 1.008(0.936,1.085) |        | 1.015(0.965,1.068) |        | 1.023(0.968,1.080) |        | 1.030(0.975,1.088) |        | 1.037(0.987,1.091) |        | 1.045(0.976,1.119) |        |
|                   | Old    | 1.067(0.994,1.144) |        | 1.010(0.961,1.062) |        | 0.972(0.920,1.026) |        | 0.963(0.912,1.018) |        | 0.984(0.937,1.034) |        | 1.021(0.956,1.091) |        |
| PM <sub>10</sub>  | Male   | 1.071(1.011,1.135) |        | 1.096(1.051,1.143) |        | 1.113(1.062,1.167) |        | 1.112(1.060,1.165) |        | 1.092(1.047,1.139) |        | 1.064(1.006,1.126) |        |
|                   | Female | 1.089(1.026,1.155) |        | 1.094(1.048,1.142) |        | 1.094(1.042,1.148) |        | 1.085(1.034,1.139) |        | 1.067(1.022,1.114) |        | 1.045(0.986,1.108) |        |
|                   | Young  | 1.041(0.979,1.107) |        | 1.086(1.040,1.135) |        | 1.119(1.067,1.175) |        | 1.126(1.073,1.181) |        | 1.105(1.058,1.153) |        | 1.070(1.009,1.136) |        |
|                   | Old    | 1.085(1.026,1.147) |        | 1.074(1.031,1.119) |        | 1.063(1.015,1.114) |        | 1.054(1.007,1.105) |        | 1.047(1.004,1.091) |        | 1.039(0.984,1.098) |        |
| SO <sub>2</sub>   | Male   | 1.014(0.908,1.133) |        | 1.157(1.086,1.233) |        | 1.273(1.191,1.361) |        | 1.303(1.218,1.395) |        | 1.242(1.166,1.323) |        | 1.140(1.027,1.266) |        |
|                   | Female | 1.031(0.921,1.154) |        | 1.177(1.104,1.256) |        | 1.289(1.205,1.379) |        | 1.300(1.213,1.392) |        | 1.206(1.131,1.286) |        | 1.073(0.966,1.193) |        |
|                   | Young  | 1.055(0.946,1.176) |        | 1.237(1.163,1.316) |        | 1.382(1.295,1.474) |        | 1.404(1.313,1.500) |        | 1.297(1.219,1.380) |        | 1.141(1.030,1.264) |        |
|                   | Old    | 0.962(0.859,1.079) |        | 1.059(0.992,1.131) |        | 1.137(1.061,1.218) |        | 1.161(1.082,1.245) |        | 1.128(1.057,1.204) |        | 1.068(0.960,1.188) |        |
| NO <sub>2</sub>   | Male   | 1.031(0.971,1.095) |        | 1.074(1.030,1.119) |        | 1.105(1.056,1.155) |        | 1.109(1.061,1.161) |        | 1.088(1.044,1.134) |        | 1.054(0.995,1.117) |        |
|                   | Female | 1.042(0.980,1.107) |        | 1.064(1.021,1.110) |        | 1.081(1.033,1.131) |        | 1.084(1.035,1.135) |        | 1.073(1.030,1.119) |        | 1.056(0.996,1.120) |        |
|                   | Young  | 1.024(0.962,1.089) |        | 1.082(1.037,1.128) |        | 1.123(1.074,1.176) |        | 1.127(1.077,1.180) |        | 1.093(1.048,1.140) |        | 1.041(0.981,1.105) |        |
|                   | Old    | 1.041(0.982,1.104) |        | 1.056(1.014,1.100) |        | 1.069(1.022,1.117) |        | 1.076(1.029,1.124) |        | 1.077(1.034,1.121) |        | 1.075(1.016,1.137) |        |
| O <sub>3</sub>    | Male   | 0.787(0.742,0.835) |        | 0.788(0.758,0.818) |        | 0.792(0.761,0.825) |        | 0.805(0.772,0.839) |        | 0.826(0.797,0.857) |        | 0.853(0.810,0.897) |        |
|                   | Female | 0.832(0.783,0.884) |        | 0.810(0.779,0.842) |        | 0.795(0.763,0.829) |        | 0.794(0.761,0.829) |        | 0.807(0.777,0.838) |        | 0.827(0.785,0.872) |        |
|                   | Young  | 0.802(0.754,0.853) |        | 0.795(0.765,0.827) |        | 0.795(0.763,0.829) |        | 0.807(0.774,0.842) |        | 0.832(0.801,0.864) |        | 0.865(0.820,0.912) |        |
|                   | Old    | 0.846(0.798,0.896) |        | 0.840(0.810,0.872) |        | 0.836(0.803,0.871) |        | 0.835(0.801,0.870) |        | 0.836(0.806,0.867) |        | 0.839(0.798,0.882) |        |

**Supplementary Table 10** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 6)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.013) |        | 0.996(0.969,1.024) |        | 1.001(0.970,1.034) |        | 1.008(0.973,1.044) |        | 1.012(0.975,1.050) |        | 1.011(0.974,1.048) |        | 1.002(0.967,1.039) |        |
|                         | Female | 0.986(0.968,1.004) |        | 0.985(0.957,1.013) |        | 0.993(0.961,1.026) |        | 1.006(0.970,1.042) |        | 1.015(0.977,1.054) |        | 1.014(0.977,1.053) |        | 1.001(0.966,1.039) |        |
|                         | Young  | 1.000(0.982,1.018) |        | 0.996(0.969,1.024) |        | 0.990(0.959,1.022) |        | 0.979(0.946,1.014) |        | 0.965(0.930,1.001) |        | 0.946(0.913,0.981) |        | 0.924(0.892,0.958) |        |
|                         | Old    | 0.979(0.961,0.997) |        | 0.975(0.948,1.003) |        | 0.985(0.954,1.017) |        | 1.002(0.968,1.038) |        | 1.019(0.981,1.058) |        | 1.028(0.991,1.067) |        | 1.026(0.989,1.064) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.992(0.973,1.012) |        | 0.991(0.966,1.015) |        | 0.990(0.961,1.019) |        | 0.988(0.955,1.022) |        | 0.985(0.949,1.022) |        | 0.980(0.942,1.018) |        |
|                         | Female | 0.989(0.976,1.001) |        | 0.982(0.963,1.002) |        | 0.979(0.955,1.004) |        | 0.978(0.950,1.008) |        | 0.978(0.945,1.012) |        | 0.976(0.941,1.013) |        | 0.973(0.936,1.012) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.998(0.979,1.019) |        | 0.995(0.970,1.020) |        | 0.989(0.960,1.019) |        | 0.982(0.950,1.016) |        | 0.974(0.939,1.010) |        | 0.965(0.929,1.003) |        |
|                         | Old    | 0.988(0.977,1.000) |        | 0.984(0.965,1.003) |        | 0.984(0.961,1.009) |        | 0.989(0.960,1.019) |        | 0.994(0.961,1.029) |        | 0.998(0.961,1.036) |        | 0.999(0.960,1.039) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.984(0.968,1.000) |        | 0.962(0.937,0.987) |        | 0.937(0.906,0.969) |        | 0.910(0.874,0.948) |        | 0.886(0.848,0.929) |        | 0.864(0.821,0.910) |        | 0.848(0.803,0.895) |        |
|                         | Female | 0.979(0.963,0.995) |        | 0.957(0.932,0.983) |        | 0.935(0.904,0.968) |        | 0.914(0.877,0.953) |        | 0.895(0.853,0.940) |        | 0.880(0.834,0.927) |        | 0.967(0.820,0.916) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.975(0.949,1.003) |        | 0.950(0.918,0.984) |        | 0.920(0.883,0.960) |        | 0.891(0.849,0.935) |        | 0.865(0.821,0.912) |        | 0.844(0.799,0.891) |        |
|                         | Old    | 0.978(0.963,0.994) |        | 0.959(0.935,0.984) |        | 0.942(0.912,0.973) |        | 0.927(0.891,0.965) |        | 0.915(0.874,0.959) |        | 0.906(0.861,0.954) |        | 0.900(0.853,0.949) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.002(0.987,1.018) |        | 0.990(0.967,1.014) |        | 0.966(0.941,0.993) |        | 0.936(0.909,0.964) |        | 0.906(0.879,0.934) |        | 0.880(0.854,0.907) |        | 0.860(0.835,0.886) |        |
|                         | Female | 0.998(0.983,1.014) |        | 0.984(0.961,1.008) |        | 0.959(0.933,0.986) |        | 0.930(0.903,0.958) |        | 0.902(0.875,0.931) |        | 0.881(0.854,0.908) |        | 0.867(0.841,0.893) |        |
|                         | Young  | 0.997(0.982,1.013) |        | 0.979(0.957,1.002) |        | 0.949(0.924,0.974) |        | 0.912(0.886,0.938) |        | 0.876(0.850,0.902) |        | 0.845(0.821,0.870) |        | 0.821(0.797,0.845) |        |
|                         | Old    | 1.007(0.991,1.024) |        | 1.003(0.979,1.028) |        | 0.991(0.963,1.019) |        | 0.972(0.943,1.003) |        | 0.955(0.924,0.986) |        | 0.940(0.911,0.970) |        | 0.931(0.902,0.961) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.992(0.966,1.018) |        | 0.967(0.929,1.008) |        | 0.931(0.885,0.980) |        | 0.891(0.839,0.946) |        | 0.854(0.797,0.914) |        | 0.826(0.767,0.889) |        | 0.808(0.747,0.873) |        |
|                         | Female | 0.988(0.963,1.015) |        | 0.967(0.927,1.008) |        | 0.937(0.891,0.987) |        | 0.904(0.851,0.961) |        | 0.872(0.814,0.935) |        | 0.845(0.784,0.910) |        | 0.823(0.760,0.890) |        |
|                         | Young  | 0.998(0.972,1.024) |        | 0.976(0.936,1.017) |        | 0.938(0.891,0.987) |        | 0.894(0.841,0.949) |        | 0.851(0.794,0.911) |        | 0.815(0.757,0.878) |        | 0.789(0.730,0.853) |        |
|                         | Old    | 0.986(0.961,1.011) |        | 0.962(0.925,1.001) |        | 0.932(0.887,0.979) |        | 0.900(0.848,0.954) |        | 0.871(0.814,0.931) |        | 0.848(0.788,0.912) |        | 0.833(0.771,0.900) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.149(1.106,1.194) |        | 1.332(1.255,1.414) |        | 1.551(1.441,1.668) |        | 1.795(1.650,1.953) |        | 2.043(1.858,2.246) |        | 2.262(2.044,2.504) |        | 2.427(2.181,2.701) |        |
|                         | Female | 1.111(1.068,1.155) |        | 1.270(1.194,1.350) |        | 1.480(1.373,1.595) |        | 1.733(1.589,1.889) |        | 1.994(1.809,2.198) |        | 2.220(2.000,2.645) |        | 2.371(2.126,2.645) |        |
|                         | Young  | 1.137(1.093,1.183) |        | 1.308(1.230,1.392) |        | 1.514(1.405,1.632) |        | 1.745(1.601,1.902) |        | 1.978(1.796,2.178) |        | 2.181(1.968,2.417) |        | 2.328(2.090,2.593) |        |
|                         | Old    | 1.099(1.059,1.141) |        | 1.232(1.161,1.306) |        | 1.398(1.300,1.502) |        | 1.589(1.460,1.728) |        | 1.781(1.620,1.959) |        | 1.949(1.759,2.159) |        | 2.068(1.856,2.304) |        |

**Supplementary Table 11** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 5)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.013) |        | 1.001(0.990,1.012) |        | 1.005(0.995,1.015) |        | 1.007(0.995,1.018) |        | 1.004(0.994,1.014) |        | 0.999(0.988,1.009) |        | 0.992(0.975,1.009) |        |
|                         | Female | 0.986(0.968,1.004) |        | 0.999(0.988,1.009) |        | 1.009(0.999,1.019) |        | 1.013(1.001,1.024) |        | 1.009(0.999,1.020) |        | 1.000(0.989,1.010) |        | 0.987(0.971,1.004) |        |
|                         | Young  | 1.000(0.982,1.018) |        | 0.997(0.986,1.007) |        | 0.993(0.984,1.003) |        | 0.989(0.978,1.000) |        | 0.985(0.975,0.995) |        | 0.981(0.971,0.991) |        | 0.977(0.961,0.993) |        |
|                         | Old    | 0.979(0.961,0.997) |        | 0.996(0.985,1.007) |        | 1.010(1.000,1.020) |        | 1.018(1.006,1.027) |        | 1.017(1.006,1.027) |        | 1.009(0.998,1.019) |        | 0.998(0.981,1.015) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.997(0.989,1.005) |        | 0.999(0.990,1.007) |        | 0.999(0.990,1.008) |        | 0.998(0.990,1.007) |        | 0.997(0.989,1.005) |        | 0.995(0.983,1.006) |        |
|                         | Female | 0.989(0.976,1.001) |        | 0.993(0.985,1.002) |        | 0.997(0.989,1.005) |        | 0.999(0.990,1.009) |        | 1.000(0.991,1.008) |        | 0.999(0.990,1.007) |        | 0.997(0.985,1.008) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.998(0.990,1.006) |        | 0.996(0.988,1.004) |        | 0.994(0.985,1.004) |        | 0.993(0.984,1.001) |        | 0.992(0.984,1.000) |        | 0.991(0.979,1.002) |        |
|                         | Old    | 0.988(0.977,1.000) |        | 0.995(0.987,1.003) |        | 1.001(0.993,1.009) |        | 1.004(0.995,1.014) |        | 1.005(0.997,1.014) |        | 1.004(0.996,1.012) |        | 1.001(0.990,1.013) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.984(0.968,1.000) |        | 0.978(0.967,0.989) |        | 0.974(0.962,0.985) |        | 0.972(0.959,0.985) |        | 0.973(0.961,0.984) |        | 0.976(0.965,0.987) |        | 0.981(0.965,0.996) |        |
|                         | Female | 0.979(0.963,0.996) |        | 0.978(0.967,0.989) |        | 0.977(0.965,0.989) |        | 0.977(0.964,0.991) |        | 0.979(0.968,0.991) |        | 0.982(0.971,0.994) |        | 0.986(0.970,1.002) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.982(0.971,0.994) |        | 0.974(0.962,0.986) |        | 0.969(0.956,0.982) |        | 0.968(0.957,0.980) |        | 0.971(0.960,0.982) |        | 0.975(0.959,0.992) |        |
|                         | Old    | 0.978(0.963,0.994) |        | 0.980(0.970,0.991) |        | 0.982(0.971,0.994) |        | 0.984(0.972,0.997) |        | 0.987(0.976,0.999) |        | 0.990(0.979,1.001) |        | 0.993(0.977,1.009) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.002(0.987,1.018) |        | 0.988(0.979,0.997) |        | 0.976(0.968,0.984) |        | 0.969(0.960,0.978) |        | 0.968(0.960,0.976) |        | 0.971(0.963,0.980) |        | 0.977(0.963,0.991) |        |
|                         | Female | 0.998(0.983,1.014) |        | 0.985(0.977,0.994) |        | 0.975(0.967,0.983) |        | 0.969(0.960,0.979) |        | 0.970(0.962,0.979) |        | 0.976(0.967,0.985) |        | 0.984(0.970,0.999) |        |
|                         | Young  | 0.997(0.982,1.013) |        | 0.982(0.973,0.990) |        | 0.969(0.961,0.977) |        | 0.961(0.952,0.977) |        | 0.960(0.952,0.968) |        | 0.965(0.956,0.973) |        | 0.971(0.958,0.985) |        |
|                         | Old    | 1.007(0.991,1.024) |        | 0.996(0.987,1.006) |        | 0.987(0.979,0.995) |        | 0.982(0.972,0.991) |        | 0.982(0.973,0.990) |        | 0.985(0.976,0.994) |        | 0.991(0.976,1.005) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.992(0.966,1.018) |        | 0.975(0.959,0.992) |        | 0.963(0.947,0.979) |        | 0.956(0.938,0.975) |        | 0.959(0.942,0.975) |        | 0.967(0.951,0.983) |        | 0.979(0.955,1.003) |        |
|                         | Female | 0.988(0.963,1.015) |        | 0.978(0.961,0.995) |        | 0.970(0.953,0.986) |        | 0.965(0.946,0.984) |        | 0.965(0.948,0.982) |        | 0.968(0.952,0.985) |        | 0.974(0.950,0.998) |        |
|                         | Young  | 0.998(0.972,1.024) |        | 0.978(0.961,0.995) |        | 0.962(0.945,0.978) |        | 0.952(0.934,0.971) |        | 0.952(0.935,0.969) |        | 0.958(0.942,0.975) |        | 0.968(0.944,0.993) |        |
|                         | Old    | 0.986(0.961,1.011) |        | 0.976(0.960,0.992) |        | 0.969(0.953,0.985) |        | 0.965(0.947,0.984) |        | 0.968(0.951,0.984) |        | 0.974(0.958,0.990) |        | 0.983(0.959,1.006) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.149(1.106,1.194) |        | 1.159(1.132,1.188) |        | 1.164(1.137,1.191) |        | 1.158(1.128,1.189) |        | 1.138(1.111,1.166) |        | 1.107(1.082,1.133) |        | 1.073(1.038,1.109) |        |
|                         | Female | 1.111(1.068,1.155) |        | 1.143(1.115,1.171) |        | 1.166(1.139,1.194) |        | 1.171(1.140,1.203) |        | 1.151(1.122,1.180) |        | 1.113(1.087,1.140) |        | 1.068(1.033,1.105) |        |
|                         | Young  | 1.137(1.093,1.183) |        | 1.150(1.122,1.179) |        | 1.157(1.130,1.185) |        | 1.153(1.122,1.184) |        | 1.133(1.105,1.162) |        | 1.103(1.077,1.129) |        | 1.068(1.032,1.105) |        |
|                         | Old    | 1.099(1.059,1.141) |        | 1.120(1.094,1.147) |        | 1.135(1.109,1.161) |        | 1.137(1.107,1.167) |        | 1.121(1.095,1.149) |        | 1.094(1.069,1.119) |        | 1.061(1.027,1.096) |        |

**Supplementary Table 12** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 6)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.023(0.940,1.113) |        | 1.018(0.895,1.159) |        | 0.994(0.856,1.155) |        | 0.964(0.819,1.135) |        | 0.946(0.796,1.12)  |        | 0.952(0.803,1.129) |        | 0.990(0.837,1.171) |        |
|                         | Female | 1.069(0.980,1.165) |        | 1.076(0.943,1.227) |        | 1.034(0.888,1.203) |        | 0.974(0.825,1.150) |        | 0.934(0.784,1.113) |        | 0.936(0.787,1.113) |        | 0.993(0.837,1.178) |        |
|                         | Young  | 1.000(0.919,1.089) |        | 1.017(0.894,1.156) |        | 1.050(0.905,1.219) |        | 1.104(0.939,1.298) |        | 1.183(0.997,1.404) |        | 1.294(1.094,1.531) |        | 1.445(1.225,1.706) |        |
|                         | Old    | 1.104(1.014,1.202) |        | 1.125(0.988,1.281) |        | 1.073(0.923,1.248) |        | 0.989(0.839,1.166) |        | 0.916(0.769,1.091) |        | 0.879(0.740,1.046) |        | 0.888(0.748,1.055) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.029(0.958,1.106) |        | 1.048(0.934,1.176) |        | 1.057(0.915,1.221) |        | 1.063(0.894,1.263) |        | 1.073(0.880,1.308) |        | 1.093(0.882,1.355) |        | 1.128(0.899,1.416) |        |
|                         | Female | 1.069(0.993,1.150) |        | 1.112(0.990,1.250) |        | 1.132(0.978,1.311) |        | 1.137(0.955,1.354) |        | 1.140(0.933,1.392) |        | 1.150(0.925,1.428) |        | 1.172(0.932,1.474) |        |
|                         | Young  | 0.998(0.927,1.075) |        | 1.009(0.897,1.135) |        | 1.032(0.892,1.194) |        | 1.067(0.898,1.268) |        | 1.112(0.913,1.354) |        | 1.167(0.944,1.443) |        | 1.232(0.985,1.541) |        |
|                         | Old    | 1.071(0.998,1.149) |        | 1.102(0.983,1.235) |        | 1.096(0.949,1.266) |        | 1.067(0.897,1.270) |        | 1.035(0.847,1.265) |        | 1.013(0.814,1.260) |        | 1.005(0.798,1.267) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.061(1.001,1.125) |        | 1.149(1.046,1.262) |        | 1.264(1.121,1.425) |        | 1.400(1.209,1.622) |        | 1.546(1.304,1.833) |        | 1.686(1.402,2.028) |        | 1.809(1.490,2.197) |        |
|                         | Female | 1.079(1.017,1.145) |        | 1.170(1.063,1.287) |        | 1.271(1.125,1.437) |        | 1.379(1.188,1.602) |        | 1.486(1.249,1.769) |        | 1.585(1.312,1.914) |        | 1.668(1.367,2.034) |        |
|                         | Young  | 1.027(0.965,1.092) |        | 1.094(0.991,1.207) |        | 1.202(1.061,1.362) |        | 1.346(1.158,1.565) |        | 1.511(1.270,1.798) |        | 1.680(1.393,2.025) |        | 1.838(1.510,2.236) |        |
|                         | Old    | 1.081(1.022,1.144) |        | 1.161(1.061,1.272) |        | 1.239(1.102,1.392) |        | 1.310(1.135,1.512) |        | 1.373(1.161,1.623) |        | 1.423(1.186,1.708) |        | 1.460(1.205,1.770) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.983(0.879,1.099) |        | 1.073(0.905,1.272) |        | 1.278(1.051,1.554) |        | 1.606(1.300,1.984) |        | 2.034(1.630,2.538) |        | 2.510(2.021,3.116) |        | 2.966(2.393,3.677) |        |
|                         | Female | 1.011(0.902,1.133) |        | 1.124(0.945,1.336) |        | 1.348(1.105,1.644) |        | 1.685(1.360,2.087) |        | 2.093(1.673,2.619) |        | 2.495(2.004,3.106) |        | 2.803(2.255,3.484) |        |
|                         | Young  | 1.019(0.914,1.136) |        | 1.163(0.986,1.372) |        | 1.460(1.208,1.765) |        | 1.941(1.582,2.382) |        | 2.596(2.095,3.218) |        | 3.366(2.729,4.151) |        | 4.149(3.370,5.108) |        |
|                         | Old    | 0.949(0.845,1.065) |        | 0.975(0.818,1.163) |        | 1.071(0.874,1.312) |        | 1.223(0.981,1.524) |        | 1.398(1.109,1.762) |        | 1.558(1.241,1.956) |        | 1.668(1.329,2.094) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.020(0.960,1.083) |        | 1.081(0.983,1.188) |        | 1.181(1.049,1.328) |        | 1.310(1.139,1.506) |        | 1.446(1.233,1.696) |        | 1.564(1.317,1.857) |        | 1.645(1.372,1.973) |        |
|                         | Female | 1.027(0.966,1.092) |        | 1.082(0.982,1.192) |        | 1.163(1.032,1.311) |        | 1.265(1.098,1.457) |        | 1.375(1.170,1.616) |        | 1.483(1.246,1.764) |        | 1.578(1.313,1.895) |        |
|                         | Young  | 1.005(0.945,1.069) |        | 1.059(0.961,1.167) |        | 1.161(1.030,1.308) |        | 1.300(1.129,1.497) |        | 1.458(1.242,1.712) |        | 1.610(1.355,1.913) |        | 1.736(1.447,2.082) |        |
|                         | Old    | 1.034(0.975,1.096) |        | 1.094(0.997,1.201) |        | 1.179(1.050,1.323) |        | 1.280(1.115,1.469) |        | 1.382(1.180,1.618) |        | 1.470(1.239,1.743) |        | 1.531(1.278,1.833) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.807(0.760,0.856) |        | 0.642(0.585,0.704) |        | 0.507(0.453,0.568) |        | 0.405(0.355,0.461) |        | 0.331(0.286,0.384) |        | 0.283(0.242,0.331) |        | 0.254(0.215,0.299) |        |
|                         | Female | 0.850(0.800,0.903) |        | 0.691(0.629,0.760) |        | 0.545(0.486,0.612) |        | 0.427(0.374,0.488) |        | 0.344(0.296,0.400) |        | 0.291(0.248,0.342) |        | 0.263(0.222,0.312) |        |
|                         | Young  | 0.819(0.771,0.871) |        | 0.660(0.600,0.726) |        | 0.527(0.469,0.591) |        | 0.423(0.370,0.483) |        | 0.348(0.300,0.404) |        | 0.299(0.255,0.351) |        | 0.271(0.229,0.320) |        |
|                         | Old    | 0.864(0.815,0.915) |        | 0.725(0.661,0.794) |        | 0.596(0.533,0.666) |        | 0.489(0.429,0.557) |        | 0.409(0.353,0.474) |        | 0.356(0.304,0.417) |        | 0.325(0.275,0.384) |        |

**Supplementary Table 13** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 6)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.023(0.940,1.113) |        | 0.996(0.948,1.046) |        | 0.976(0.933,1.021) |        | 0.970(0.920,1.022) |        | 0.981(0.936,1.029) |        | 1.006(0.959,1.057) |        | 1.039(0.961,1.124) |        |
|                         | Female | 1.069(0.980,1.165) |        | 1.006(0.957,1.058) |        | 0.961(0.918,1.006) |        | 0.943(0.893,0.995) |        | 0.959(0.913,1.006) |        | 1.002(0.954,1.052) |        | 1.061(0.981,1.149) |        |
|                         | Young  | 1.000(0.919,1.089) |        | 1.016(0.968,1.067) |        | 1.033(1.988,1.080) |        | 1.051(0.998,1.108) |        | 1.072(1.023,1.123) |        | 1.094(1.043,1.147) |        | 1.117(1.034,1.206) |        |
|                         | Old    | 1.104(1.014,1.202) |        | 1.019(0.969,1.071) |        | 0.954(0.911,0.999) |        | 0.921(0.876,0.972) |        | 0.926(0.883,0.972) |        | 0.960(0.914,1.008) |        | 1.010(0.934,1.093) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.029(0.958,1.106) |        | 1.018(0.970,1.068) |        | 1.009(0.961,1.059) |        | 1.005(0.952,1.062) |        | 1.010(0.960,1.061) |        | 1.019(0.971,1.070) |        | 1.032(0.964,1.104) |        |
|                         | Female | 1.069(0.993,1.150) |        | 1.041(0.991,1.093) |        | 1.018(0.969,1.069) |        | 1.004(0.950,1.061) |        | 1.002(0.953,1.054) |        | 1.009(0.961,1.059) |        | 1.019(0.952,1.092) |        |
|                         | Young  | 0.998(0.927,1.075) |        | 1.011(0.963,1.061) |        | 1.023(0.975,1.074) |        | 1.034(0.979,1.092) |        | 1.042(0.991,1.096) |        | 1.049(1.000,1.101) |        | 1.056(0.986,1.131) |        |
|                         | Old    | 1.071(0.998,1.149) |        | 1.029(0.980,1.080) |        | 0.995(0.947,1.045) |        | 0.974(0.922,1.029) |        | 0.970(0.922,1.020) |        | 0.978(0.932,1.026) |        | 0.993(0.928,1.061) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.061(1.001,1.125) |        | 1.083(1.040,1.127) |        | 1.100(1.055,1.147) |        | 1.108(1.057,1.161) |        | 1.104(1.058,1.151) |        | 1.091(1.048,1.135) |        | 1.073(1.013,1.137) |        |
|                         | Female | 1.079(1.017,1.145) |        | 1.084(1.040,1.129) |        | 1.087(1.041,1.135) |        | 1.085(1.034,1.138) |        | 1.078(1.032,1.125) |        | 1.066(1.023,1.111) |        | 1.052(0.992,1.117) |        |
|                         | Young  | 1.027(0.965,1.092) |        | 1.065(1.022,1.111) |        | 1.099(1.053,1.147) |        | 1.120(1.067,1.175) |        | 1.123(1.075,1.172) |        | 1.112(1.067,1.158) |        | 1.094(1.030,1.162) |        |
|                         | Old    | 1.081(1.022,1.144) |        | 1.074(1.033,1.117) |        | 1.066(1.023,1.111) |        | 1.058(1.010,1.108) |        | 1.048(1.005,1.092) |        | 1.037(0.997,1.079) |        | 1.026(0.970,1.086) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.983(0.879,1.099) |        | 1.091(1.023,1.164) |        | 1.191(1.124,1.263) |        | 1.257(1.174,1.345) |        | 1.267(1.192,1.346) |        | 1.234(1.158,1.315) |        | 1.182(1.065,1.312) |        |
|                         | Female | 1.011(0.902,1.133) |        | 1.111(0.041,1.186) |        | 1.200(1.131,1.273) |        | 1.250(1.167,1.339) |        | 1.242(1.168,1.322) |        | 1.192(1.117,1.272) |        | 1.123(1.011,1.249) |        |
|                         | Young  | 1.019(0.914,1.136) |        | 1.142(1.072,1.215) |        | 1.255(1.186,1.329) |        | 1.329(1.243,1.421) |        | 1.338(1.260,1.420) |        | 1.296(1.218,1.379) |        | 1.233(1.113,1.365) |        |
|                         | Old    | 0.949(0.845,1.065) |        | 1.028(0.961,1.099) |        | 1.098(1.034,1.167) |        | 1.141(1.064,1.224) |        | 1.144(1.074,1.218) |        | 1.114(1.043,1.190) |        | 1.071(0.962,1.192) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.020(0.960,1.083) |        | 1.060(1.019,1.102) |        | 1.093(1.050,1.137) |        | 1.109(1.061,1.160) |        | 1.104(1.060,1.150) |        | 1.082(1.040,1.125) |        | 1.052(0.993,1.114) |        |
|                         | Female | 1.027(0.966,1.092) |        | 1.053(1.012,1.096) |        | 1.075(1.033,1.119) |        | 1.087(1.039,1.138) |        | 1.087(1.043,1.133) |        | 1.078(1.036,1.122) |        | 1.064(1.004,1.128) |        |
|                         | Young  | 1.005(0.945,1.069) |        | 1.054(1.013,1.097) |        | 1.095(1.053,1.140) |        | 1.120(1.071,1.173) |        | 1.121(1.076,1.169) |        | 1.104(1.061,1.149) |        | 1.078(1.017,1.143) |        |
|                         | Old    | 1.034(0.975,1.096) |        | 1.058(1.018,1.100) |        | 1.077(1.036,1.120) |        | 1.086(1.039,1.135) |        | 1.080(1.037,1.124) |        | 1.063(1.023,1.105) |        | 1.042(0.985,1.102) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.807(0.760,0.856) |        | 0.796(0.767,0.826) |        | 0.791(0.763,0.819) |        | 0.797(0.765,0.830) |        | 0.819(0.789,0.850) |        | 0.854(0.824,0.885) |        | 0.897(0.852,0.943) |        |
|                         | Female | 0.850(0.800-0.903) |        | 0.814(0.783,0.845) |        | 0.789(0.760,0.818) |        | 0.784(0.752,0.817) |        | 0.805(0.774,0.836) |        | 0.847(0.817,0.879) |        | 0.903(0.857,0.952) |        |
|                         | Young  | 0.819(0.771,0.871) |        | 0.805(0.775,0.837) |        | 0.798(0.769,0.824) |        | 0.803(0.770,0.837) |        | 0.824(0.793,0.856) |        | 0.860(0.829,0.892) |        | 0.904(0.857,0.953) |        |
|                         | Old    | 0.864(0.815,0.915) |        | 0.839(0.809,0.871) |        | 0.822(0.794,0.852) |        | 0.820(0.788,0.854) |        | 0.838(0.807,0.869) |        | 0.870(0.840,0.902) |        | 0.912(0.868,0.959) |        |

**Supplementary Table 14** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 8)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.996(0.978,1.015) |        | 0.995(0.966,1.024) |        | 0.995(0.961,1.029) |        | 0.996(0.960,1.033) |        | 0.998(0.960,1.037) |        |
|                         | Female | 0.992(0.973,1.010) |        | 0.987(0.958,1.016) |        | 0.985(0.951,1.020) |        | 0.986(0.950,1.023) |        | 0.988(0.951,1.028) |        |
|                         | Young  | 1.003(0.985,1.021) |        | 1.000(0.971,1.029) |        | 0.990(0.957,1.024) |        | 0.977(0.942,1.013) |        | 0.962(0.926,0.999) |        |
|                         | Old    | 0.983(0.965,1.001) |        | 0.975(0.947,1.004) |        | 0.975(0.943,1.009) |        | 0.982(0.947,1.019) |        | 0.993(0.956,1.033) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.996(0.983,1.008) |        | 0.992(0.972,1.012) |        | 0.989(0.965,1.014) |        | 0.987(0.959,1.015) |        | 0.985(0.954,1.017) |        |
|                         | Female | 0.990(0.978,1.003) |        | 0.983(0.963,1.003) |        | 0.978(0.954,1.003) |        | 0.975(0.948,1.003) |        | 0.973(0.942,1.005) |        |
|                         | Young  | 1.001(0.988,1.013) |        | 0.999(0.979,1.020) |        | 0.995(0.970,1.020) |        | 0.988(0.961,1.017) |        | 0.981(0.950,1.014) |        |
|                         | Old    | 0.990(0.978,1.002) |        | 0.984(0.965,1.004) |        | 0.982(0.959,1.007) |        | 0.984(0.957,1.012) |        | 0.988(0.956,1.020) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.984(0.969,1.000) |        | 0.965(0.940,0.991) |        | 0.943(0.912,0.975) |        | 0.919(0.885,0.955) |        | 0.895(0.856,0.936) |        |
|                         | Female | 0.982(0.966,0.998) |        | 0.962(0.936,0.988) |        | 0.941(0.910,0.973) |        | 0.920(0.885,0.957) |        | 0.900(0.860,0.941) |        |
|                         | Young  | 0.994(0.977,1.011) |        | 0.979(0.952,1.006) |        | 0.956(0.924,0.990) |        | 0.929(0.893,0.966) |        | 0.900(0.860,0.942) |        |
|                         | Old    | 0.981(0.965,0.996) |        | 0.963(0.939,0.988) |        | 0.947(0.917,0.978) |        | 0.933(0.898,0.969) |        | 0.920(0.881,0.961) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.989,1.020) |        | 0.994(0.971,1.019) |        | 0.973(0.946,1.001) |        | 0.943(0.916,0.972) |        | 0.912(0.884,0.941) |        |
|                         | Female | 1.000(0.985,1.016) |        | 0.990(0.966,1.015) |        | 0.972(0.944,1.000) |        | 0.947(0.919,0.976) |        | 0.920(0.891,0.950) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.984(0.961,1.007) |        | 0.957(0.931,0.984) |        | 0.923(0.896,0.950) |        | 0.886(0.860,0.914) |        |
|                         | Old    | 1.010(0.994,1.026) |        | 1.009(0.984,1.034) |        | 0.999(0.970,1.029) |        | 0.983(0.953,1.014) |        | 0.964(0.933,0.966) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.998(0.972,1.024) |        | 0.981(0.940,1.023) |        | 0.951(0.903,1.001) |        | 0.913(0.861,0.968) |        | 0.873(0.818,0.933) |        |
|                         | Female | 0.997(0.971,1.024) |        | 0.982(0.941,1.025) |        | 0.956(0.908,1.008) |        | 0.924(0.870,0.980) |        | 0.888(0.831,0.949) |        |
|                         | Young  | 1.004(0.978,1.031) |        | 0.989(0.947,1.032) |        | 0.956(0.907,1.008) |        | 0.912(0.860,0.968) |        | 0.866(0.810,0.925) |        |
|                         | Old    | 0.994(0.970,1.020) |        | 0.979(0.940,1.020) |        | 0.956(0.909,1.006) |        | 0.927(0.875,0.982) |        | 0.895(0.839,0.955) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.131(1.090,1.174) |        | 1.279(1.204,1.359) |        | 1.447(1.345,1.557) |        | 1.635(1.507,1.775) |        | 1.845(1.685,2.020) |        |
|                         | Female | 1.099(1.057,1.141) |        | 1.222(1.148,1.300) |        | 1.374(1.274,1.481) |        | 1.557(1.432,1.693) |        | 1.770(1.613,1.942) |        |
|                         | Young  | 1.122(1.080,1.166) |        | 1.257(1.181,1.338) |        | 1.408(1.305,1.518) |        | 1.574(1.447,1.712) |        | 1.759(1.604,1.929) |        |
|                         | Old    | 1.087(1.048,1.127) |        | 1.193(1.125,1.266) |        | 1.323(1.231,1.422) |        | 1.476(1.361,1.600) |        | 1.648(1.506,1.804) |        |

| pollutant         | group  | Lag05              |        | Lag06              |        | Lag07              |        | Lag08              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.000(0.961,1.042) |        | 1.003(0.963,1.044) |        | 1.004(0.966,1.043) |        | 1.005(0.968,1.042) |        |
|                   | Female | 0.992(0.952,1.033) |        | 0.995(0.955,1.037) |        | 0.999(0.961,1.038) |        | 1.001(0.964,1.039) |        |
|                   | Young  | 0.947(0.910,0.985) |        | 0.935(0.898,0.973) |        | 0.926(0.892,0.962) |        | 0.922(0.889,0.956) |        |
|                   | Old    | 1.006(0.965,1.047) |        | 1.016(0.975,1.059) |        | 1.024(0.985,1.064) |        | 1.027(0.989,1.067) |        |
| PM <sub>2.5</sub> | Male   | 0.983(0.948,1.019) |        | 0.981(0.944,1.020) |        | 0.979(0.941,1.020) |        | 0.977(0.938,1.018) |        |
|                   | Female | 0.972(0.937,1.008) |        | 0.971(0.934,1.010) |        | 0.970(0.931,1.010) |        | 0.968(0.928,1.009) |        |
|                   | Young  | 0.975(0.940,1.010) |        | 0.969(0.932,1.007) |        | 0.964(0.927,1.003) |        | 0.961(0.923,1.001) |        |
|                   | Old    | 0.992(0.956,1.029) |        | 0.995(0.957,1.036) |        | 0.997(0.957,1.039) |        | 0.997(0.956,1.040) |        |
| PM <sub>10</sub>  | Male   | 0.873(0.830,0.918) |        | 0.854(0.809,0.901) |        | 0.838(0.792,0.887) |        | 0.827(0.780,0.876) |        |
|                   | Female | 0.881(0.837,0.927) |        | 0.865(0.818,0.914) |        | 0.852(0.804,0.903) |        | 0.843(0.794,0.895) |        |
|                   | Young  | 0.873(0.830,0.919) |        | 0.851(0.805,0.899) |        | 0.834(0.788,0.883) |        | 0.825(0.777,0.875) |        |
|                   | Old    | 0.908(0.864,0.954) |        | 0.898(0.851,0.947) |        | 0.888(0.840,0.939) |        | 0.880(0.830,0.932) |        |
| SO <sub>2</sub>   | Male   | 0.884(0.855,0.913) |        | 0.864(0.836,0.893) |        | 0.854(0.828,0.881) |        | 0.856(0.830,0.883) |        |
|                   | Female | 0.895(0.866,0.926) |        | 0.876(0.847,0.906) |        | 0.864(0.837,0.892) |        | 0.859(0.833,0.887) |        |
|                   | Young  | 0.854(0.827,0.882) |        | 0.830(0.804,0.857) |        | 0.817(0.792,0.842) |        | 0.815(0.791,0.840) |        |
|                   | Old    | 0.946(0.914,0.979) |        | 0.933(0.901,0.965) |        | 0.926(0.896,0.957) |        | 0.927(0.897,0.958) |        |
| NO <sub>2</sub>   | Male   | 0.837(0.778,0.901) |        | 0.808(0.747,0.874) |        | 0.789(0.727,0.855) |        | 0.779(0.718,0.847) |        |
|                   | Female | 0.854(0.793,0.920) |        | 0.825(0.762,0.894) |        | 0.803(0.740,0.871) |        | 0.788(0.725,0.857) |        |
|                   | Young  | 0.823(0.765,0.886) |        | 0.790(0.731,0.855) |        | 0.770(0.710,0.835) |        | 0.762(0.702,0.828) |        |
|                   | Old    | 0.864(0.804,0.929) |        | 0.836(0.774,0.904) |        | 0.813(0.750,0.881) |        | 0.794(0.731,0.862) |        |
| O <sub>3</sub>    | Male   | 2.076(1.879,2.294) |        | 2.326(2.090,2.588) |        | 2.594(2.323,2.897) |        | 2.879(2.567,3.229) |        |
|                   | Female | 2.008(1.813,2.224) |        | 2.261(2.027,2.523) |        | 2.521(2.252,2.823) |        | 2.779(2.471,3.125) |        |
|                   | Young  | 1.965(1.086,1.175) |        | 2.194(1.969,2.444) |        | 2.450(2.192,2.738) |        | 2.736(2.438,3.071) |        |
|                   | Old    | 1.834(1.659,2.027) |        | 2.023(1.817,2.253) |        | 2.206(1.973,2.468) |        | 2.374(2.113,2.668) |        |

**Supplementary Table 15** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 8)

| pollutant         | group  | Lag0               |        | Lag1                |        | Lag2               |        | Lag3               |        | Lag4               |        |
|-------------------|--------|--------------------|--------|---------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                  | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.996(0.978,1.015) |        | 0.998(0.987,1.010)  |        | 1.000(0.992,1.008) |        | 1.001(0.992,1.011) |        | 1.002(0.991,1.013) |        |
|                   | Female | 0.992(0.973,1.010) |        | 0.995(0.9884,1.006) |        | 0.998(0.990,1.007) |        | 1.001(0.991,1.011) |        | 1.003(0.992,1.014) |        |
|                   | Young  | 1.003(0.985,1.021) |        | 0.997(0.986,1.008)  |        | 0.991(0.983,0.999) |        | 0.987(0.977,0.996) |        | 0.984(0.974,0.995) |        |
|                   | Old    | 0.983(0.963,1.001) |        | 0.992(0.981,1.003)  |        | 1.000(0.992,1.009) |        | 1.007(0.997,1.017) |        | 1.011(1.000,1.022) |        |
| PM <sub>2.5</sub> | Male   | 0.996(0.983,1.008) |        | 0.996(0.988,1.005)  |        | 0.997(0.990,1.004) |        | 0.998(0.990,1.006) |        | 0.998(0.989,1.007) |        |
|                   | Female | 0.990(0.978,1.003) |        | 0.993(0.985,1.001)  |        | 0.995(0.988,1.002) |        | 0.997(0.989,1.005) |        | 0.998(0.989,1.007) |        |
|                   | Young  | 1.001(0.988,1.013) |        | 0.998(0.990,1.006)  |        | 0.996(0.989,1.003) |        | 0.994(0.986,1.002) |        | 0.993(0.984,1.002) |        |
|                   | Old    | 0.990(0.978,1.002) |        | 0.994(0.986,1.002)  |        | 0.998(0.992,1.005) |        | 1.002(0.994,1.010) |        | 1.004(0.995,1.013) |        |
| PM <sub>10</sub>  | Male   | 0.984(0.969,1.000) |        | 0.980(0.970,0.991)  |        | 0.977(0.968,0.986) |        | 0.975(0.964,0.985) |        | 0.974(0.962,0.986) |        |
|                   | Female | 0.982(0.966,0.998) |        | 0.980(0.969,0.991)  |        | 0.978(0.969,0.988) |        | 0.978(0.967,0.989) |        | 0.978(0.966,0.990) |        |
|                   | Young  | 0.994(0.977,1.011) |        | 0.985(0.974,0.996)  |        | 0.977(0.968,0.987) |        | 0.971(0.961,0.982) |        | 0.969(0.957,0.981) |        |
|                   | Old    | 0.981(0.965,0.996) |        | 0.982(0.972,0.993)  |        | 0.984(0.974,0.993) |        | 0.985(0.974,0.996) |        | 0.986(0.975,0.998) |        |
| SO <sub>2</sub>   | Male   | 1.004(0.989,1.020) |        | 0.990(0.981,1.000)  |        | 0.978(0.972,0.985) |        | 0.970(0.962,0.977) |        | 0.966(0.958,0.975) |        |
|                   | Female | 1.000(0.985,1.016) |        | 0.990(0.981,1.000)  |        | 0.981(0.974,0.988) |        | 0.975(0.967,0.982) |        | 0.972(0.963,0.981) |        |
|                   | Young  | 0.999(0.984,1.014) |        | 0.985(0.976,0.994)  |        | 0.973(0.966,0.979) |        | 0.964(0.957,0.972) |        | 0.961(0.952,0.969) |        |
|                   | Old    | 1.010(0.994,1.026) |        | 0.999(0.990,1.009)  |        | 0.990(0.983,0.997) |        | 0.984(0.976,0.992) |        | 0.981(0.971,0.990) |        |
| NO <sub>2</sub>   | Male   | 0.998(0.972,1.024) |        | 0.983(0.966,1.000)  |        | 0.970(0.956,0.984) |        | 0.960(0.945,0.976) |        | 0.956(0.939,0.974) |        |
|                   | Female | 0.997(0.971,1.024) |        | 0.985(0.968,1.002)  |        | 0.974(0.960,0.988) |        | 0.966(0.950,0.982) |        | 0.961(0.944,0.979) |        |
|                   | Young  | 1.004(0.978,1.031) |        | 0.984(0.967,1.002)  |        | 0.967(0.953,0.981) |        | 0.954(0.939,0.970) |        | 0.949(0.932,0.966) |        |
|                   | Old    | 0.994(0.970,1.020) |        | 0.985(0.969,1.001)  |        | 0.976(0.963,0.990) |        | 0.970(0.954,0.985) |        | 0.966(0.949,0.983) |        |
| O <sub>3</sub>    | Male   | 1.131(1.090,1.174) |        | 1.131(1.104,1.159)  |        | 1.131(1.110,1.153) |        | 1.130(1.106,1.155) |        | 1.128(1.101,1.156) |        |
|                   | Female | 1.099(1.057,1.141) |        | 1.112(1.085,1.140)  |        | 1.124(1.103,1.147) |        | 1.133(1.108,1.159) |        | 1.137(1.109,1.166) |        |
|                   | Young  | 1.122(1.080,1.166) |        | 1.121(1.093,1.149)  |        | 1.119(1.098,1.141) |        | 1.118(1.094,1.143) |        | 1.117(1.090,1.146) |        |
|                   | Old    | 1.087(1.048,1.127) |        | 1.098(1.072,1.125)  |        | 1.108(1.088,1.130) |        | 1.115(1.091,1.140) |        | 1.117(1.090,1.144) |        |

| pollutant         | group  | Lag5               |        | Lag6               |        | Lag7               |        | Lag8               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.002(0.993,1.012) |        | 1.002(0.994,1.011) |        | 1.001(0.991,1.012) |        | 1.001(0.984,1.017) |        |
|                   | Female | 1.004(0.994,1.014) |        | 1.004(0.995,1.012) |        | 1.003(0.992,1.014) |        | 1.002(0.986,1.020) |        |
|                   | Young  | 0.985(0.975,0.994) |        | 0.987(0.979,0.995) |        | 0.991(0.980,1.001) |        | 0.995(0.979,1.012) |        |
|                   | Old    | 1.012(1.002,1.022) |        | 1.011(1.002,1.022) |        | 1.007(0.997,1.018) |        | 1.003(0.987,1.020) |        |
| PM <sub>2.5</sub> | Male   | 0.998(0.990,1.006) |        | 0.998(0.991,1.005) |        | 0.998(0.990,1.006) |        | 0.998(0.987,1.009) |        |
|                   | Female | 0.999(0.991,1.007) |        | 0.999(0.992,1.006) |        | 0.999(0.991,1.006) |        | 0.998(0.987,1.010) |        |
|                   | Young  | 0.993(0.985,1.001) |        | 0.994(0.987,1.001) |        | 0.995(0.988,1.003) |        | 0.997(0.986,1.009) |        |
|                   | Old    | 1.004(0.996,1.012) |        | 1.003(0.996,1.010) |        | 1.002(0.994,1.009) |        | 1.000(0.989,1.011) |        |
| PM <sub>10</sub>  | Male   | 0.975(0.965,0.986) |        | 0.978(0.969,0.987) |        | 0.982(0.971,0.992) |        | 0.986(0.971,1.002) |        |
|                   | Female | 0.979(0.968,0.990) |        | 0.982(0.973,0.991) |        | 0.985(0.975,0.996) |        | 0.989(0.973,1.005) |        |
|                   | Young  | 0.970(0.959,0.981) |        | 0.974(0.965,0.984) |        | 0.981(0.970,0.992) |        | 0.988(0.972,1.005) |        |
|                   | Old    | 0.987(0.977,0.998) |        | 0.988(0.979,0.998) |        | 0.989(0.979,1.000) |        | 0.990(0.975,1.006) |        |
| SO <sub>2</sub>   | Male   | 0.969(0.961,0.977) |        | 0.977(0.971,0.984) |        | 0.989(0.980,0.998) |        | 1.002(0.988,1.017) |        |
|                   | Female | 0.973(0.965,0.981) |        | 0.978(0.971,0.985) |        | 0.986(0.977,0.995) |        | 0.995(0.981,1.009) |        |
|                   | Young  | 0.964(0.956,0.972) |        | 0.972(0.965,0.979) |        | 0.984(0.975,0.992) |        | 0.998(0.984,1.012) |        |
|                   | Old    | 0.982(0.973,0.990) |        | 0.986(0.979,0.993) |        | 0.993(0.984,1.002) |        | 1.001(0.987,1.016) |        |
| NO <sub>2</sub>   | Male   | 0.958(0.942,0.974) |        | 0.965(0.952,0.979) |        | 0.976(0.960,0.992) |        | 0.988(0.965,1.013) |        |
|                   | Female | 0.962(0.946,0.978) |        | 0.966(0.952,0.980) |        | 0.973(0.957,0.990) |        | 0.981(0.958,1.006) |        |
|                   | Young  | 0.951(0.935,0.967) |        | 0.960(0.946,0.974) |        | 0.974(0.958,0.990) |        | 0.990(0.966,1.015) |        |
|                   | Old    | 0.965(0.950,0.981) |        | 0.968(0.954,0.982) |        | 0.972(0.956,0.988) |        | 0.977(0.954,1.000) |        |
| O <sub>3</sub>    | Male   | 1.125(1.100,1.151) |        | 1.121(1.099,1.143) |        | 1.115(1.091,1.140) |        | 1.110(1.075,1.146) |        |
|                   | Female | 1.134(1.108,1.161) |        | 1.126(1.104,1.149) |        | 1.115(1.090,1.141) |        | 1.102(1.066,1.140) |        |
|                   | Young  | 1.117(1.091,1.143) |        | 1.117(1.095,1.139) |        | 1.117(1.092,1.142) |        | 1.117(1.080,1.155) |        |
|                   | Old    | 1.113(1.088,1.138) |        | 1.103(1.082,1.125) |        | 1.090(1.067,1.115) |        | 1.076(1.043,1.111) |        |

**Supplementary Table 16** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 8)

| pollutant         | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03               |        | Lag04              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|---------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                  | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.017(0.935,1.107) |        | 1.026(0.896,1.174) |        | 1.026(0.875,1.203) |        | 1.020(0.860,1.208)  |        | 1.009(0.844,1.207) |        |
|                   | Female | 1.040(0.955,1.134) |        | 1.065(0.929,1.221) |        | 1.074(0.914,1.262) |        | 1.070(0.900,1.271)  |        | 1.056(0.881,1.267) |        |
|                   | Young  | 0.986(0.907,1.073) |        | 1.002(0.877,1.146) |        | 1.046(0.893,1.225) |        | 1.114(0.941,1.319)  |        | 1.199(1.004,1.432) |        |
|                   | Old    | 1.084(0.996,1.180) |        | 1.125(0.983,1.288) |        | 1.124(0.958,1.318) |        | 1.087(0.916,1.290)  |        | 1.032(0.861,1.236) |        |
| PM <sub>2.5</sub> | Male   | 1.026(0.955,1.103) |        | 1.048(0.932,1.179) |        | 1.066(0.923,1.232) |        | 1.081(0.916,1.275)  |        | 1.093(0.905,1.319) |        |
|                   | Female | 1.059(0.984,1.139) |        | 1.105(0.981,1.245) |        | 1.138(0.983,1.318) |        | 1.159(0.981,1.370)  |        | 1.171(0.969,1.417) |        |
|                   | Young  | 0.995(0.924,1.072) |        | 1.007(0.893,1.135) |        | 1.032(0.891,1.196) |        | 1.070(0.906,1.264)  |        | 1.116(0.924,1.347) |        |
|                   | Old    | 1.062(0.990,1.140) |        | 1.099(0.979,1.234) |        | 1.109(0.961,1.280) |        | 1.098(0.931,1.296)  |        | 1.074(0.889,1.299) |        |
| PM <sub>10</sub>  | Male   | 1.058(0.999,1.121) |        | 1.136(1.033,1.249) |        | 1.234(1.097,1.389) |        | 1.353(1.179,1.553)  |        | 1.487(1.269,1.743) |        |
|                   | Female | 1.068(1.007,1.133) |        | 1.149(1.043,1.266) |        | 1.243(1.101,1.403) |        | 1.349(1.1711,1.553) |        | 1.462(1.242,1.720) |        |
|                   | Young  | 1.023(0.963,1.087) |        | 1.081(0.978,1.194) |        | 1.175(1.038,1.329) |        | 1.303(1.130,1.503)  |        | 1.460(1.240,1.717) |        |
|                   | Old    | 1.073(1.015,1.134) |        | 1.145(1.044,1.255) |        | 1.215(1.083,1.363) |        | 1.283(1.122,1.468)  |        | 1.349(1.154,1.577) |        |
| SO <sub>2</sub>   | Male   | 0.970(0.869,1.084) |        | 1.041(0.875,1.240) |        | 1.220(0.995,1.496) |        | 1.522(1.227,1.888)  |        | 1.947(1.554,2.438) |        |
|                   | Female | 0.997(0.891,1.115) |        | 1.071(0.897,1.279) |        | 1.229(0.999,1.512) |        | 1.480(1.189,1.843)  |        | 1.820(1.448,2.289) |        |
|                   | Young  | 1.007(0.905,1.121) |        | 1.124(0.948,1.332) |        | 1.372(1.125,1.673) |        | 1.786(1.448,2.202)  |        | 2.383(1.913,2.968) |        |
|                   | Old    | 0.934(0.833,1.046) |        | 0.939(0.783,1.124) |        | 1.007(0.815,1.244) |        | 1.134(0.906,1.418)  |        | 1.306(1.003,1.652) |        |
| NO <sub>2</sub>   | Male   | 1.005(0.947,1.068) |        | 1.047(0.949,1.155) |        | 1.125(0.997,1.268) |        | 1.236(1.078,1.416)  |        | 1.371(1.176,1.599) |        |
|                   | Female | 1.007(0.947,1.070) |        | 1.043(0.944,1.153) |        | 1.110(0.982,1.254) |        | 1.204(1.048,1.382)  |        | 1.319(1.129,1.541) |        |
|                   | Young  | 0.990(0.931,1.053) |        | 1.027(0.929,1.135) |        | 1.111(0.983,1.256) |        | 1.239(1.078,1.423)  |        | 1.401(1.199,1.636) |        |
|                   | Old    | 1.013(0.955,1.074) |        | 1.050(0.954,1.155) |        | 1.111(0.987,1.249) |        | 1.193(1.044,1.365)  |        | 1.294(1.112,1.506) |        |
| O <sub>3</sub>    | Male   | 0.827(0.781,0.876) |        | 0.683(0.622,0.750) |        | 0.565(0.504,0.632) |        | 0.467(0.412,0.530)  |        | 0.388(0.337,0.446) |        |
|                   | Female | 0.865(0.815,0.917) |        | 0.734(0.667,0.807) |        | 0.612(0.545,0.687) |        | 0.504(0.443,0.574)  |        | 0.413(0.358,0.477) |        |
|                   | Young  | 0.837(0.788,0.888) |        | 0.702(0.637,0.773) |        | 0.589(0.524,0.662) |        | 0.496(0.436,0.564)  |        | 0.418(0.362,0.482) |        |
|                   | Old    | 0.879(0.831,0.930) |        | 0.761(0.694,0.834) |        | 0.649(0.580,0.725) |        | 0.548(0.483,0.621)  |        | 0.462(0.401,0.531) |        |

| pollutant               | group  | Lag05              |        | Lag06              |        | Lag07              |        | Lag08              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.998(0.827,1.204) |        | 0.988(0.818,1.194) |        | 0.982(0.822,1.173) |        | 0.979(0.824,1.163) |        |
|                         | Female | 1.039(0.858,1.257) |        | 1.021(0.844,1.237) |        | 1.007(0.840,1.206) |        | 0.996(0.836,1.186) |        |
|                         | Young  | 1.289(1.071,1.552) |        | 1.370(1.137,1.650) |        | 1.431(1.200,1.705) |        | 1.463(1.234,1.734) |        |
|                         | Old    | 0.975(0.806,1.179) |        | 0.927(0.766,1.123) |        | 0.896(0.747,1.074) |        | 0.882(0.740,1.052) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.104(0.894,1.364) |        | 1.116(0.888,1.402) |        | 1.129(0.892,1.430) |        | 1.144(0.899,1.457) |        |
|                         | Female | 1.179(0.953,1.460) |        | 1.187(0.943,1.495) |        | 1.197(0.943,1.518) |        | 1.210(0.948,1.545) |        |
|                         | Young  | 1.163(0.942,1.435) |        | 1.206(0.962,1.511) |        | 1.239(0.982,1.563) |        | 1.260(0.993,1.598) |        |
|                         | Old    | 1.048(0.846,1.298) |        | 1.028(0.815,1.296) |        | 1.017(0.080,1.294) |        | 1.019(0.796,1.305) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.628(1.360,1.948) |        | 1.763(1.451,2.143) |        | 1.884(1.538,2.306) |        | 1.980(1.606,2.442) |        |
|                         | Female | 1.576(1.311,1.894) |        | 1.682(1.378,2.054) |        | 1.775(1.443,2.183) |        | 1.847(1.491,2.287) |        |
|                         | Young  | 1.627(1.355,1.954) |        | 1.786(1.466,2.175) |        | 1.915(1.561,2.349) |        | 1.998(1.617,2.468) |        |
|                         | Old    | 1.412(1.182,1.686) |        | 1.472(1.214,1.785) |        | 1.529(1.252,1.869) |        | 1.583(1.287,1.948) |        |
| <b>SO<sub>2</sub></b>   | Male   | 2.436(1.925,3.084) |        | 2.873(2.267,3.641) |        | 3.114(2.486,3.901) |        | 3.061(2.449,3.826) |        |
|                         | Female | 2.214(1.742,2.813) |        | 2.592(2.038,3.298) |        | 2.871(2.284,3.608) |        | 2.980(2.378,3.736) |        |
|                         | Young  | 3.109(2.470,3.912) |        | 3.814(3.028,4.805) |        | 4.289(3.446,5.338) |        | 4.363(3.515,5.415) |        |
|                         | Old    | 1.493(1.167,1.910) |        | 1.652(1.289,2.118) |        | 1.738(1.371,2.205) |        | 1.726(1.363,2.184) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.515(1.277,1.797) |        | 1.645(1.370,1.975) |        | 1.741(1.442,2.101) |        | 1.788(1.474,2.170) |        |
|                         | Female | 1.444(1.215,1.717) |        | 1.565(1.300,1.883) |        | 1.667(1.379,2.016) |        | 1.742(1.433,2.118) |        |
|                         | Young  | 1.575(0.326,1.871) |        | 1.731(1.441,2.081) |        | 1.841(1.525,2.222) |        | 1.883(1.553,2.284) |        |
|                         | Old    | 1.405(1.187,1.664) |        | 1.517(1.265,1.819) |        | 1.621(1.345,1.954) |        | 1.712(1.413,2.074) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.323(0.277,0.377) |        | 0.271(0.230,0.320) |        | 0.229(0.193,0.272) |        | 0.195(0.163,0.233) |        |
|                         | Female | 0.340(0.291,0.399) |        | 0.283(0.239,0.335) |        | 0.239(0.201,0.285) |        | 0.206(0.172,0.247) |        |
|                         | Young  | 0.352(0.301,0.412) |        | 0.297(0.251,0.351) |        | 0.250(0.211,0.297) |        | 0.211(0.176,0.252) |        |
|                         | Old    | 0.391(0.335,0.457) |        | 0.336(0.285,0.397) |        | 0.294(0.247,0.350) |        | 0.263(0.219,0.314) |        |

**Supplementary Table 17** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 8)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.017(0.935,1.107) |        | 1.008(0.957,1.063) |        | 1.000(0.963,1.039) |        | 0.994(0.950,1.039) |        | 0.990(0.941,1.041) |        |
|                   | Female | 1.040(0.955,1.134) |        | 1.024(0.971,1.080) |        | 1.008(0.970,1.048) |        | 0.996(0.952,1.042) |        | 0.987(0.938,1.040) |        |
|                   | Young  | 0.986(0.907,1.073) |        | 1.016(0.965,1.070) |        | 1.044(1.005,1.084) |        | 1.065(1.019,1.113) |        | 1.076(1.024,1.132) |        |
|                   | Old    | 1.084(0.996,1.180) |        | 1.038(0.985,1.094) |        | 0.998(0.961,1.038) |        | 0.968(0.925,1.012) |        | 0.949(0.902,0.999) |        |
| PM <sub>2.5</sub> | Male   | 1.026(0.955,1.103) |        | 1.021(0.974,1.072) |        | 1.017(0.977,1.059) |        | 1.014(0.967,1.062) |        | 1.011(0.960,1.065) |        |
|                   | Female | 1.059(0.984,1.139) |        | 1.044(0.994,1.096) |        | 1.030(0.989,1.072) |        | 1.018(0.972,1.068) |        | 1.011(0.959,1.065) |        |
|                   | Young  | 0.995(0.924,1.072) |        | 1.011(0.963,1.062) |        | 1.026(0.985,1.067) |        | 1.037(0.989,1.086) |        | 1.043(0.990,1.098) |        |
|                   | Old    | 1.062(0.990,1.140) |        | 1.034(0.986,1.085) |        | 1.009(0.969,1.051) |        | 0.990(0.945,1.038) |        | 0.978(0.929,1.030) |        |
| PM <sub>10</sub>  | Male   | 1.058(0.999,1.121) |        | 1.073(1.032,1.116) |        | 1.087(1.050,1.124) |        | 1.096(1.054,1.140) |        | 1.099(1.053,1.147) |        |
|                   | Female | 1.068(1.007,1.133) |        | 1.076(1.033,1.120) |        | 1.082(1.045,1.120) |        | 1.085(1.042,1.130) |        | 1.084(1.038,1.133) |        |
|                   | Young  | 1.023(0.963,1.087) |        | 1.056(1.014,1.101) |        | 1.087(1.050,1.125) |        | 1.109(1.066,1.155) |        | 1.120(1.072,1.170) |        |
|                   | Old    | 1.073(1.015,1.134) |        | 1.067(1.027,1.109) |        | 1.061(1.026,1.098) |        | 1.056(1.016,1.098) |        | 1.051(1.008,1.096) |        |
| SO <sub>2</sub>   | Male   | 0.97(0.869,1.084)  |        | 1.073(1.003,1.148) |        | 1.172(1.117,1.229) |        | 1.248(1.178,1.321) |        | 1.279(1.198,1.366) |        |
|                   | Female | 0.997(0.891,1.115) |        | 1.074(1.004,1.150) |        | 1.148(1.093,1.205) |        | 1.204(1.136,1.276) |        | 1.230(1.151,1.315) |        |
|                   | Young  | 1.007(0.905,1.121) |        | 1.116(1.045,1.191) |        | 1.221(1.165,1.279) |        | 1.301(1.231,1.376) |        | 1.334(1.251,1.423) |        |
|                   | Old    | 0.934(0.833,1.046) |        | 1.005(0.938,1.078) |        | 1.073(1.021,1.127) |        | 1.126(1.061,1.194) |        | 1.152(1.077,1.233) |        |
| NO <sub>2</sub>   | Male   | 1.005(0.947,1.068) |        | 1.041(1.001,1.084) |        | 1.074(1.039,1.110) |        | 1.099(1.058,1.141) |        | 1.110(1.065,1.157) |        |
|                   | Female | 1.007(0.947,1.070) |        | 1.036(0.995,1.079) |        | 1.064(1.029,1.099) |        | 1.085(1.044,1.127) |        | 1.096(1.050,1.143) |        |
|                   | Young  | 0.990(0.931,1.053) |        | 1.038(0.996,1.081) |        | 1.082(1.046,1.118) |        | 1.115(1.073,1.158) |        | 1.131(1.084,1.180) |        |
|                   | Old    | 1.013(0.955,1.074) |        | 1.036(0.997,1.078) |        | 1.058(1.024,1.082) |        | 1.075(1.035,1.115) |        | 1.085(1.041,1.130) |        |
| O <sub>3</sub>    | Male   | 0.827(0.781,0.876) |        | 0.826(0.796,0.858) |        | 0.827(0.803,0.851) |        | 0.828(0.800,0.856) |        | 0.830(0.799,0.861) |        |
|                   | Female | 0.865(0.815,0.917) |        | 0.848(0.816,0.881) |        | 0.834(0.809,0.860) |        | 0.824(0.796,0.853) |        | 0.820(0.789,0.852) |        |
|                   | Young  | 0.837(0.788,0.888) |        | 0.838(0.807,0.871) |        | 0.840(0.815,0.865) |        | 0.841(0.813,0.871) |        | 0.842(0.810,0.875) |        |
|                   | Old    | 0.879(0.831,0.930) |        | 0.865(0.834,0.897) |        | 0.853(0.828,0.878) |        | 0.845(0.817,0.873) |        | 0.843(0.812,0.875) |        |

| pollutant         | group  | Lag5               |        | Lag6                |        | Lag7               |        | Lag8               |        |
|-------------------|--------|--------------------|--------|---------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                  | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.989(0.944,1.036) |        | 0.990(0.952,1.030)  |        | 0.993(0.946,1.043) |        | 0.997(0.922,1.078) |        |
|                   | Female | 0.984(0.939,1.031) |        | 0.983(0.945,1.023)  |        | 0.986(0.938,1.036) |        | 0.989(0.914,1.070) |        |
|                   | Young  | 1.075(1.027,1.125) |        | 1.063(1.023,1.105)  |        | 1.044(0.995,1.096) |        | 1.023(0.947,1.105) |        |
|                   | Old    | 0.945(0.902,0.990) |        | 0.951(0.915,0.990)  |        | 0.966(0.919,1.015) |        | 0.985(0.911,1.065) |        |
| PM <sub>2.5</sub> | Male   | 1.010(0.964,1.060) |        | 1.011(0.971,1.052)  |        | 1.012(0.967,1.058) |        | 1.013(0.949,1.082) |        |
|                   | Female | 1.007(0.960,1.056) |        | 1.006(0.966,1.048)  |        | 1.008(0.964,1.055) |        | 1.011(0.946,1.081) |        |
|                   | Young  | 1.042(0.994,1.093) |        | 1.037(0.996,1.079)  |        | 1.028(0.982,1.075) |        | 1.017(0.951,1.088) |        |
|                   | Old    | 0.976(0.929,1.030) |        | 0.980(0.941,1.021)  |        | 0.990(0.947,1.035) |        | 1.002(0.939,1.069) |        |
| PM <sub>10</sub>  | Male   | 1.094(1.052,1.138) |        | 1.083(1.048,1.120)  |        | 1.068(1.028,1.110) |        | 1.051(0.993,1.113) |        |
|                   | Female | 1.078(1.036,1.122) |        | 1.068(1.032,1.105)  |        | 1.055(1.014,1.097) |        | 1.041(0.982,1.103) |        |
|                   | Young  | 1.115(1.071,1.160) |        | 1.097(1.060,1.136)  |        | 1.072(1.030,1.116) |        | 1.043(0.983,1.107) |        |
|                   | Old    | 1.047(1.007,1.088) |        | 1.043(1.009,1.1078) |        | 1.039(1.000,1.079) |        | 1.035(1.979,1.094) |        |
| SO <sub>2</sub>   | Male   | 1.252(1.179,1.329) |        | 1.179(1.122,1.240)  |        | 1.084(1.017,1.155) |        | 0.983(0.888,1.088) |        |
|                   | Female | 1.216(1.145,1.292) |        | 1.171(1.113,1.232)  |        | 1.107(1.038,1.181) |        | 1.038(0.937,1.151) |        |
|                   | Young  | 1.305(1.231,1.383) |        | 1.227(1.168,1.289)  |        | 1.124(1.056,1.197) |        | 1.017(0.921,1.124) |        |
|                   | Old    | 1.143(1.075,1.216) |        | 1.106(1.050,1.165)  |        | 1.052(0.986,1.123) |        | 0.993(0.895,1.101) |        |
| NO <sub>2</sub>   | Male   | 1.105(1.063,1.148) |        | 1.086(1.050,1.123)  |        | 1.058(1.018,1.100) |        | 1.027(0.971,1.087) |        |
|                   | Female | 1.095(1.053,1.139) |        | 1.083(1.047,1.121)  |        | 1.066(1.025,1.108) |        | 1.045(1.987,1.107) |        |
|                   | Young  | 1.124(1.081,1.169) |        | 1.099(1.063,1.137)  |        | 1.063(1.023,1.106) |        | 1.023(0.966,1.084) |        |
|                   | Old    | 1.086(1.045,1.128) |        | 1.080(1.044,1.116)  |        | 1.069(1.029,1.110) |        | 1.056(0.999,1.115) |        |
| O <sub>3</sub>    | Male   | 0.834(0.805,0.863) |        | 0.839(0.814,0.864)  |        | 0.845(0.816,0.874) |        | 0.851(0.810,0.895) |        |
|                   | Female | 0.823(0.794,0.853) |        | 0.832(0.806,0.858)  |        | 0.845(0.816,0.875) |        | 0.860(0.817,0.906) |        |
|                   | Young  | 0.843(0.813,0.874) |        | 0.843(0.817,0.870)  |        | 0.843(0.814,0.873) |        | 0.843(0.800,0.888) |        |
|                   | Old    | 0.848(0.819,0.878) |        | 0.859(0.834,0.886)  |        | 0.875(0.846,0.905) |        | 0.893(0.850,0.938) |        |

**Supplementary Table 18** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 9)

| pollutant         | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.996(0.978,1.014) |        | 0.996(0.967,1.025) |        | 0.998(0.964,1.033) |        | 1.002(0.966,1.040) |        | 1.008(0.970,1.047) |        |
|                   | Female | 0.992(0.974,1.011) |        | 0.988(0.960,1.018) |        | 0.988(0.954,1.023) |        | 0.990(0.954,1.028) |        | 0.994(0.956,1.034) |        |
|                   | Young  | 1.002(0.984,1.020) |        | 1.001(0.973,1.030) |        | 0.997(0.963,1.032) |        | 0.990(0.955,1.027) |        | 0.981(0.945,1.019) |        |
|                   | Old    | 0.984(0.966,1.002) |        | 0.976(0.948,1.005) |        | 0.976(0.942,1.010) |        | 0.981(0.945,1.018) |        | 0.991(0.953,1.030) |        |
| PM <sub>2.5</sub> | Male   | 0.996(0.984,1.008) |        | 0.992(0.973,1.013) |        | 0.991(0.966,1.016) |        | 0.990(0.962,1.018) |        | 0.989(0.958,1.020) |        |
|                   | Female | 0.991(0.979,1.003) |        | 0.983(0.964,1.004) |        | 0.978(0.954,1.003) |        | 0.975(0.947,1.003) |        | 0.972(0.942,1.004) |        |
|                   | Young  | 1.000(0.988,1.013) |        | 0.999(0.979,1.020) |        | 0.997(0.972,1.022) |        | 0.993(0.965,1.021) |        | 0.988(0.957,1.019) |        |
|                   | Old    | 0.990(0.978,1.002) |        | 0.984(0.965,1.004) |        | 0.982(0.958,1.007) |        | 0.983(0.956,1.011) |        | 0.986(0.955,1.017) |        |
| PM <sub>10</sub>  | Male   | 0.984(0.968,1.000) |        | 0.966(0.941,0.992) |        | 0.947(0.916,0.979) |        | 0.926(0.892,0.962) |        | 0.906(0.868,0.945) |        |
|                   | Female | 0.982(0.966,0.998) |        | 0.963(0.937,0.989) |        | 0.943(0.912,0.976) |        | 0.923(0.888,0.960) |        | 0.903(0.865,0.944) |        |
|                   | Young  | 0.993(0.976,1.009) |        | 0.979(0.952,1.006) |        | 0.960(0.927,0.993) |        | 0.936(0.900,0.974) |        | 0.911(0.872,0.952) |        |
|                   | Old    | 0.981(0.966,0.996) |        | 0.964(0.940,0.989) |        | 0.949(0.919,0.980) |        | 0.935(0.901,0.971) |        | 0.923(0.885,0.963) |        |
| SO <sub>2</sub>   | Male   | 1.000(0.985,1.015) |        | 0.992(0.969,1.017) |        | 0.978(0.950,1.006) |        | 0.957(0.929,0.986) |        | 0.934(0.905,0.963) |        |
|                   | Female | 0.999(0.984,1.015) |        | 0.990(0.966,1.015) |        | 0.973(0.946,1.002) |        | 0.952(0.923,0.981) |        | 0.927(0.898,0.957) |        |
|                   | Young  | 0.995(0.981,1.010) |        | 0.982(0.959,1.006) |        | 0.962(0.936,0.989) |        | 0.936(0.909,0.964) |        | 0.907(0.881,0.935) |        |
|                   | Old    | 1.008(0.993,1.025) |        | 1.008(0.983,1.034) |        | 1.001(0.971,1.031) |        | 0.987(0.957,1.018) |        | 0.970(0.939,1.002) |        |
| NO <sub>2</sub>   | Male   | 0.997(0.971,1.022) |        | 0.982(0.941,1.024) |        | 0.957(0.909,1.008) |        | 0.925(0.873,0.981) |        | 0.890(0.835,0.949) |        |
|                   | Female | 0.998(0.972,1.024) |        | 0.983(0.942,1.026) |        | 0.958(0.908,1.009) |        | 0.924(0.872,0.981) |        | 0.888(0.832,0.947) |        |
|                   | Young  | 1.003(0.977,1.030) |        | 0.990(0.948,1.033) |        | 0.963(0.913,1.015) |        | 0.925(0.873,0.982) |        | 0.883(0.828,0.942) |        |
|                   | Old    | 0.995(0.971,1.020) |        | 0.980(0.941,1.021) |        | 0.956(0.909,1.006) |        | 0.926(0.975,0.980) |        | 0.893(0.838,0.950) |        |
| O <sub>3</sub>    | Male   | 1.121(1.081,1.162) |        | 1.259(1.186,1.337) |        | 1.418(1.316,1.527) |        | 1.597(1.471,1.735) |        | 1.799(1.644,1.968) |        |
|                   | Female | 1.091(1.051,1.133) |        | 1.207(1.135,1.284) |        | 1.352(1.253,1.459) |        | 1.527(1.403,1.662) |        | 1.734(1.581,1.901) |        |
|                   | Young  | 1.111(1.070,1.154) |        | 1.236(1.161,1.315) |        | 1.375(1.274,1.485) |        | 1.531(1.406,1.666) |        | 1.705(1.555,1.869) |        |
|                   | Old    | 1.081(1.043,1.121) |        | 1.182(1.114,1.255) |        | 1.306(1.214,1.405) |        | 1.453(1.338,1.577) |        | 1.620(1.481,1.773) |        |

| pollutant               | group  | Lag05              |        | Lag06              |        | Lag07              |        | Lag08              |        | Lag09              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.013(0.973,1.054) |        | 1.015(0.974,1.059) |        | 1.015(0.974,1.058) |        | 1.011(0.972,1.050) |        | 1.002(0.965,1.040) |        |
|                         | Female | 0.998(0.958,1.040) |        | 1.002(0.960,1.046) |        | 1.004(0.962,1.047) |        | 1.003(0.964,1.043) |        | 0.999(0.962,1.038) |        |
|                         | Young  | 0.970(0.933,1.010) |        | 0.958(0.919,0.999) |        | 0.945(0.907,0.984) |        | 0.931(0.896,0.967) |        | 0.916(0.883,0.951) |        |
|                         | Old    | 1.002(0.962,1.044) |        | 1.014(0.971,1.058) |        | 1.022(0.980,1.066) |        | 1.027(0.988,1.068) |        | 1.027(0.989,1.067) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.988(0.954,1.023) |        | 0.986(0.949,1.025) |        | 0.983(0.944,1.024) |        | 0.978(0.939,1.019) |        | 0.972(0.931,1.014) |        |
|                         | Female | 0.971(0.937,1.006) |        | 0.970(0.933,1.008) |        | 0.969(0.930,1.009) |        | 0.968(0.928,1.009) |        | 0.967(0.926,1.009) |        |
|                         | Young  | 0.982(0.948,1.017) |        | 0.976(0.939,1.013) |        | 0.969(0.931,1.009) |        | 0.963(0.924,1.002) |        | 0.956(0.917,0.997) |        |
|                         | Old    | 0.989(0.955,1.025) |        | 0.993(0.955,1.032) |        | 0.996(0.955,1.037) |        | 0.996(0.955,1.039) |        | 0.995(0.953,1.039) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.885(0.843,0.928) |        | 0.864(0.820,0.912) |        | 0.845(0.799,0.894) |        | 0.827(0.780,0.877) |        | 0.810(0.762,0.861) |        |
|                         | Female | 0.885(0.842,0.930) |        | 0.868(0.822,0.917) |        | 0.854(0.806,0.905) |        | 0.843(0.794,0.895) |        | 0.835(0.785,0.888) |        |
|                         | Young  | 0.885(0.843,0.930) |        | 0.861(0.816,0.909) |        | 0.841(0.794,0.890) |        | 0.824(0.777,0.874) |        | 0.812(0.764,0.863) |        |
|                         | Old    | 0.912(0.870,0.957) |        | 0.901(0.855,0.950) |        | 0.891(0.842,0.942) |        | 0.880(0.831,0.933) |        | 0.870(0.819,0.923) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.910(0.881,0.940) |        | 0.888(0.859,0.919) |        | 0.871(0.842,0.901) |        | 0.858(0.831,0.886) |        | 0.850(0.824,0.877) |        |
|                         | Female | 0.903(0.874,0.933) |        | 0.883(0.853,0.914) |        | 0.868(0.839,0.898) |        | 0.859(0.832,0.887) |        | 0.858(0.831,0.886) |        |
|                         | Young  | 0.879(0.852,0.907) |        | 0.854(0.826,0.882) |        | 0.833(0.806,0.861) |        | 0.818(0.793,0.844) |        | 0.809(0.785,0.834) |        |
|                         | Old    | 0.953(0.921,0.986) |        | 0.938(0.905,0.972) |        | 0.928(0.896,0.962) |        | 0.924(0.894,0.956) |        | 0.927(0.897,0.958) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.855(0.797,0.918) |        | 0.824(0.763,0.890) |        | 0.799(0.736,0.866) |        | 0.780(0.718,0.848) |        | 0.770(0.707,0.838) |        |
|                         | Female | 0.853(0.794,0.916) |        | 0.823(0.761,0.890) |        | 0.801(0.738,0.870) |        | 0.789(0.726,0.858) |        | 0.786(0.722,0.857) |        |
|                         | Young  | 0.842(0.784,0.904) |        | 0.806(0.746,0.871) |        | 0.779(0.718,0.845) |        | 0.762(0.701,0.828) |        | 0.755(0.694,0.822) |        |
|                         | Old    | 0.860(0.802,0.923) |        | 0.832(0.771,0.898) |        | 0.811(0.748,0.879) |        | 0.797(0.734,0.865) |        | 0.791(0.727,0.860) |        |
| <b>O<sub>3</sub></b>    | Male   | 2.021(1.832,2.230) |        | 2.262(2.033,2.515) |        | 2.516(2.250,2.812) |        | 2.779(2.480,3.115) |        | 3.048(2.711,3.428) |        |
|                         | Female | 1.965(1.777,2.174) |        | 2.212(1.984,2.466) |        | 2.460(2.194,2.757) |        | 2.695(2.398,3.028) |        | 2.905(2.576,3.275) |        |
|                         | Young  | 1.898(1.717,2.098) |        | 2.113(1.897,2.354) |        | 2.352(2.101,2.633) |        | 2.617(2.333,2.934) |        | 2.910(2.586,3.274) |        |
|                         | Old    | 1.803(1.634,1.990) |        | 1.990(1.788,2.215) |        | 2.170(1.939,2.429) |        | 2.331(2.077,2.617) |        | 2.464(2.186,2.777) |        |

**Supplementary Table 19** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 9)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.996(0.978,1.014) |        | 0.999(0.988,1.011) |        | 1.002(0.995,1.010) |        | 1.004(0.996,1.013) |        | 1.005(0.995,1.016) |        |
|                   | Female | 0.992(0.974,1.011) |        | 0.996(0.985,1.008) |        | 0.999(0.992,1.007) |        | 1.002(0.994,1.011) |        | 1.004(0.993,1.015) |        |
|                   | Young  | 1.002(0.984,1.020) |        | 0.999(0.988,1.010) |        | 0.996(0.988,1.004) |        | 0.993(0.985,1.002) |        | 0.991(0.981,1.001) |        |
|                   | Old    | 0.984(0.966,1.002) |        | 0.992(0.981,1.003) |        | 0.999(0.992,1.007) |        | 1.006(0.997,1.014) |        | 1.010(0.999,1.021) |        |
| PM <sub>2.5</sub> | Male   | 0.996(0.984,1.008) |        | 0.997(0.989,1.005) |        | 0.998(0.992,1.005) |        | 0.999(0.992,1.006) |        | 0.999(0.991,1.008) |        |
|                   | Female | 0.991(0.979,1.003) |        | 0.993(0.984,1.001) |        | 0.995(0.988,1.001) |        | 0.996(0.989,1.003) |        | 0.998(0.989,1.006) |        |
|                   | Young  | 1.000(0.988,1.013) |        | 0.999(0.990,1.007) |        | 0.997(0.991,1.004) |        | 0.996(0.989,1.003) |        | 0.995(0.987,1.003) |        |
|                   | Old    | 0.990(0.978,1.002) |        | 0.994(0.986,1.002) |        | 0.998(0.991,1.004) |        | 1.001(0.994,1.008) |        | 1.003(0.995,1.011) |        |
| PM <sub>10</sub>  | Male   | 0.984(0.968,1.000) |        | 0.982(0.971,0.993) |        | 0.980(0.971,0.989) |        | 0.979(0.969,0.988) |        | 0.977(0.967,0.988) |        |
|                   | Female | 0.982(0.966,0.998) |        | 0.981(0.970,0.992) |        | 0.979(0.971,0.988) |        | 0.979(0.969,0.988) |        | 0.979(0.968,0.990) |        |
|                   | Young  | 0.993(0.976,1.009) |        | 0.986(0.975,0.998) |        | 0.980(0.972,0.989) |        | 0.976(0.966,0.985) |        | 0.973(0.962,0.984) |        |
|                   | Old    | 0.981(0.966,0.996) |        | 0.983(0.972,0.993) |        | 0.984(0.976,0.993) |        | 0.986(0.977,0.995) |        | 0.987(0.976,0.998) |        |
| SO <sub>2</sub>   | Male   | 1.000(0.985,1.015) |        | 0.992(0.983,1.002) |        | 0.985(0.979,0.991) |        | 0.979(0.972,0.984) |        | 0.976(0.967,0.984) |        |
|                   | Female | 0.999(0.984,1.015) |        | 0.991(0.981,1.000) |        | 0.983(0.977,0.990) |        | 0.978(0.971,0.985) |        | 0.974(0.966,0.983) |        |
|                   | Young  | 0.995(0.981,1.010) |        | 0.987(0.978,0.996) |        | 0.979(0.973,0.985) |        | 0.973(0.966,0.980) |        | 0.969(0.961,0.978) |        |
|                   | Old    | 1.008(0.993,1.024) |        | 1.000(0.990,1.010) |        | 0.992(0.986,0.999) |        | 0.986(0.979,0.994) |        | 0.983(0.974,0.992) |        |
| NO <sub>2</sub>   | Male   | 0.997(0.971,1.022) |        | 0.985(0.968,1.002) |        | 0.975(0.962,0.988) |        | 0.967(0.953,0.981) |        | 0.962(0.946,0.978) |        |
|                   | Female | 0.998(0.972,1.024) |        | 0.985(0.968,1.003) |        | 0.974(0.961,0.987) |        | 0.965(0.951,0.980) |        | 0.961(0.944,0.977) |        |
|                   | Young  | 1.003(0.977,1.030) |        | 0.987(0.970,1.004) |        | 0.973(0.960,0.986) |        | 0.961(0.947,0.975) |        | 0.954(0.938,0.971) |        |
|                   | Old    | 0.995(0.971,1.020) |        | 0.985(0.968,1.001) |        | 0.976(0.963,0.988) |        | 0.968(0.955,0.982) |        | 0.964(0.948,0.980) |        |
| O <sub>3</sub>    | Male   | 1.121(1.081,1.162) |        | 1.124(1.096,1.151) |        | 1.126(1.105,1.146) |        | 1.127(1.105,1.149) |        | 1.126(1.101,1.152) |        |
|                   | Female | 1.091(1.051,1.133) |        | 1.106(1.079,1.134) |        | 1.120(1.099,1.141) |        | 1.130(1.108,1.153) |        | 1.135(1.109,1.162) |        |
|                   | Young  | 1.111(1.070,1.154) |        | 1.112(1.084,1.141) |        | 1.113(1.092,1.134) |        | 1.113(1.091,1.135) |        | 1.113(1.088,1.139) |        |
|                   | Old    | 1.081(1.043,1.121) |        | 1.094(1.067,1.120) |        | 1.104(1.085,1.125) |        | 1.112(1.091,1.134) |        | 1.116(1.091,1.141) |        |

| pollutant               | group  | Lag5               |        | Lag6               |        | Lag7               |        | Lag8               |        | Lag9               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.005(0.994,1.016) |        | 1.003(0.994,1.012) |        | 1.000(0.992,1.007) |        | 0.996(0.985,1.006) |        | 0.991(0.975,1.008) |        |
|                         | Female | 1.004(0.994,1.015) |        | 1.004(0.995,1.013) |        | 1.002(0.994,1.010) |        | 0.999(0.988,1.010) |        | 0.996(0.980,1.014) |        |
|                         | Young  | 0.989(0.979,0.999) |        | 0.987(0.979,0.996) |        | 0.986(0.979,0.994) |        | 0.985(0.975,0.996) |        | 0.984(0.968,1.001) |        |
|                         | Old    | 1.012(1.001,1.023) |        | 1.011(1.002,1.020) |        | 1.009(1.001,1.017) |        | 1.005(0.994,1.016) |        | 1.000(0.984,1.017) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.999(0.991,1.007) |        | 0.998(0.991,1.007) |        | 0.997(0.991,1.003) |        | 0.995(0.987,1.003) |        | 0.993(0.982,1.005) |        |
|                         | Female | 0.999(0.990,1.007) |        | 0.999(0.992,1.006) |        | 0.999(0.993,1.005) |        | 0.999(0.991,1.007) |        | 0.999(0.987,1.010) |        |
|                         | Young  | 0.994(0.986,1.002) |        | 0.994(0.987,1.001) |        | 0.993(0.987,1.000) |        | 0.993(0.985,1.001) |        | 0.993(0.982,1.005) |        |
|                         | Old    | 1.004(0.996,1.012) |        | 1.004(0.996,1.011) |        | 1.003(0.996,1.009) |        | 1.001(0.993,1.009) |        | 0.999(0.988,1.010) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.977(0.966,0.988) |        | 0.977(0.968,0.987) |        | 0.978(0.969,0.986) |        | 0.978(0.968,0.989) |        | 0.979(0.964,0.995) |        |
|                         | Female | 0.980(0.969,0.991) |        | 0.981(0.972,0.991) |        | 0.984(0.975,0.993) |        | 0.987(0.976,0.998) |        | 0.990(0.974,1.006) |        |
|                         | Young  | 0.972(0.961,0.983) |        | 0.973(0.964,0.983) |        | 0.976(0.968,0.985) |        | 0.980(0.970,0.991) |        | 0.985(0.969,1.001) |        |
|                         | Old    | 0.988(0.977,0.999) |        | 0.988(0.979,0.998) |        | 0.988(0.980,0.997) |        | 0.988(0.978,0.999) |        | 0.988(0.973,1.003) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.975(0.966,0.983) |        | 0.976(0.969,0.984) |        | 0.980(0.974,0.986) |        | 0.985(0.977,0.994) |        | 0.991(0.977,1.005) |        |
|                         | Female | 0.974(0.965,0.983) |        | 0.977(0.970,0.985) |        | 0.983(0.977,0.989) |        | 0.990(0.981,0.999) |        | 0.998(0.984,1.013) |        |
|                         | Young  | 0.969(0.960,0.977) |        | 0.971(0.964,0.978) |        | 0.976(0.970,0.982) |        | 0.982(0.974,0.990) |        | 0.989(0.976,1.003) |        |
|                         | Old    | 0.982(0.973,0.991) |        | 0.985(0.977,0.992) |        | 0.989(0.983,0.996) |        | 0.996(0.987,1.005) |        | 1.003(0.989,1.017) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.961(0.944,0.977) |        | 0.963(0.949,0.978) |        | 0.969(0.957,0.982) |        | 0.977(0.961,0.993) |        | 0.986(0.963,1.010) |        |
|                         | Female | 0.960(0.944,0.977) |        | 0.965(0.951,0.980) |        | 0.974(0.961,0.987) |        | 0.985(0.968,1.001) |        | 0.997(0.973,1.022) |        |
|                         | Young  | 0.953(0.937,0.970) |        | 0.958(0.943,0.972) |        | 0.966(0.953,0.979) |        | 0.978(0.962,0.994) |        | 0.991(0.967,1.016) |        |
|                         | Old    | 0.964(0.948,0.980) |        | 0.967(0.953,0.982) |        | 0.974(0.961,0.987) |        | 0.983(0.967,0.999) |        | 0.993(0.969,1.016) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.124(1.098,1.150) |        | 1.119(1.096,1.142) |        | 1.112(1.092,1.133) |        | 1.105(1.081,1.129) |        | 1.097(1.063,1.132) |        |
|                         | Female | 1.134(1.107,1.161) |        | 1.125(1.102,1.149) |        | 1.112(1.091,1.133) |        | 1.096(1.071,1.121) |        | 1.078(1.043,1.114) |        |
|                         | Young  | 1.114(1.088,1.140) |        | 1.113(1.091,1.137) |        | 1.113(1.093,1.134) |        | 1.113(1.088,1.138) |        | 1.112(1.076,1.149) |        |
|                         | Old    | 1.113(1.088,1.138) |        | 1.104(1.082,1.126) |        | 1.090(1.071,1.110) |        | 1.074(1.051,1.098) |        | 1.057(1.024,1.090) |        |

**Supplementary Table 20** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 9)

| pollutant         | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.018(0.937,1.107) |        | 1.021(0.892,1.169) |        | 1.010(0.860,1.187) |        | 0.989(0.833,1.175) |        | 0.965(0.806,1.154) |        |
|                   | Female | 1.036(0.952,1.128) |        | 1.056(0.920,1.211) |        | 1.058(0.898,1.247) |        | 1.047(0.879,1.248) |        | 1.028(0.857,1.234) |        |
|                   | Young  | 0.991(0.912,1.076) |        | 0.995(0.870,1.138) |        | 1.014(0.864,1.190) |        | 1.046(0.883,1.241) |        | 1.092(0.915,1.304) |        |
|                   | Old    | 1.078(0.991,1.172) |        | 1.119(0.997,1.282) |        | 1.122(0.954,1.320) |        | 1.093(0.919,1.301) |        | 1.044(0.871,1.251) |        |
| PM <sub>2.5</sub> | Male   | 1.026(0.956,1.102) |        | 1.045(0.929,1.176) |        | 1.057(0.914,1.223) |        | 1.064(0.902,1.254) |        | 1.068(0.889,1.283) |        |
|                   | Female | 1.056(0.983,1.136) |        | 1.103(0.978,1.243) |        | 1.138(0.982,1.319) |        | 1.163(0.984,1.374) |        | 1.179(0.979,1.420) |        |
|                   | Young  | 0.998(0.927,1.073) |        | 1.005(0.891,1.133) |        | 1.020(0.880,1.184) |        | 1.044(0.884,1.233) |        | 1.076(0.895,1.293) |        |
|                   | Old    | 1.059(0.987,1.136) |        | 1.097(0.976,1.232) |        | 1.112(0.962,1.285) |        | 1.107(0.939,1.305) |        | 1.089(0.905,1.309) |        |
| PM <sub>10</sub>  | Male   | 1.060(1.001,1.122) |        | 1.132(1.030,1.245) |        | 1.217(1.081,1.370) |        | 1.315(1.148,1.507) |        | 1.427(1.224,1.664) |        |
|                   | Female | 1.067(1.007,1.132) |        | 1.145(1.039,1.262) |        | 1.234(1.093,1.393) |        | 1.333(1.160,1.532) |        | 1.440(1.231,1.686) |        |
|                   | Young  | 1.027(0.967,1.091) |        | 1.080(0.977,1.193) |        | 1.159(1.024,1.313) |        | 1.266(1.100,1.458) |        | 1.399(1.195,1.637) |        |
|                   | Old    | 1.072(1.014,1.132) |        | 1.141(1.041,1.251) |        | 1.207(1.075,1.355) |        | 1.270(1.112,1.451) |        | 1.331(1.144,1.548) |        |
| SO <sub>2</sub>   | Male   | 0.998(0.896,1.113) |        | 1.056(0.887,1.257) |        | 1.177(0.959,1.446) |        | 1.369(1.103,1.700) |        | 1.637(1.310,2.045) |        |
|                   | Female | 1.006(0.902,1.124) |        | 1.076(0.901,1.284) |        | 1.214(0.985,1.497) |        | 1.430(1.147,1.783) |        | 1.725(1.375,2.165) |        |
|                   | Young  | 1.034(0.931,1.149) |        | 1.137(0.960,1.347) |        | 1.323(1.084,1.616) |        | 1.610(1.304,1.986) |        | 2.013(1.621,2.500) |        |
|                   | Old    | 0.942(0.842,1.054) |        | 0.943(0.787,1.129) |        | 0.996(0.805,1.234) |        | 1.099(0.877,1.377) |        | 1.245(0.987,1.572) |        |
| NO <sub>2</sub>   | Male   | 1.008(0.950,1.070) |        | 1.044(0.946,1.152) |        | 1.107(0.981,1.250) |        | 1.198(1.046,1.372) |        | 1.312(1.130,1.523) |        |
|                   | Female | 1.005(0.946,1.068) |        | 1.041(0.942,1.150) |        | 1.107(0.979,1.251) |        | 1.201(1.047,1.378) |        | 1.319(1.134,1.535) |        |
|                   | Young  | 0.993(0.934,1.056) |        | 1.024(0.926,1.132) |        | 1.093(0.966,1.236) |        | 1.198(1.044,1.375) |        | 1.336(1.148,1.554) |        |
|                   | Old    | 1.011(0.954,1.072) |        | 1.048(0.952,1.154) |        | 1.110(0.987,1.250) |        | 1.197(1.048,1.367) |        | 1.304(1.126,1.510) |        |
| O <sub>3</sub>    | Male   | 0.838(0.792,0.887) |        | 0.700(0.638,0.769) |        | 0.583(0.520,0.654) |        | 0.485(0.427,0.551) |        | 0.403(0.351,0.463) |        |
|                   | Female | 0.874(0.824,0.926) |        | 0.747(0.679,0.822) |        | 0.627(0.558,0.706) |        | 0.519(0.456,0.592) |        | 0.427(0.370,0.492) |        |
|                   | Young  | 0.849(0.801,0.900) |        | 0.721(0.654,0.793) |        | 0.611(0.543,0.688) |        | 0.518(0.454,0.590) |        | 0.438(0.380,0.505) |        |
|                   | Old    | 0.886(0.838,0.937) |        | 0.772(0.704,0.846) |        | 0.662(0.591,0.741) |        | 0.561(0.495,0.637) |        | 0.474(0.413,0.545) |        |

| pollutant         | group  | Lag05              |        | Lag06              |        | Lag07              |        | Lag08              |        | Lag09              |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.943(0.781,1.139) |        | 0.931(0.765,1.132) |        | 0.933(0.769,1.131) |        | 0.952(0.795,1.140) |        | 0.992(0.833,1.182) |        |
|                   | Female | 1.007(0.832,1.220) |        | 0.991(0.812,1.208) |        | 0.983(0.808,1.195) |        | 0.987(0.822,1.184) |        | 1.003(0.840,1.198) |        |
|                   | Young  | 1.150(0.955,1.385) |        | 1.220(1.007,1.480) |        | 1.302(1.077,1.575) |        | 1.396(1.169,1.667) |        | 1.503(1.266,1.786) |        |
|                   | Old    | 0.989(0.817,1.196) |        | 0.939(0.770,1.145) |        | 0.902(0.742,1.097) |        | 0.882(0.735,1.060) |        | 0.881(0.738,1.053) |        |
| PM <sub>2.5</sub> | Male   | 1.074(0.875,1.318) |        | 1.086(0.867,1.359) |        | 1.106(0.873,1.402) |        | 1.138(0.894,1.449) |        | 1.184(0.924,1.516) |        |
|                   | Female | 1.189(0.967,1.463) |        | 1.197(0.954,1.501) |        | 1.203(0.947,1.529) |        | 1.211(0.948,1.546) |        | 1.220(0.950,1.568) |        |
|                   | Young  | 1.113(0.908,1.366) |        | 1.156(0.925,1.444) |        | 1.202(0.951,1.519) |        | 1.251(0.986,1.587) |        | 1.302(1.020,1.661) |        |
|                   | Old    | 1.065(0.865,1.309) |        | 1.042(0.830,1.309) |        | 1.027(0.807,1.307) |        | 1.021(0.798,1.308) |        | 1.028(0.797,1.325) |        |
| PM <sub>10</sub>  | Male   | 1.551(1.305,1.844) |        | 1.686(1.393,2.040) |        | 1.829(1.493,2.239) |        | 1.977(1.604,2.437) |        | 2.130(1.714,2.647) |        |
|                   | Female | 1.551(1.299,1.852) |        | 1.659(1.365,2.017) |        | 1.758(1.429,2.163) |        | 1.844(1.489,2.282) |        | 1.910(1.531,2.384) |        |
|                   | Young  | 1.549(1.299,1.848) |        | 1.708(1.407,2.072) |        | 1.861(1.517,2.284) |        | 1.998(1.618,2.467) |        | 2.108(1.694,2.625) |        |
|                   | Old    | 1.391(1.172,1.649) |        | 1.451(1.202,1.752) |        | 1.514(1.239,1.850) |        | 1.580(1.285,1.943) |        | 1.651(1.331,2.046) |        |
| SO <sub>2</sub>   | Male   | 1.971(1.560,2.490) |        | 2.344(1.836,2.991) |        | 2.710(2.126,3.455) |        | 3.018(2.400,3.796) |        | 3.220(2.568,4.038) |        |
|                   | Female | 2.082(1.642,2.642) |        | 2.456(1.917,3.146) |        | 2.779(2.173,3.553) |        | 2.981(2.364,3.759) |        | 3.014(2.397,3.791) |        |
|                   | Young  | 2.530(2.015,3.176) |        | 3.125(2.465,3.961) |        | 3.728(2.945,4.720) |        | 4.249(3.402,5.307) |        | 4.600(3.693,5.728) |        |
|                   | Old    | 1.417(1.110,1.809) |        | 1.584(1.227,2.044) |        | 1.710(1.326,2.205) |        | 1.764(1.386,2.246) |        | 1.729(1.361,2.196) |        |
| NO <sub>2</sub>   | Male   | 1.441(1.221,1.700) |        | 1.572(1.312,1.882) |        | 1.690(1.398,2.043) |        | 1.784(1.471,2.163) |        | 1.842(1.511,2.246) |        |
|                   | Female | 1.450(1.226,1.714) |        | 1.575(1.312,1.890) |        | 1.676(1.384,2.031) |        | 1.739(1.431,2.113) |        | 1.751(1.434,2.139) |        |
|                   | Young  | 1.494(1.264,1.765) |        | 1.653(1.379,1.982) |        | 1.791(1.481,2.166) |        | 1.886(1.555,2.287) |        | 1.925(1.580,2.346) |        |
|                   | Old    | 1.421(1.207,1.673) |        | 1.535(1.284,1.835) |        | 1.632(1.352,1.970) |        | 1.700(1.403,2.059) |        | 1.729(1.420,2.106) |        |
| O <sub>3</sub>    | Male   | 0.337(0.289,0.392) |        | 0.283(0.240,0.334) |        | 0.240(0.202,0.285) |        | 0.206(0.173,0.245) |        | 0.178(0.149,0.214) |        |
|                   | Female | 0.352(0.301,0.411) |        | 0.293(0.248,0.347) |        | 0.249(0.208,0.297) |        | 0.216(0.180,0.258) |        | 0.192(0.160,0.231) |        |
|                   | Young  | 0.371(0.318,0.433) |        | 0.314(0.266,0.371) |        | 0.266(0.224,0.317) |        | 0.226(0.189,0.270) |        | 0.192(0.160,0.230) |        |
|                   | Old    | 0.402(0.345,0.468) |        | 0.345(0.292,0.407) |        | 0.302(0.253,0.359) |        | 0.270(0.226,0.323) |        | 0.248(0.206,0.298) |        |

**Supplementary Table 21** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(the maximum lag period = 9)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.018(0.937,1.107) |        | 1.003(0.951,1.058) |        | 0.989(0.954,1.026) |        | 0.979(0.941,1.019) |        | 0.975(0.929,1.024) |        |
|                   | Female | 1.036(0.952,1.128) |        | 1.019(0.965,1.075) |        | 1.003(0.966,1.040) |        | 0.990(0.950,1.031) |        | 0.982(0.935,1.031) |        |
|                   | Young  | 0.991(0.912,1.076) |        | 1.005(0.953,1.059) |        | 1.019(0.983,1.056) |        | 1.032(0.992,1.073) |        | 1.044(0.995,1.095) |        |
|                   | Old    | 1.078(0.991,1.172) |        | 1.038(0.984,1.095) |        | 1.003(0.967,1.040) |        | 0.974(0.936,1.014) |        | 0.955(0.909,1.003) |        |
| PM <sub>2.5</sub> | Male   | 1.026(0.956,1.102) |        | 1.018(0.970,1.069) |        | 1.011(0.974,1.050) |        | 1.006(0.965,1.049) |        | 1.004(0.957,1.053) |        |
|                   | Female | 1.056(0.983,1.136) |        | 1.044(0.994,1.096) |        | 1.032(0.994,1.072) |        | 1.022(0.980,1.066) |        | 1.014(0.966,1.064) |        |
|                   | Young  | 0.998(0.927,1.073) |        | 1.007(0.959,1.058) |        | 1.016(0.978,1.055) |        | 1.024(0.982,1.067) |        | 1.030(0.982,1.081) |        |
|                   | Old    | 1.059(0.987,1.136) |        | 1.035(0.987,1.086) |        | 1.014(0.976,1.053) |        | 0.996(0.955,1.038) |        | 0.983(0.937,1.032) |        |
| PM <sub>10</sub>  | Male   | 1.060(1.001,1.122) |        | 1.068(1.027,1.111) |        | 1.075(1.042,1.109) |        | 1.081(1.044,1.119) |        | 1.085(1.043,1.129) |        |
|                   | Female | 1.067(1.007,1.132) |        | 1.073(1.031,1.117) |        | 1.078(1.043,1.113) |        | 1.080(1.043,1.119) |        | 1.080(1.038,1.125) |        |
|                   | Young  | 1.027(0.967,1.091) |        | 1.051(1.009,1.095) |        | 1.074(1.040,1.109) |        | 1.092(1.054,1.132) |        | 1.104(1.061,1.150) |        |
|                   | Old    | 1.072(1.014,1.132) |        | 1.065(1.025,1.106) |        | 1.058(1.026,1.091) |        | 1.052(1.017,1.089) |        | 1.048(1.008,1.089) |        |
| SO <sub>2</sub>   | Male   | 0.998(0.896,1.113) |        | 1.058(0.988,1.132) |        | 1.115(1.066,1.166) |        | 1.163(1.106,1.224) |        | 1.195(1.123,1.273) |        |
|                   | Female | 1.006(0.902,1.124) |        | 1.069(0.998,1.145) |        | 1.129(1.078,1.182) |        | 1.177(1.118,1.240) |        | 1.206(1.132,1.286) |        |
|                   | Young  | 1.034(0.931,1.149) |        | 1.100(1.030,1.175) |        | 1.163(1.113,1.215) |        | 1.216(1.158,1.278) |        | 1.250(1.176,1.330) |        |
|                   | Old    | 0.942(0.842,1.054) |        | 1.001(0.933,1.074) |        | 1.057(1.008,1.107) |        | 1.103(1.047,1.163) |        | 1.133(1.062,1.209) |        |
| NO <sub>2</sub>   | Male   | 1.008(0.950,1.070) |        | 1.035(0.995,1.078) |        | 1.061(1.029,1.094) |        | 1.082(1.046,1.119) |        | 1.095(1.053,1.139) |        |
|                   | Female | 1.005(0.946,1.068) |        | 1.035(0.994,1.078) |        | 1.063(1.031,1.097) |        | 1.086(1.049,1.123) |        | 1.098(1.056,1.143) |        |
|                   | Young  | 0.993(0.934,1.056) |        | 1.031(0.990,1.074) |        | 1.067(1.035,1.100) |        | 1.096(1.060,1.134) |        | 1.115(1.071,1.160) |        |
|                   | Old    | 1.011(0.954,1.072) |        | 1.036(0.997,1.078) |        | 1.060(1.028,1.092) |        | 1.078(1.043,1.114) |        | 1.089(1.048,1.132) |        |
| O <sub>3</sub>    | Male   | 1.121(1.081,1.162) |        | 1.124(1.096,1.151) |        | 1.126(1.105,1.146) |        | 1.127(1.105,1.149) |        | 1.126(1.101,1.152) |        |
|                   | Female | 1.091(1.051,1.133) |        | 1.106(1.079,1.134) |        | 1.120(1.099,1.141) |        | 1.130(1.108,1.153) |        | 1.135(1.109,1.162) |        |
|                   | Young  | 1.111(1.070,1.154) |        | 1.112(1.084,1.141) |        | 1.113(1.092,1.134) |        | 1.113(1.091,1.135) |        | 1.113(1.088,1.139) |        |
|                   | Old    | 1.081(1.043,1.121) |        | 1.094(1.067,1.120) |        | 1.104(1.085,1.125) |        | 1.112(1.091,1.134) |        | 1.116(1.091,1.141) |        |

| pollutant         | group  | Lag5               |        | Lag6               |        | Lag7               |        | Lag8               |        | Lag9               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 0.978(0.931,1.027) |        | 0.987(0.947,1.029) |        | 1.002(0.966,1.039) |        | 1.021(0.971,1.074) |        | 1.042(0.964,1.127) |        |
|                   | Female | 0.980(0.932,1.030) |        | 0.984(0.943,1.026) |        | 0.992(0.956,1.029) |        | 1.004(0.954,1.056) |        | 1.017(0.939,1.101) |        |
|                   | Young  | 1.053(1.004,1.106) |        | 1.061(1.019,1.105) |        | 1.067(1.030,1.106) |        | 1.072(1.020,1.126) |        | 1.077(0.997,1.163) |        |
|                   | Old    | 0.947(0.901,0.995) |        | 0.950(0.911,0.990) |        | 0.961(0.926,0.997) |        | 0.978(0.930,1.029) |        | 0.999(0.923,1.081) |        |
| PM <sub>2.5</sub> | Male   | 1.006(0.958,1.055) |        | 1.011(0.969,1.054) |        | 1.019(0.982,1.057) |        | 1.029(0.983,1.077) |        | 1.040(0.973,1.112) |        |
|                   | Female | 1.009(0.961,1.059) |        | 1.006(0.964,1.050) |        | 1.005(0.968,1.044) |        | 1.006(0.961,1.054) |        | 1.008(0.942,1.078) |        |
|                   | Young  | 1.035(0.986,1.086) |        | 1.038(0.995,1.083) |        | 1.040(1.002,1.079) |        | 1.041(0.994,1.090) |        | 1.041(0.973,1.114) |        |
|                   | Old    | 0.978(0.932,1.026) |        | 0.979(0.938,1.021) |        | 0.985(0.949,1.023) |        | 0.995(0.951,1.041) |        | 1.006(0.942,1.075) |        |
| PM <sub>10</sub>  | Male   | 1.087(1.045,1.131) |        | 1.087(1.050,1.125) |        | 1.085(1.051,1.119) |        | 1.081(1.040,1.124) |        | 1.077(1.018,1.140) |        |
|                   | Female | 1.077(1.034,1.121) |        | 1.070(1.033,1.108) |        | 1.060(1.027,1.094) |        | 1.048(1.008,1.091) |        | 1.036(0.978,1.098) |        |
|                   | Young  | 1.108(1.064,1.154) |        | 1.102(1.064,1.142) |        | 1.090(1.056,1.125) |        | 1.074(1.031,1.117) |        | 1.055(0.995,1.119) |        |
|                   | Old    | 1.045(1.005,1.086) |        | 1.043(1.009,1.080) |        | 1.043(1.012,1.076) |        | 1.044(1.005,1.084) |        | 1.045(0.989,1.104) |        |
| SO <sub>2</sub>   | Male   | 1.204(1.130,1.284) |        | 1.189(1.127,1.254) |        | 1.157(1.105,1.211) |        | 1.114(1.046,1.186) |        | 1.067(0.966,1.179) |        |
|                   | Female | 1.207(1.131,1.288) |        | 1.179(1.117,1.245) |        | 1.132(1.080,1.186) |        | 1.073(1.006,1.144) |        | 1.011(0.913,1.119) |        |
|                   | Young  | 1.257(1.181,1.338) |        | 1.235(1.172,1.301) |        | 1.193(1.141,1.248) |        | 1.140(1.071,1.213) |        | 1.082(0.982,1.194) |        |
|                   | Old    | 1.138(1.065,1.215) |        | 1.118(1.058,1.181) |        | 1.080(1.030,1.133) |        | 1.032(0.966,1.101) |        | 0.980(0.884,1.086) |        |
| NO <sub>2</sub>   | Male   | 1.098(1.055,1.143) |        | 1.091(1.054,1.129) |        | 1.075(1.043,1.109) |        | 1.055(1.016,1.096) |        | 1.033(0.976,1.093) |        |
|                   | Female | 1.099(1.055,1.144) |        | 1.086(1.049,1.125) |        | 1.065(1.032,1.098) |        | 1.037(0.997,1.078) |        | 1.007(0.951,1.067) |        |
|                   | Young  | 1.118(1.074,1.164) |        | 1.106(1.068,1.146) |        | 1.083(1.050,1.118) |        | 1.053(1.013,1.095) |        | 1.021(1.964,1.081) |        |
|                   | Old    | 1.090(1.048,1.133) |        | 1.080(1.044,1.118) |        | 1.063(1.031,1.096) |        | 1.041(1.003,1.081) |        | 1.018(0.963,1.075) |        |
| O <sub>3</sub>    | Male   | 1.124(1.098,1.150) |        | 1.119(1.096,1.142) |        | 1.112(1.092,1.133) |        | 1.105(1.081,1.129) |        | 1.097(1.063,1.132) |        |
|                   | Female | 1.134(1.107,1.161) |        | 1.125(1.102,1.149) |        | 1.112(1.091,1.133) |        | 1.096(1.071,1.121) |        | 1.078(1.043,1.114) |        |
|                   | Young  | 1.114(1.088,1.140) |        | 1.113(1.091,1.137) |        | 1.113(1.093,1.134) |        | 1.113(1.088,1.138) |        | 1.112(1.076,1.149) |        |
|                   | Old    | 1.113(1.088,1.138) |        | 1.104(1.082,1.126) |        | 1.090(1.071,1.110) |        | 1.074(1.051,1.098) |        | 1.057(1.024,1.090) |        |

**Supplementary Table 22** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 2)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.996(0.978,1.014) |        | 0.993(0.965,1.022) |        | 0.992(0.960,1.025) |        | 0.992(0.958,1.027) |        | 0.993(0.957,1.031) |        | 0.996(0.958,1.035) |        | 0.999(0.963,1.037) |        | 1.004(0.968,1.041) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.985(0.958,1.014) |        | 0.989(0.957,1.023) |        | 0.997(0.963,1.033) |        | 1.006(0.968,1.045) |        | 1.010(0.972,1.051) |        | 1.008(0.971,1.047) |        | 0.999(0.962,1.036) |        |
|                         | Young  | 1.001(0.983,1.020) |        | 0.996(0.968,1.024) |        | 0.984(0.953,1.017) |        | 0.969(0.936,1.003) |        | 0.953(0.918,0.989) |        | 0.939(0.904,0.976) |        | 0.929(0.895,0.964) |        | 0.924(0.891,0.957) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.975(0.948,1.003) |        | 0.980(0.948,1.012) |        | 0.992(0.957,1.027) |        | 1.007(0.969,1.046) |        | 1.019(0.980,1.060) |        | 1.026(0.988,1.065) |        | 1.024(0.987,1.063) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.008) |        | 0.992(0.972,1.011) |        | 0.988(0.964,1.012) |        | 0.985(0.958,1.014) |        | 0.983(0.951,1.016) |        | 0.981(0.946,1.018) |        | 0.981(0.943,1.019) |        | 0.980(0.942,1.021) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.982(0.963,1.002) |        | 0.978(0.954,1.003) |        | 0.976(0.949,1.005) |        | 0.975(0.943,1.008) |        | 0.974(0.939,1.011) |        | 0.972(0.935,1.011) |        | 0.970(0.931,1.010) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.977,1.018) |        | 0.991(0.967,1.016) |        | 0.983(0.956,1.012) |        | 0.975(0.944,1.008) |        | 0.969(0.935,1.005) |        | 0.966(0.930,1.003) |        | 0.965(0.928,1.005) |        |
|                         | Old    | 0.989(0.978,1.002) |        | 0.985(0.966,1.004) |        | 0.984(0.961,1.009) |        | 0.988(0.960,1.016) |        | 0.992(0.960,1.026) |        | 0.996(0.960,1.034) |        | 0.998(0.960,1.038) |        | 0.998(0.957,1.040) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.962(0.937,0.988) |        | 0.938(0.908,0.969) |        | 0.912(0.877,0.948) |        | 0.887(0.848,0.928) |        | 0.866(0.823,0.911) |        | 0.848(0.804,0.896) |        | 0.836(0.790,0.885) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.960(0.935,0.986) |        | 0.941(0.910,0.973) |        | 0.922(0.886,0.959) |        | 0.903(0.862,0.946) |        | 0.885(0.840,0.932) |        | 0.866(0.819,0.915) |        | 0.847(0.799,0.898) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.976(0.949,1.003) |        | 0.950(0.919,0.983) |        | 0.921(0.885,0.958) |        | 0.891(0.850,0.933) |        | 0.865(0.821,0.911) |        | 0.845(0.800,0.893) |        | 0.833(0.787,0.882) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.961(0.937,0.986) |        | 0.947(0.917,0.977) |        | 0.934(0.900,0.971) |        | 0.923(0.883,0.965) |        | 0.911(0.867,0.958) |        | 0.898(0.852,0.948) |        | 0.884(0.836,0.935) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.995(0.971,1.019) |        | 0.976(0.949,1.004) |        | 0.950(0.922,0.979) |        | 0.921(0.893,0.951) |        | 0.894(0.866,0.923) |        | 0.871(0.845,0.898) |        | 0.853(0.827,0.879) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.967,1.015) |        | 0.974(0.947,1.002) |        | 0.952(0.924,0.981) |        | 0.927(0.898,0.957) |        | 0.902(0.873,0.932) |        | 0.879(0.852,0.907) |        | 0.858(0.832,0.885) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.984(0.961,1.008) |        | 0.959(0.933,0.985) |        | 0.926(0.900,0.953) |        | 0.892(0.865,0.920) |        | 0.860(0.834,0.888) |        | 0.834(0.810,0.859) |        | 0.814(0.790,0.838) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.010(0.985,1.035) |        | 1.004(0.975,1.033) |        | 0.992(0.962,1.023) |        | 0.976(0.944,1.008) |        | 0.958(0.927,0.991) |        | 0.941(0.911,0.972) |        | 0.923(0.894,0.953) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.996(0.971,1.022) |        | 0.979(0.939,1.020) |        | 0.951(0.904,1.000) |        | 0.916(0.864,0.971) |        | 0.878(0.821,0.938) |        | 0.841(0.782,0.905) |        | 0.809(0.748,0.874) |        | 0.780(0.720,0.846) |        |
|                         | Female | 0.994(0.968,1.020) |        | 0.978(0.937,1.020) |        | 0.954(0.906,1.004) |        | 0.924(0.871,0.980) |        | 0.891(0.833,0.953) |        | 0.858(0.796,0.924) |        | 0.825(0.763,0.892) |        | 0.794(0.732,0.862) |        |
|                         | Young  | 1.002(0.976,1.029) |        | 0.987(0.946,1.029) |        | 0.957(0.909,1.007) |        | 0.917(0.865,0.973) |        | 0.874(0.817,0.935) |        | 0.832(0.773,0.896) |        | 0.795(0.736,0.859) |        | 0.763(0.704,0.827) |        |
|                         | Old    | 0.991(0.967,1.016) |        | 0.975(0.936,1.015) |        | 0.951(0.905,0.999) |        | 0.923(0.871,0.977) |        | 0.892(0.835,0.953) |        | 0.861(0.801,0.926) |        | 0.831(0.770,0.898) |        | 0.803(0.741,0.871) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.138(1.096,1.182) |        | 1.301(1.225,1.381) |        | 1.489(1.385,1.601) |        | 1.703(1.569,1.848) |        | 1.936(1.765,2.123) |        | 2.179(1.969,2.411) |        | 2.419(2.175,2.691) |        | 2.646(2.367,2.958) |        |
|                         | Female | 1.103(1.061,1.146) |        | 1.241(1.167,1.320) |        | 1.420(1.319,1.530) |        | 1.639(1.507,1.783) |        | 1.886(1.716,2.073) |        | 2.138(1.928,2.372) |        | 2.370(2.126,2.643) |        | 2.559(2.283,2.867) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.282(1.204,1.364) |        | 1.458(1.353,1.571) |        | 1.658(1.525,1.802) |        | 1.874(1.707,2.059) |        | 2.097(1.893,2.323) |        | 2.314(2.079,2.576) |        | 2.514(2.247,2.812) |        |
|                         | Old    | 1.091(1.051,1.132) |        | 1.207(1.138,1.280) |        | 1.352(1.258,1.452) |        | 1.523(1.403,1.652) |        | 1.711(1.560,1.876) |        | 1.900(1.716,2.103) |        | 2.074(1.863,2.309) |        | 2.219(1.982,2.483) |        |

**Supplementary Table 23** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 2)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.996(0.978,1.014) |        | 0.997(0.987,1.008) |        | 0.999(0.990,1.007) |        | 1.000(0.989,1.011) |        | 1.001(0.990,1.012) |        | 1.003(0.993,1.012) |        | 1.004(0.993,1.014) |        | 1.005(0.988,1.022) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.997(0.986,1.008) |        | 1.004(0.995,1.013) |        | 1.008(0.997,1.019) |        | 1.008(0.997,1.020) |        | 1.005(0.995,1.014) |        | 0.998(0.988,1.008) |        | 0.990(0.974,1.007) |        |
|                         | Young  | 1.001(0.983,1.020) |        | 0.994(0.984,1.005) |        | 0.988(0.980,0.997) |        | 0.984(0.974,0.995) |        | 0.983(0.973,0.994) |        | 0.985(0.977,0.994) |        | 0.989(0.979,0.999) |        | 0.994(0.978,1.011) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.994(0.983,1.004) |        | 1.005(0.996,1.014) |        | 1.012(1.002,1.023) |        | 1.015(1.004,1.026) |        | 1.012(1.003,1.022) |        | 1.006(0.996,1.017) |        | 0.999(0.982,1.015) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.008) |        | 0.996(0.988,1.004) |        | 0.997(0.989,1.004) |        | 0.997(0.988,1.006) |        | 0.998(0.989,1.007) |        | 0.998(0.991,1.006) |        | 0.999(0.991,1.007) |        | 1.000(0.989,1.011) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.993(0.985,1.001) |        | 0.996(0.988,1.003) |        | 0.998(0.989,1.007) |        | 0.999(0.990,1.008) |        | 0.999(0.991,1.007) |        | 0.998(0.990,1.006) |        | 0.997(0.986,1.009) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.989,1.005) |        | 0.994(0.987,1.001) |        | 0.992(0.983,1.001) |        | 0.992(0.983,1.001) |        | 0.994(0.986,1.001) |        | 0.996(0.989,1.004) |        | 1.000(0.988,1.011) |        |
|                         | Old    | 0.989(0.978,1.002) |        | 0.995(0.987,1.003) |        | 1.000(0.992,1.007) |        | 1.003(0.995,1.012) |        | 1.005(0.996,1.014) |        | 1.004(0.996,1.012) |        | 1.002(0.994,1.010) |        | 0.999(0.988,1.010) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.979(0.968,0.989) |        | 0.975(0.965,0.985) |        | 0.972(0.961,0.984) |        | 0.973(0.961,0.985) |        | 0.976(0.966,0.986) |        | 0.980(0.970,0.991) |        | 0.986(0.970,1.002) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.980(0.969,0.991) |        | 0.980(0.970,0.990) |        | 0.980(0.968,0.992) |        | 0.980(0.968,0.992) |        | 0.979(0.969,0.990) |        | 0.979(0.968,0.990) |        | 0.978(0.962,0.994) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.983(0.972,0.994) |        | 0.974(0.964,0.984) |        | 0.969(0.957,0.981) |        | 0.968(0.956,0.980) |        | 0.971(0.961,0.981) |        | 0.977(0.967,0.989) |        | 0.986(0.969,1.002) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.982(0.972,0.992) |        | 0.985(0.975,0.995) |        | 0.987(0.975,0.999) |        | 0.988(0.976,1.000) |        | 0.987(0.977,0.997) |        | 0.986(0.975,0.996) |        | 0.984(0.969,1.000) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.992(0.983,1.001) |        | 0.981(0.974,0.988) |        | 0.973(0.965,0.982) |        | 0.970(0.961,0.979) |        | 0.971(0.963,0.978) |        | 0.974(0.965,0.983) |        | 0.979(0.965,0.993) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.982,1.000) |        | 0.983(0.976,0.990) |        | 0.977(0.968,0.986) |        | 0.974(0.965,0.983) |        | 0.973(0.966,0.981) |        | 0.974(0.966,0.983) |        | 0.976(0.962,0.991) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.986(0.977,0.994) |        | 0.974(0.967,0.981) |        | 0.966(0.958,0.975) |        | 0.963(0.954,0.972) |        | 0.965(0.957,0.972) |        | 0.969(0.961,0.978) |        | 0.976(0.962,0.990) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.001(0.992,1.011) |        | 0.994(0.986,1.001) |        | 0.988(0.979,0.997) |        | 0.984(0.975,0.993) |        | 0.982(0.974,0.990) |        | 0.981(0.973,0.990) |        | 0.981(0.967,0.996) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.996(0.971,1.022) |        | 0.983(0.967,0.999) |        | 0.971(0.957,0.986) |        | 0.963(0.946,0.980) |        | 0.959(0.941,0.976) |        | 0.958(0.943,0.974) |        | 0.961(0.945,0.977) |        | 0.965(0.942,0.989) |        |
|                         | Female | 0.994(0.968,1.020) |        | 0.984(0.968,1.001) |        | 0.976(0.961,0.991) |        | 0.969(0.951,0.986) |        | 0.964(0.947,0.982) |        | 0.962(0.947,0.978) |        | 0.962(0.946,0.978) |        | 0.963(0.939,0.987) |        |
|                         | Young  | 1.002(0.976,1.029) |        | 0.985(0.968,1.002) |        | 0.970(0.955,0.985) |        | 0.959(0.941,0.976) |        | 0.953(0.935,0.971) |        | 0.952(0.937,0.967) |        | 0.955(0.939,0.971) |        | 0.960(0.937,0.984) |        |
|                         | Old    | 0.991(0.967,1.016) |        | 0.983(0.967,0.999) |        | 0.976(0.962,0.991) |        | 0.970(0.953,0.987) |        | 0.967(0.950,0.984) |        | 0.965(0.950,0.980) |        | 0.965(0.950,0.981) |        | 0.966(0.944,0.989) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.138(1.096,1.182) |        | 1.143(1.116,1.170) |        | 1.145(1.122,1.169) |        | 1.144(1.116,1.172) |        | 1.137(1.109,1.166) |        | 1.125(1.101,1.150) |        | 1.110(1.086,1.135) |        | 1.094(1.059,1.130) |        |
|                         | Female | 1.103(1.061,1.146) |        | 1.126(1.098,1.153) |        | 1.144(1.120,1.169) |        | 1.154(1.126,1.183) |        | 1.151(1.121,1.181) |        | 1.134(1.109,1.159) |        | 1.108(1.083,1.134) |        | 1.079(1.044,1.117) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.135(1.107,1.163) |        | 1.138(1.114,1.162) |        | 1.137(1.109,1.166) |        | 1.131(1.102,1.160) |        | 1.119(1.094,1.144) |        | 1.103(1.078,1.129) |        | 1.086(1.050,1.124) |        |
|                         | Old    | 1.091(1.051,1.132) |        | 1.107(1.081,1.133) |        | 1.120(1.097,1.143) |        | 1.127(1.100,1.154) |        | 1.123(1.096,1.152) |        | 1.111(1.087,1.135) |        | 1.092(1.068,1.116) |        | 1.070(1.036,1.105) |        |

**Supplementary Table 24** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 2)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.020(0.936,1.110) |        | 1.033(0.905,1.178) |        | 1.039(0.892,1.210) |        | 1.039(0.882,1.224) |        | 1.033(0.867,1.230) |        | 1.021(0.852,1.222) |        | 1.003(0.843,1.194) |        | 0.981(0.827,1.164) |        |
|                         | Female | 1.055(0.968,1.150) |        | 1.071(0.936,1.224) |        | 1.052(0.901,1.228) |        | 1.012(0.858,1.195) |        | 0.974(0.816,1.162) |        | 0.953(0.794,1.144) |        | 0.962(0.806,1.148) |        | 1.007(0.846,1.197) |        |
|                         | Young  | 0.993(0.913,1.081) |        | 1.020(0.894,1.163) |        | 1.077(0.925,1.253) |        | 1.158(0.985,1.362) |        | 1.252(1.054,1.488) |        | 1.341(1.123,1.603) |        | 1.410(1.188,1.675) |        | 1.449(1.225,1.715) |        |
|                         | Old    | 1.093(1.004,1.190) |        | 1.126(0.987,1.285) |        | 1.101(0.945,1.283) |        | 1.039(0.881,1.225) |        | 0.969(0.812,1.156) |        | 0.915(0.762,1.098) |        | 0.888(0.744,1.060) |        | 0.894(0.751,1.064) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.027(0.955,1.104) |        | 1.051(0.936,1.180) |        | 1.073(0.930,1.237) |        | 1.091(0.924,1.288) |        | 1.106(0.913,1.339) |        | 1.116(0.902,1.381) |        | 1.122(0.895,1.406) |        | 1.123(0.886,1.422) |        |
|                         | Female | 1.063(0.988,1.144) |        | 1.109(0.986,1.247) |        | 1.137(0.984,1.314) |        | 1.152(0.974,1.362) |        | 1.159(0.955,1.406) |        | 1.166(0.940,1.446) |        | 1.178(0.937,1.480) |        | 1.197(0.942,1.520) |        |
|                         | Young  | 0.998(0.926,1.074) |        | 1.016(0.903,1.144) |        | 1.054(0.912,1.218) |        | 1.105(0.935,1.305) |        | 1.158(0.957,1.402) |        | 1.202(0.973,1.485) |        | 1.228(0.982,1.534) |        | 1.229(0.973,1.551) |        |
|                         | Old    | 1.064(0.991,1.142) |        | 1.096(0.977,1.228) |        | 1.096(0.952,1.263) |        | 1.075(0.910,1.270) |        | 1.046(0.862,1.269) |        | 1.021(0.823,1.268) |        | 1.010(0.802,1.271) |        | 1.014(0.797,1.292) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.126) |        | 1.148(1.045,1.261) |        | 1.259(1.120,1.414) |        | 1.391(1.211,1.598) |        | 1.536(1.305,1.807) |        | 1.678(1.399,2.014) |        | 1.803(1.485,2.189) |        | 1.899(1.549,2.329) |        |
|                         | Female | 1.076(1.014,1.142) |        | 1.158(1.052,1.274) |        | 1.245(1.104,1.402) |        | 1.338(1.161,1.542) |        | 1.439(1.219,1.700) |        | 1.551(1.287,1.869) |        | 1.676(1.375,2.043) |        | 1.815(1.474,2.236) |        |
|                         | Young  | 1.026(0.965,1.091) |        | 1.092(0.989,1.205) |        | 1.200(1.062,1.355) |        | 1.346(1.166,1.553) |        | 1.515(1.283,1.789) |        | 1.684(1.399,2.026) |        | 1.827(1.502,2.222) |        | 1.924(1.566,2.364) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.152(1.052,1.261) |        | 1.216(1.086,1.363) |        | 1.275(1.113,1.461) |        | 1.333(1.136,1.564) |        | 1.396(1.166,1.671) |        | 1.469(1.213,1.780) |        | 1.556(1.271,1.904) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.974(0.871,1.089) |        | 1.036(0.871,1.231) |        | 1.189(0.974,1.453) |        | 1.445(1.168,1.788) |        | 1.802(1.438,2.257) |        | 2.235(1.775,2.814) |        | 2.701(2.165,3.371) |        | 3.149(2.529,3.922) |        |
|                         | Female | 1.001(0.894,1.121) |        | 1.068(0.896,1.273) |        | 1.207(0.986,1.479) |        | 1.426(1.149,1.770) |        | 1.726(1.373,2.170) |        | 2.099(1.662,2.652) |        | 2.531(2.022,3.168) |        | 3.005(2.407,3.752) |        |
|                         | Young  | 1.009(0.906,1.125) |        | 1.121(0.947,1.327) |        | 1.354(1.115,1.644) |        | 1.735(1.411,2.134) |        | 2.277(1.830,2.835) |        | 2.953(2.361,3.695) |        | 3.693(2.979,4.578) |        | 4.401(3.559,5.443) |        |
|                         | Old    | 0.938(0.836,1.053) |        | 0.932(0.779,1.114) |        | 0.974(0.792,1.199) |        | 1.063(0.851,1.327) |        | 1.193(0.943,1.509) |        | 1.358(1.067,1.728) |        | 1.554(1.231,1.962) |        | 1.779(1.411,2.243) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.009(0.950,1.072) |        | 1.051(0.954,1.157) |        | 1.124(0.999,1.265) |        | 1.228(1.072,1.407) |        | 1.356(1.161,1.584) |        | 1.497(1.261,1.777) |        | 1.642(1.371,1.967) |        | 1.783(1.477,2.153) |        |
|                         | Female | 1.015(0.955,1.080) |        | 1.054(0.956,1.163) |        | 1.117(0.991,1.258) |        | 1.202(1.048,1.380) |        | 1.308(1.118,1.531) |        | 1.431(1.203,1.702) |        | 1.565(1.304,1.879) |        | 1.711(1.414,2.070) |        |
|                         | Young  | 0.996(0.936,1.059) |        | 1.032(0.935,1.139) |        | 1.109(0.984,1.250) |        | 1.224(1.066,1.404) |        | 1.370(1.171,1.602) |        | 1.536(1.292,1.825) |        | 1.709(1.426,2.048) |        | 1.880(1.557,2.270) |        |
|                         | Old    | 1.021(0.963,1.083) |        | 1.062(0.967,1.167) |        | 1.124(1.002,1.262) |        | 1.206(1.055,1.379) |        | 1.306(1.120,1.522) |        | 1.418(1.196,1.680) |        | 1.539(1.286,1.841) |        | 1.667(1.382,2.010) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.818(0.772,0.867) |        | 0.666(0.607,0.731) |        | 0.540(0.483,0.604) |        | 0.439(0.387,0.498) |        | 0.360(0.312,0.415) |        | 0.300(0.256,0.351) |        | 0.255(0.216,0.301) |        | 0.222(0.187,0.264) |        |
|                         | Female | 0.860(0.810,0.913) |        | 0.716(0.651,0.788) |        | 0.581(0.518,0.652) |        | 0.466(0.409,0.530) |        | 0.375(0.324,0.434) |        | 0.309(0.263,0.362) |        | 0.263(0.222,0.312) |        | 0.234(0.196,0.279) |        |
|                         | Young  | 0.828(0.780,0.880) |        | 0.681(0.619,0.750) |        | 0.558(0.497,0.626) |        | 0.458(0.402,0.521) |        | 0.378(0.327,0.438) |        | 0.318(0.272,0.373) |        | 0.273(0.231,0.323) |        | 0.240(0.202,0.286) |        |
|                         | Old    | 0.875(0.826,0.926) |        | 0.748(0.683,0.819) |        | 0.628(0.562,0.701) |        | 0.522(0.460,0.592) |        | 0.436(0.378,0.503) |        | 0.371(0.317,0.434) |        | 0.324(0.274,0.382) |        | 0.292(0.245,0.347) |        |

**Supplementary Table 25** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 2)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.020(0.936,1.110) |        | 1.013(0.963,1.065) |        | 1.006(0.966,1.048) |        | 1.000(0.951,1.051) |        | 0.994(0.944,1.046) |        | 0.988(0.947,1.031) |        | 0.983(0.937,1.031) |        | 0.978(0.905,1.057) |        |
|                         | Female | 1.055(0.968,1.150) |        | 1.015(0.964,1.068) |        | 0.982(0.943,1.023) |        | 0.963(0.915,1.013) |        | 0.962(0.913,1.013) |        | 0.979(0.937,1.022) |        | 1.009(0.961,1.059) |        | 1.047(0.968,1.132) |        |
|                         | Young  | 0.993(0.913,1.081) |        | 1.027(0.977,1.079) |        | 1.056(1.014,1.099) |        | 1.076(1.024,1.130) |        | 1.081(1.028,1.137) |        | 1.071(1.027,1.117) |        | 1.052(1.003,1.102) |        | 1.028(0.952,1.110) |        |
|                         | Old    | 1.093(1.004,1.190) |        | 1.030(0.979,1.083) |        | 0.978(0.939,1.019) |        | 0.944(0.897,0.993) |        | 0.933(0.886,0.982) |        | 0.944(0.904,0.985) |        | 0.971(0.925,1.019) |        | 1.006(0.931,1.088) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.027(0.955,1.104) |        | 1.024(0.977,1.073) |        | 1.021(0.977,1.066) |        | 1.017(0.967,1.070) |        | 1.013(0.962,1.067) |        | 1.009(0.965,1.056) |        | 1.005(0.960,1.052) |        | 1.001(0.936,1.069) |        |
|                         | Female | 1.063(0.988,1.144) |        | 1.043(0.994,1.094) |        | 1.026(0.982,1.071) |        | 1.013(0.962,1.066) |        | 1.006(0.955,1.060) |        | 1.006(0.961,1.053) |        | 1.010(0.964,1.058) |        | 1.016(0.950,1.087) |        |
|                         | Young  | 0.998(0.926,1.074) |        | 1.019(0.971,1.069) |        | 1.037(0.993,1.082) |        | 1.048(0.996,1.103) |        | 1.048(0.995,1.105) |        | 1.038(0.992,1.086) |        | 1.021(0.975,1.070) |        | 1.001(0.935,1.071) |        |
|                         | Old    | 1.064(0.991,1.142) |        | 1.030(0.982,1.079) |        | 1.001(0.958,1.045) |        | 0.981(0.932,1.032) |        | 0.973(0.923,1.025) |        | 0.977(0.933,1.022) |        | 0.989(0.944,1.035) |        | 1.005(0.941,1.073) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.126) |        | 1.081(1.040,1.124) |        | 1.096(1.057,1.138) |        | 1.105(1.058,1.155) |        | 1.104(1.057,1.153) |        | 1.093(1.053,1.134) |        | 1.074(1.033,1.117) |        | 1.053(0.994,1.117) |        |
|                         | Female | 1.076(1.014,1.142) |        | 1.076(1.034,1.119) |        | 1.075(1.035,1.116) |        | 1.075(1.028,1.124) |        | 1.076(1.029,1.125) |        | 1.078(1.038,1.120) |        | 1.080(1.038,1.124) |        | 1.083(1.020,1.150) |        |
|                         | Young  | 1.026(0.965,1.091) |        | 1.065(1.022,1.108) |        | 1.099(1.058,1.141) |        | 1.121(1.073,1.173) |        | 1.126(1.077,1.177) |        | 1.111(1.070,1.155) |        | 1.085(1.042,1.130) |        | 1.053(0.992,1.119) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.067(1.027,1.108) |        | 1.056(1.018,1.095) |        | 1.048(1.004,1.094) |        | 1.045(1.001,1.091) |        | 1.047(1.010,1.086) |        | 1.052(1.013,1.094) |        | 1.059(1.000,1.121) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.974(0.871,1.089) |        | 1.063(0.996,1.135) |        | 1.148(1.090,1.210) |        | 1.215(1.140,1.295) |        | 1.247(1.168,1.331) |        | 1.240(1.174,1.311) |        | 1.209(1.134,1.288) |        | 1.166(1.052,1.293) |        |
|                         | Female | 1.001(0.894,1.121) |        | 1.067(0.998,1.141) |        | 1.130(1.072,1.192) |        | 1.181(1.107,1.260) |        | 1.210(1.133,1.293) |        | 1.216(1.150,1.286) |        | 1.206(1.130,1.286) |        | 1.187(1.069,1.318) |        |
|                         | Young  | 1.009(0.906,1.125) |        | 1.111(1.042,1.184) |        | 1.208(1.148,1.271) |        | 1.282(1.204,1.364) |        | 1.312(1.231,1.399) |        | 1.297(1.229,1.369) |        | 1.251(1.175,1.331) |        | 1.192(1.077,1.319) |        |
|                         | Old    | 0.938(0.836,1.053) |        | 0.993(0.927,1.063) |        | 1.046(0.991,1.104) |        | 1.091(1.022,1.165) |        | 1.122(1.049,1.200) |        | 1.139(1.075,1.206) |        | 1.144(1.072,1.222) |        | 1.145(1.030,1.273) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.009(0.950,1.072) |        | 1.041(1.001,1.082) |        | 1.070(1.033,1.108) |        | 1.092(1.048,1.139) |        | 1.104(1.058,1.152) |        | 1.104(1.064,1.145) |        | 1.097(1.055,1.140) |        | 1.086(1.026,1.149) |        |
|                         | Female | 1.015(0.955,1.080) |        | 1.038(0.998,1.080) |        | 1.059(1.022,1.098) |        | 1.077(1.032,1.123) |        | 1.088(1.042,1.136) |        | 1.093(1.053,1.135) |        | 1.094(1.052,1.138) |        | 1.093(1.032,1.158) |        |
|                         | Young  | 0.996(0.936,1.059) |        | 1.036(0.996,1.078) |        | 1.074(1.037,1.113) |        | 1.104(1.058,1.151) |        | 1.119(1.072,1.169) |        | 1.121(1.080,1.163) |        | 1.113(1.070,1.157) |        | 1.100(1.038,1.165) |        |
|                         | Old    | 1.021(0.963,1.083) |        | 1.040(1.001,1.081) |        | 1.058(1.022,1.096) |        | 1.073(1.030,1.118) |        | 1.082(1.038,1.128) |        | 1.086(1.047,1.126) |        | 1.085(1.045,1.127) |        | 1.083(1.025,1.145) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.818(0.772,0.867) |        | 0.814(0.784,0.844) |        | 0.811(0.786,0.837) |        | 0.813(0.783,0.844) |        | 0.820(0.789,0.852) |        | 0.833(0.806,0.861) |        | 0.851(0.822,0.880) |        | 0.871(0.828,0.916) |        |
|                         | Female | 0.860(0.810,0.913) |        | 0.833(0.802,0.865) |        | 0.812(0.786,0.839) |        | 0.801(0.771,0.833) |        | 0.805(0.774,0.838) |        | 0.823(0.796,0.852) |        | 0.853(0.823,0.884) |        | 0.888(0.843,0.936) |        |
|                         | Young  | 0.828(0.780,0.880) |        | 0.823(0.792,0.854) |        | 0.819(0.793,0.846) |        | 0.820(0.789,0.852) |        | 0.827(0.795,0.860) |        | 0.841(0.812,0.870) |        | 0.859(0.829,0.890) |        | 0.880(0.835,0.927) |        |
|                         | Old    | 0.875(0.826,0.926) |        | 0.855(0.824,0.887) |        | 0.839(0.813,0.866) |        | 0.832(0.801,0.863) |        | 0.835(0.804,0.868) |        | 0.850(0.822,0.879) |        | 0.873(0.844,0.904) |        | 0.901(0.857,0.947) |        |

**Supplementary Table 26** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 4)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.014) |        | 0.992(0.965,1.021) |        | 0.991(0.959,1.024) |        | 0.991(0.957,1.027) |        | 0.993(0.957,1.031) |        | 0.996(0.958,1.035) |        | 1.000(0.963,1.038) |        | 1.005(0.969,1.042) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.986(0.958,1.014) |        | 0.989(0.957,1.023) |        | 0.998(0.963,1.034) |        | 1.006(0.968,1.045) |        | 1.011(0.972,1.051) |        | 1.009(0.971,1.048) |        | 0.999(0.962,1.037) |        |
|                         | Young  | 1.001(0.983,1.020) |        | 0.996(0.968,1.024) |        | 0.984(0.953,1.017) |        | 0.969(0.936,1.003) |        | 0.953(0.918,0.989) |        | 0.939(0.904,0.976) |        | 0.929(0.895,0.964) |        | 0.923(0.891,0.957) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.974(0.947,1.002) |        | 0.979(0.947,1.012) |        | 0.991(0.957,1.027) |        | 1.007(0.969,1.045) |        | 1.020(0.980,1.060) |        | 1.026(0.988,1.066) |        | 1.025(0.988,1.064) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.991(0.971,1.011) |        | 0.987(0.964,1.012) |        | 0.985(0.957,1.013) |        | 0.982(0.951,1.015) |        | 0.981(0.946,1.017) |        | 0.980(0.943,1.019) |        | 0.980(0.941,1.021) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.982(0.963,1.002) |        | 0.978(0.954,1.003) |        | 0.976(0.948,1.004) |        | 0.975(0.943,1.008) |        | 0.974(0.939,1.011) |        | 0.972(0.935,1.011) |        | 0.970(0.931,1.010) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.977,1.018) |        | 0.991(0.967,1.016) |        | 0.983(0.956,1.012) |        | 0.975(0.944,1.008) |        | 0.969(0.935,1.005) |        | 0.966(0.929,1.003) |        | 0.965(0.928,1.005) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.984(0.965,1.003) |        | 0.984(0.960,1.008) |        | 0.987(0.959,1.015) |        | 0.992(0.960,1.025) |        | 0.996(0.960,1.033) |        | 0.998(0.960,1.038) |        | 0.997(0.957,1.039) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.962(0.938,0.988) |        | 0.938(0.908,0.969) |        | 0.912(0.878,0.948) |        | 0.887(0.848,0.929) |        | 0.866(0.823,0.911) |        | 0.848(0.804,0.896) |        | 0.836(0.790,0.885) |        |
|                         | Female | 0.980(0.963,0.996) |        | 0.960(0.935,0.986) |        | 0.941(0.910,0.973) |        | 0.922(0.886,0.959) |        | 0.903(0.862,0.946) |        | 0.885(0.840,0.932) |        | 0.866(0.819,0.915) |        | 0.847(0.799,0.897) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.976(0.949,1.003) |        | 0.950(0.919,0.983) |        | 0.921(0.885,0.958) |        | 0.891(0.850,0.933) |        | 0.865(0.821,0.911) |        | 0.845(0.800,0.893) |        | 0.833(0.787,0.882) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.961(0.937,0.986) |        | 0.947(0.917,0.977) |        | 0.935(0.900,0.971) |        | 0.923(0.883,0.965) |        | 0.911(0.867,0.958) |        | 0.898(0.852,0.948) |        | 0.884(0.835,0.935) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.995(0.972,1.019) |        | 0.976(0.950,1.004) |        | 0.950(0.923,0.979) |        | 0.922(0.893,0.951) |        | 0.895(0.866,0.924) |        | 0.871(0.845,0.899) |        | 0.853(0.827,0.879) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.967,1.016) |        | 0.974(0.947,1.002) |        | 0.952(0.924,0.981) |        | 0.927(0.898,0.957) |        | 0.902(0.873,0.932) |        | 0.879(0.852,0.907) |        | 0.858(0.832,0.885) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.984(0.961,1.008) |        | 0.959(0.933,0.985) |        | 0.926(0.900,0.953) |        | 0.892(0.865,0.919) |        | 0.860(0.834,0.887) |        | 0.834(0.809,0.859) |        | 0.814(0.790,0.838) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.010(0.985,1.035) |        | 1.004(0.975,1.033) |        | 0.992(0.962,1.023) |        | 0.976(0.945,1.009) |        | 0.959(0.927,0.991) |        | 0.941(0.911,0.972) |        | 0.923(0.894,0.954) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        | 0.991(0.966,1.016) |        |
|                         | Female | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        | 0.974(0.935,1.014) |        |
|                         | Young  | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        | 0.951(0.905,0.999) |        |
|                         | Old    | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        | 0.923(0.871,0.977) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.140(1.098,1.184) |        | 1.303(1.227,1.384) |        | 1.493(1.388,1.605) |        | 1.707(1.573,1.853) |        | 1.941(1.770,2.128) |        | 2.183(1.973,2.416) |        | 2.424(2.179,2.696) |        | 2.651(2.371,2.963) |        |
|                         | Female | 1.104(1.062,1.147) |        | 1.243(1.169,1.322) |        | 1.422(1.320,1.532) |        | 1.641(1.509,1.785) |        | 1.888(1.718,2.075) |        | 2.140(1.929,2.374) |        | 2.372(2.127,2.645) |        | 2.561(2.285,2.870) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.282(1.205,1.364) |        | 1.459(1.354,1.571) |        | 1.658(1.525,1.803) |        | 1.875(1.707,2.060) |        | 2.098(1.894,2.324) |        | 2.315(2.079,2.577) |        | 2.515(2.248,2.813) |        |
|                         | Old    | 1.092(1.052,1.133) |        | 1.210(1.140,1.283) |        | 1.355(1.262,1.456) |        | 1.527(1.407,1.657) |        | 1.715(1.564,1.881) |        | 1.905(1.720,2.109) |        | 2.079(1.867,2.315) |        | 2.224(1.987,2.490) |        |

**Supplementary Table 27** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 4)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.014) |        | 0.997(0.986,1.008) |        | 0.999(0.990,1.007) |        | 1.000(0.990,1.011) |        | 1.002(0.991,1.013) |        | 1.003(0.994,1.012) |        | 1.004(0.994,1.014) |        | 1.005(0.988,1.022) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.997(0.986,1.008) |        | 1.004(0.995,1.013) |        | 1.008(0.997,1.019) |        | 1.008(0.997,1.020) |        | 1.005(0.995,1.014) |        | 0.998(0.988,1.008) |        | 0.990(0.974,1.007) |        |
|                         | Young  | 1.001(0.983,1.020) |        | 0.994(0.984,1.005) |        | 0.988(0.980,0.997) |        | 0.984(0.974,0.995) |        | 0.983(0.973,0.994) |        | 0.985(0.976,0.994) |        | 0.989(0.979,0.999) |        | 0.994(0.978,1.011) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.994(0.983,1.004) |        | 1.005(0.996,1.014) |        | 1.013(1.002,1.024) |        | 1.015(1.004,1.027) |        | 1.013(1.004,1.022) |        | 1.007(0.996,1.017) |        | 0.999(0.982,1.016) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.996(0.988,1.004) |        | 0.996(0.989,1.004) |        | 0.997(0.989,1.006) |        | 0.998(0.989,1.007) |        | 0.999(0.991,1.006) |        | 0.999(0.991,1.007) |        | 1.000(0.989,1.011) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.993(0.985,1.001) |        | 0.996(0.988,1.003) |        | 0.998(0.989,1.007) |        | 0.999(0.990,1.008) |        | 0.999(0.991,1.007) |        | 0.998(0.990,1.006) |        | 0.997(0.986,1.009) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.989,1.005) |        | 0.994(0.987,1.001) |        | 0.992(0.983,1.001) |        | 0.992(0.983,1.001) |        | 0.994(0.986,1.001) |        | 0.996(0.989,1.004) |        | 1.000(0.988,1.011) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.995(0.987,1.003) |        | 1.000(0.992,1.007) |        | 1.003(0.995,1.012) |        | 1.005(0.996,1.014) |        | 1.004(0.996,1.012) |        | 1.002(0.994,1.010) |        | 0.999(0.988,1.010) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.979(0.968,0.989) |        | 0.975(0.965,0.985) |        | 0.973(0.961,0.984) |        | 0.973(0.961,0.985) |        | 0.976(0.966,0.986) |        | 0.980(0.969,0.991) |        | 0.985(0.970,1.002) |        |
|                         | Female | 0.980(0.963,0.996) |        | 0.980(0.969,0.991) |        | 0.980(0.970,0.990) |        | 0.980(0.968,0.992) |        | 0.980(0.968,0.992) |        | 0.979(0.969,0.990) |        | 0.979(0.968,0.990) |        | 0.978(0.962,0.994) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.983(0.972,0.994) |        | 0.974(0.964,0.984) |        | 0.969(0.957,0.981) |        | 0.968(0.956,0.980) |        | 0.971(0.961,0.981) |        | 0.977(0.967,0.989) |        | 0.986(0.969,1.002) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.982(0.972,0.993) |        | 0.985(0.975,0.995) |        | 0.987(0.975,0.999) |        | 0.988(0.976,1.000) |        | 0.987(0.977,0.997) |        | 0.986(0.975,0.996) |        | 0.984(0.968,1.000) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.992(0.983,1.001) |        | 0.981(0.974,0.988) |        | 0.973(0.965,0.982) |        | 0.970(0.961,0.979) |        | 0.971(0.963,0.978) |        | 0.974(0.965,0.983) |        | 0.979(0.965,0.993) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.982,1.000) |        | 0.983(0.976,0.990) |        | 0.977(0.968,0.986) |        | 0.974(0.965,0.983) |        | 0.973(0.966,0.981) |        | 0.974(0.966,0.983) |        | 0.976(0.962,0.991) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.986(0.977,0.994) |        | 0.974(0.967,0.981) |        | 0.966(0.958,0.975) |        | 0.963(0.954,0.972) |        | 0.965(0.957,0.972) |        | 0.969(0.961,0.978) |        | 0.976(0.962,0.990) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.001(0.992,1.011) |        | 0.994(0.986,1.001) |        | 0.988(0.979,0.997) |        | 0.984(0.975,0.993) |        | 0.982(0.974,0.990) |        | 0.981(0.973,0.990) |        | 0.981(0.967,0.996) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.995(0.970,1.022) |        | 0.983(0.966,0.999) |        | 0.972(0.957,0.986) |        | 0.963(0.946,0.981) |        | 0.959(0.942,0.977) |        | 0.959(0.944,0.974) |        | 0.962(0.946,0.978) |        | 0.966(0.942,0.989) |        |
|                         | Female | 0.994(0.968,1.020) |        | 0.984(0.968,1.001) |        | 0.976(0.961,0.991) |        | 0.969(0.951,0.986) |        | 0.964(0.947,0.982) |        | 0.962(0.947,0.978) |        | 0.962(0.946,0.978) |        | 0.963(0.939,0.987) |        |
|                         | Young  | 1.002(0.976,1.029) |        | 0.985(0.968,1.002) |        | 0.970(0.955,0.985) |        | 0.959(0.941,0.976) |        | 0.953(0.935,0.970) |        | 0.952(0.937,0.967) |        | 0.955(0.939,0.971) |        | 0.960(0.936,0.984) |        |
|                         | Old    | 0.991(0.966,1.016) |        | 0.983(0.967,0.999) |        | 0.976(0.962,0.991) |        | 0.971(0.954,0.988) |        | 0.967(0.950,0.985) |        | 0.966(0.951,0.981) |        | 0.966(0.950,0.982) |        | 0.967(0.944,0.990) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.140(1.098,1.184) |        | 1.143(1.116,1.171) |        | 1.145(1.122,1.169) |        | 1.144(1.116,1.172) |        | 1.137(1.109,1.166) |        | 1.125(1.101,1.150) |        | 1.110(1.086,1.135) |        | 1.094(1.059,1.130) |        |
|                         | Female | 1.104(1.062,1.147) |        | 1.126(1.099,1.154) |        | 1.144(1.120,1.169) |        | 1.154(1.125,1.183) |        | 1.150(1.121,1.180) |        | 1.134(1.109,1.159) |        | 1.108(1.083,1.134) |        | 1.080(1.044,1.117) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.135(1.107,1.163) |        | 1.138(1.114,1.162) |        | 1.137(1.109,1.166) |        | 1.131(1.102,1.160) |        | 1.119(1.094,1.144) |        | 1.103(1.078,1.129) |        | 1.086(1.050,1.124) |        |
|                         | Old    | 1.092(1.052,1.133) |        | 1.108(1.082,1.134) |        | 1.120(1.098,1.144) |        | 1.127(1.100,1.154) |        | 1.123(1.096,1.152) |        | 1.110(1.087,1.135) |        | 1.092(1.068,1.116) |        | 1.070(1.036,1.105) |        |

**Supplementary Table 28** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 4)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.022(0.939,1.113) |        | 1.037(0.908,1.183) |        | 1.043(0.895,1.215) |        | 1.041(0.884,1.227) |        | 1.033(0.867,1.230) |        | 1.019(0.851,1.221) |        | 1.001(0.841,1.191) |        | 0.978(0.824,1.160) |        |
|                         | Female | 1.055(0.967,1.150) |        | 1.070(0.936,1.224) |        | 1.051(0.900,1.227) |        | 1.012(0.857,1.194) |        | 0.973(0.815,1.161) |        | 0.952(0.793,1.144) |        | 0.961(0.805,1.147) |        | 1.006(0.846,1.196) |        |
|                         | Young  | 0.993(0.913,1.081) |        | 1.020(0.894,1.163) |        | 1.076(0.925,1.253) |        | 1.158(0.985,1.362) |        | 1.252(1.053,1.488) |        | 1.341(1.123,1.603) |        | 1.411(1.188,1.675) |        | 1.450(1.225,1.716) |        |
|                         | Old    | 1.096(1.006,1.193) |        | 1.130(0.990,1.290) |        | 1.105(0.948,1.287) |        | 1.041(0.883,1.228) |        | 0.969(0.813,1.157) |        | 0.913(0.761,1.097) |        | 0.885(0.742,1.057) |        | 0.890(0.748,1.060) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.030(0.958,1.107) |        | 1.056(0.940,1.186) |        | 1.078(0.934,1.243) |        | 1.096(0.928,1.294) |        | 1.109(0.916,1.343) |        | 1.118(0.904,1.384) |        | 1.123(0.896,1.408) |        | 1.124(0.887,1.424) |        |
|                         | Female | 1.064(0.988,1.144) |        | 1.110(0.986,1.248) |        | 1.138(0.985,1.315) |        | 1.152(0.974,1.363) |        | 1.159(0.955,1.407) |        | 1.166(0.940,1.446) |        | 1.178(0.937,1.480) |        | 1.197(0.942,1.520) |        |
|                         | Young  | 0.998(0.926,1.074) |        | 1.016(0.903,1.144) |        | 1.054(0.912,1.218) |        | 1.105(0.935,1.305) |        | 1.158(0.957,1.402) |        | 1.202(0.973,1.485) |        | 1.228(0.982,1.535) |        | 1.229(0.973,1.551) |        |
|                         | Old    | 1.067(0.994,1.145) |        | 1.100(0.981,1.234) |        | 1.102(0.956,1.270) |        | 1.080(0.914,1.276) |        | 1.049(0.865,1.273) |        | 1.024(0.825,1.271) |        | 1.011(0.803,1.273) |        | 1.016(0.798,1.294) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.125) |        | 1.148(1.045,1.260) |        | 1.258(1.119,1.414) |        | 1.390(1.210,1.597) |        | 1.535(1.305,1.806) |        | 1.677(1.398,2.013) |        | 1.803(1.485,2.188) |        | 1.900(1.549,2.330) |        |
|                         | Female | 1.077(1.015,1.143) |        | 1.158(1.052,1.275) |        | 1.245(1.105,1.403) |        | 1.338(1.161,1.542) |        | 1.440(1.219,1.700) |        | 1.551(1.288,1.870) |        | 1.676(1.375,2.044) |        | 1.816(1.474,2.237) |        |
|                         | Young  | 1.026(0.964,1.091) |        | 1.092(0.989,1.205) |        | 1.200(1.062,1.355) |        | 1.346(1.166,1.553) |        | 1.515(1.283,1.789) |        | 1.684(1.399,2.026) |        | 1.827(1.502,2.222) |        | 1.924(1.566,2.364) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.152(1.052,1.261) |        | 1.216(1.086,1.363) |        | 1.275(1.113,1.460) |        | 1.332(1.135,1.564) |        | 1.396(1.166,1.671) |        | 1.469(1.213,1.780) |        | 1.557(1.273,1.906) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.974(0.871,1.089) |        | 1.035(0.871,1.231) |        | 1.189(0.973,1.452) |        | 1.444(1.167,1.787) |        | 1.799(1.436,2.254) |        | 2.230(1.771,2.808) |        | 2.694(2.159,3.362) |        | 3.139(2.521,3.910) |        |
|                         | Female | 1.000(0.893,1.120) |        | 1.066(0.895,1.271) |        | 1.205(0.984,1.477) |        | 1.424(1.147,1.768) |        | 1.725(1.373,2.168) |        | 2.099(1.662,2.652) |        | 2.532(2.023,3.169) |        | 3.007(2.408,3.755) |        |
|                         | Young  | 1.009(0.905,1.125) |        | 1.121(0.947,1.327) |        | 1.354(1.115,1.644) |        | 1.736(1.412,2.135) |        | 2.279(1.831,2.836) |        | 2.955(2.362,3.698) |        | 3.697(2.982,4.583) |        | 4.406(3.562,5.449) |        |
|                         | Old    | 0.938(0.836,1.052) |        | 0.931(0.778,1.113) |        | 0.973(0.790,1.197) |        | 1.061(0.850,1.324) |        | 1.190(0.941,1.506) |        | 1.355(1.064,1.724) |        | 1.550(1.227,1.957) |        | 1.774(1.407,2.237) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.011(0.951,1.074) |        | 1.053(0.956,1.159) |        | 1.126(1.001,1.267) |        | 1.229(1.073,1.408) |        | 1.355(1.160,1.583) |        | 1.495(1.259,1.774) |        | 1.638(1.367,1.962) |        | 1.777(1.472,2.146) |        |
|                         | Female | 1.015(0.954,1.079) |        | 1.053(0.955,1.162) |        | 1.116(0.990,1.258) |        | 1.202(1.047,1.379) |        | 1.308(1.118,1.531) |        | 1.431(1.203,1.702) |        | 1.565(1.304,1.879) |        | 1.710(1.414,2.069) |        |
|                         | Young  | 0.996(0.936,1.059) |        | 1.032(0.935,1.139) |        | 1.108(0.983,1.250) |        | 1.224(1.066,1.404) |        | 1.370(1.171,1.603) |        | 1.536(1.293,1.826) |        | 1.710(1.427,2.049) |        | 1.881(1.558,2.272) |        |
|                         | Old    | 1.022(0.964,1.084) |        | 1.064(0.968,1.169) |        | 1.126(1.003,1.263) |        | 1.207(1.056,1.380) |        | 1.305(1.119,1.521) |        | 1.415(1.194,1.678) |        | 1.535(1.283,1.836) |        | 1.661(1.377,2.004) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.817(0.770,0.866) |        | 0.664(0.605,0.728) |        | 0.538(0.481,0.602) |        | 0.437(0.385,0.497) |        | 0.359(0.311,0.414) |        | 0.299(0.256,0.350) |        | 0.254(0.216,0.300) |        | 0.221(0.186,0.263) |        |
|                         | Female | 0.858(0.808,0.912) |        | 0.714(0.649,0.786) |        | 0.580(0.517,0.651) |        | 0.465(0.408,0.529) |        | 0.374(0.323,0.433) |        | 0.308(0.263,0.362) |        | 0.263(0.222,0.311) |        | 0.234(0.196,0.279) |        |
|                         | Young  | 0.828(0.779,0.880) |        | 0.681(0.619,0.750) |        | 0.558(0.497,0.626) |        | 0.457(0.402,0.521) |        | 0.378(0.327,0.437) |        | 0.318(0.271,0.373) |        | 0.273(0.231,0.322) |        | 0.240(0.202,0.286) |        |
|                         | Old    | 0.873(0.824,0.924) |        | 0.745(0.680,0.816) |        | 0.625(0.559,0.698) |        | 0.520(0.458,0.590) |        | 0.434(0.376,0.501) |        | 0.369(0.315,0.432) |        | 0.322(0.273,0.381) |        | 0.290(0.244,0.346) |        |

**Supplementary Table 29** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of temperature = 4)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.022(0.939,1.113) |        | 1.014(0.964,1.066) |        | 1.006(0.966,1.048) |        | 0.999(0.950,1.050) |        | 0.992(0.943,1.044) |        | 0.987(0.945,1.030) |        | 0.982(0.936,1.030) |        | 0.977(0.904,1.056) |        |
|                         | Female | 1.055(0.967,1.150) |        | 1.015(0.964,1.068) |        | 0.982(0.942,1.023) |        | 0.963(0.915,1.013) |        | 0.962(0.913,1.013) |        | 0.979(0.937,1.022) |        | 1.009(0.961,1.059) |        | 1.047(0.967,1.132) |        |
|                         | Young  | 0.993(0.913,1.081) |        | 1.026(0.977,1.079) |        | 1.056(1.014,1.099) |        | 1.076(1.024,1.130) |        | 1.081(1.028,1.137) |        | 1.071(1.027,1.117) |        | 1.052(1.003,1.103) |        | 1.028(0.952,1.110) |        |
|                         | Old    | 1.096(1.006,1.193) |        | 1.031(0.980,1.084) |        | 0.978(0.938,1.019) |        | 0.943(0.896,0.991) |        | 0.931(0.884,0.980) |        | 0.942(0.903,0.984) |        | 0.969(0.924,1.017) |        | 1.006(0.930,1.087) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.030(0.958,1.107) |        | 1.025(0.978,1.075) |        | 1.021(0.978,1.066) |        | 1.017(0.966,1.070) |        | 1.012(0.961,1.066) |        | 1.008(0.964,1.055) |        | 1.004(0.959,1.052) |        | 1.000(0.936,1.069) |        |
|                         | Female | 1.064(0.988,1.144) |        | 1.043(0.995,1.094) |        | 1.026(0.982,1.071) |        | 1.013(0.962,1.066) |        | 1.006(0.954,1.060) |        | 1.006(0.961,1.053) |        | 1.010(0.964,1.058) |        | 1.016(0.950,1.087) |        |
|                         | Young  | 0.998(0.926,1.074) |        | 1.019(0.971,1.069) |        | 1.037(0.993,1.082) |        | 1.048(0.996,1.103) |        | 1.048(0.995,1.105) |        | 1.038(0.992,1.086) |        | 1.021(0.975,1.070) |        | 1.001(0.935,1.071) |        |
|                         | Old    | 1.067(0.994,1.145) |        | 1.031(0.984,1.081) |        | 1.001(0.958,1.046) |        | 0.980(0.931,1.032) |        | 0.972(0.922,1.024) |        | 0.976(0.932,1.021) |        | 0.988(0.943,1.034) |        | 1.005(0.941,1.073) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.125) |        | 1.081(1.040,1.123) |        | 1.096(1.056,1.138) |        | 1.105(1.058,1.154) |        | 1.104(1.057,1.153) |        | 1.093(1.053,1.134) |        | 1.075(1.034,1.118) |        | 1.054(0.994,1.117) |        |
|                         | Female | 1.077(1.015,1.143) |        | 1.076(1.034,1.119) |        | 1.075(1.035,1.116) |        | 1.075(1.028,1.124) |        | 1.076(1.029,1.125) |        | 1.078(1.037,1.120) |        | 1.080(1.038,1.124) |        | 1.083(1.021,1.150) |        |
|                         | Young  | 1.026(0.964,1.091) |        | 1.065(1.022,1.108) |        | 1.099(1.058,1.141) |        | 1.121(1.073,1.173) |        | 1.126(1.077,1.177) |        | 1.111(1.070,1.155) |        | 1.085(1.042,1.130) |        | 1.053(0.992,1.119) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.067(1.027,1.108) |        | 1.056(1.018,1.095) |        | 1.048(1.004,1.094) |        | 1.045(1.001,1.091) |        | 1.047(1.010,1.086) |        | 1.053(1.013,1.094) |        | 1.060(1.001,1.122) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.974(0.871,1.089) |        | 1.063(0.995,1.135) |        | 1.148(1.090,1.209) |        | 1.214(1.140,1.294) |        | 1.246(1.167,1.330) |        | 1.240(1.173,1.310) |        | 1.208(1.134,1.288) |        | 1.165(1.051,1.292) |        |
|                         | Female | 1.000(0.893,1.120) |        | 1.067(0.998,1.140) |        | 1.130(1.072,1.192) |        | 1.182(1.108,1.261) |        | 1.211(1.133,1.294) |        | 1.217(1.151,1.287) |        | 1.206(1.131,1.287) |        | 1.188(1.069,1.319) |        |
|                         | Young  | 1.009(0.905,1.125) |        | 1.111(1.042,1.184) |        | 1.208(1.148,1.271) |        | 1.282(1.204,1.365) |        | 1.313(1.231,1.399) |        | 1.297(1.229,1.369) |        | 1.251(1.175,1.331) |        | 1.192(1.077,1.319) |        |
|                         | Old    | 0.938(0.836,1.052) |        | 0.992(0.927,1.063) |        | 1.045(0.990,1.103) |        | 1.090(1.021,1.164) |        | 1.122(1.049,1.200) |        | 1.138(1.075,1.205) |        | 1.144(1.071,1.222) |        | 1.144(1.030,1.272) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.011(0.951,1.074) |        | 1.042(1.002,1.083) |        | 1.070(1.033,1.108) |        | 1.091(1.047,1.138) |        | 1.103(1.057,1.150) |        | 1.103(1.063,1.144) |        | 1.096(1.054,1.139) |        | 1.085(1.025,1.148) |        |
|                         | Female | 1.015(0.954,1.079) |        | 1.038(0.998,1.080) |        | 1.059(1.022,1.098) |        | 1.077(1.032,1.123) |        | 1.088(1.043,1.136) |        | 1.093(1.053,1.135) |        | 1.094(1.052,1.138) |        | 1.093(1.032,1.157) |        |
|                         | Young  | 0.996(0.936,1.059) |        | 1.036(0.996,1.078) |        | 1.074(1.037,1.113) |        | 1.104(1.058,1.151) |        | 1.120(1.073,1.169) |        | 1.121(1.080,1.164) |        | 1.113(1.071,1.157) |        | 1.100(1.039,1.165) |        |
|                         | Old    | 1.022(0.964,1.084) |        | 1.041(1.002,1.081) |        | 1.058(1.022,1.096) |        | 1.072(1.029,1.117) |        | 1.081(1.037,1.127) |        | 1.085(1.046,1.125) |        | 1.084(1.044,1.126) |        | 1.082(1.024,1.144) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.817(0.770,0.866) |        | 0.813(0.783,0.843) |        | 0.811(0.785,0.837) |        | 0.813(0.783,0.844) |        | 0.820(0.789,0.852) |        | 0.833(0.806,0.862) |        | 0.851(0.822,0.881) |        | 0.871(0.828,0.916) |        |
|                         | Female | 0.858(0.808,0.912) |        | 0.832(0.801,0.864) |        | 0.812(0.786,0.839) |        | 0.801(0.771,0.833) |        | 0.805(0.774,0.838) |        | 0.824(0.796,0.853) |        | 0.853(0.823,0.884) |        | 0.888(0.843,0.936) |        |
|                         | Young  | 0.828(0.779,0.880) |        | 0.822(0.792,0.854) |        | 0.819(0.793,0.846) |        | 0.820(0.789,0.852) |        | 0.827(0.795,0.860) |        | 0.841(0.812,0.870) |        | 0.859(0.829,0.890) |        | 0.880(0.835,0.927) |        |
|                         | Old    | 0.873(0.824,0.924) |        | 0.854(0.823,0.885) |        | 0.839(0.813,0.866) |        | 0.832(0.801,0.863) |        | 0.835(0.804,0.868) |        | 0.850(0.822,0.879) |        | 0.873(0.844,0.904) |        | 0.901(0.857,0.947) |        |

**Supplementary Table 30** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 2)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.996(0.978,1.014) |        | 0.993(0.965,1.022) |        | 0.992(0.960,1.025) |        | 0.993(0.959,1.028) |        | 0.995(0.958,1.033) |        | 0.998(0.960,1.037) |        | 1.001(0.965,1.039) |        | 1.006(0.970,1.043) |        |
|                         | Female | 0.989(0.971,1.007) |        | 0.986(0.958,1.015) |        | 0.990(0.958,1.023) |        | 0.998(0.964,1.035) |        | 1.007(0.970,1.046) |        | 1.012(0.973,1.052) |        | 1.010(0.973,1.049) |        | 1.000(0.963,1.038) |        |
|                         | Young  | 1.002(0.984,1.020) |        | 0.996(0.969,1.025) |        | 0.985(0.954,1.018) |        | 0.970(0.937,1.004) |        | 0.954(0.920,0.990) |        | 0.940(0.905,0.977) |        | 0.930(0.897,0.965) |        | 0.924(0.892,0.958) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.975(0.948,1.003) |        | 0.980(0.948,1.013) |        | 0.993(0.958,1.028) |        | 1.008(0.971,1.047) |        | 1.021(0.982,1.062) |        | 1.028(0.990,1.068) |        | 1.026(0.989,1.065) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.991(0.971,1.011) |        | 0.988(0.964,1.012) |        | 0.985(0.958,1.013) |        | 0.983(0.952,1.016) |        | 0.982(0.947,1.018) |        | 0.981(0.944,1.020) |        | 0.981(0.942,1.021) |        |
|                         | Female | 0.989(0.977,1.002) |        | 0.982(0.963,1.002) |        | 0.978(0.954,1.003) |        | 0.976(0.949,1.005) |        | 0.976(0.944,1.008) |        | 0.975(0.940,1.011) |        | 0.973(0.936,1.012) |        | 0.970(0.931,1.011) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.977,1.018) |        | 0.991(0.967,1.016) |        | 0.984(0.956,1.012) |        | 0.976(0.945,1.008) |        | 0.970(0.935,1.005) |        | 0.966(0.930,1.004) |        | 0.966(0.928,1.005) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.984(0.965,1.003) |        | 0.984(0.960,1.008) |        | 0.987(0.960,1.016) |        | 0.992(0.960,1.026) |        | 0.997(0.961,1.034) |        | 0.999(0.960,1.039) |        | 0.998(0.957,1.040) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.984(0.968,1.000) |        | 0.963(0.938,0.988) |        | 0.939(0.909,0.970) |        | 0.913(0.879,0.949) |        | 0.889(0.849,0.930) |        | 0.867(0.824,0.912) |        | 0.850(0.805,0.897) |        | 0.837(0.791,0.886) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.960(0.935,0.986) |        | 0.942(0.911,0.973) |        | 0.923(0.887,0.960) |        | 0.905(0.864,0.947) |        | 0.886(0.841,0.933) |        | 0.867(0.820,0.916) |        | 0.847(0.800,0.898) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.976(0.950,1.003) |        | 0.951(0.919,0.984) |        | 0.921(0.885,0.959) |        | 0.892(0.851,0.934) |        | 0.866(0.822,0.912) |        | 0.846(0.801,0.894) |        | 0.834(0.787,0.883) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.962(0.938,0.986) |        | 0.948(0.918,0.978) |        | 0.936(0.901,0.972) |        | 0.924(0.884,0.966) |        | 0.912(0.868,0.959) |        | 0.899(0.853,0.949) |        | 0.885(0.836,0.936) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.005(0.989,1.020) |        | 0.997(0.973,1.021) |        | 0.978(0.951,1.006) |        | 0.952(0.924,0.981) |        | 0.923(0.895,0.952) |        | 0.896(0.868,0.925) |        | 0.872(0.846,0.900) |        | 0.854(0.828,0.880) |        |
|                         | Female | 1.001(0.985,1.017) |        | 0.992(0.969,1.017) |        | 0.976(0.949,1.004) |        | 0.953(0.925,0.983) |        | 0.928(0.899,0.958) |        | 0.903(0.874,0.933) |        | 0.880(0.853,0.908) |        | 0.859(0.833,0.886) |        |
|                         | Young  | 0.999(0.985,1.015) |        | 0.985(0.963,1.009) |        | 0.960(0.935,0.986) |        | 0.927(0.901,0.954) |        | 0.893(0.866,0.920) |        | 0.861(0.835,0.888) |        | 0.835(0.810,0.860) |        | 0.814(0.791,0.839) |        |
|                         | Old    | 1.010(0.994,1.026) |        | 1.012(0.987,1.037) |        | 1.006(0.977,1.035) |        | 0.994(0.964,1.025) |        | 0.978(0.946,1.010) |        | 0.960(0.928,0.993) |        | 0.942(0.912,0.973) |        | 0.924(0.895,0.955) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.997(0.972,1.023) |        | 0.981(0.941,1.022) |        | 0.953(0.906,1.002) |        | 0.918(0.866,0.973) |        | 0.880(0.823,0.940) |        | 0.843(0.783,0.907) |        | 0.810(0.750,0.875) |        | 0.782(0.721,0.848) |        |
|                         | Female | 0.995(0.969,1.021) |        | 0.980(0.940,1.022) |        | 0.956(0.909,1.006) |        | 0.926(0.873,0.982) |        | 0.893(0.835,0.955) |        | 0.859(0.797,0.925) |        | 0.826(0.764,0.893) |        | 0.795(0.732,0.862) |        |
|                         | Young  | 1.003(0.977,1.030) |        | 0.988(0.948,1.031) |        | 0.959(0.911,1.009) |        | 0.919(0.866,0.974) |        | 0.875(0.818,0.936) |        | 0.833(0.773,0.897) |        | 0.795(0.736,0.859) |        | 0.763(0.703,0.827) |        |
|                         | Old    | 0.992(0.968,1.017) |        | 0.976(0.938,1.016) |        | 0.953(0.907,1.001) |        | 0.925(0.873,0.979) |        | 0.894(0.837,0.955) |        | 0.863(0.802,0.928) |        | 0.833(0.771,0.899) |        | 0.805(0.742,0.872) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.140(1.097,1.183) |        | 1.303(1.227,1.384) |        | 1.492(1.388,1.604) |        | 1.707(1.573,1.853) |        | 1.941(1.770,2.129) |        | 2.184(1.974,2.416) |        | 2.423(2.179,2.696) |        | 2.649(2.370,2.961) |        |
|                         | Female | 1.103(1.061,1.147) |        | 1.242(1.168,1.321) |        | 1.422(1.320,1.531) |        | 1.641(1.509,1.785) |        | 1.889(1.718,2.076) |        | 2.141(1.930,2.375) |        | 2.372(2.128,2.645) |        | 2.559(2.283,2.867) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.282(1.205,1.364) |        | 1.459(1.354,1.572) |        | 1.659(1.526,1.804) |        | 1.876(1.708,2.060) |        | 2.099(1.894,2.325) |        | 2.315(2.079,2.577) |        | 2.513(2.247,2.812) |        |
|                         | Old    | 1.091(1.052,1.132) |        | 1.209(1.140,1.282) |        | 1.355(1.261,1.455) |        | 1.527(1.407,1.656) |        | 1.715(1.564,1.881) |        | 1.905(1.721,2.109) |        | 2.079(1.867,2.315) |        | 2.222(1.985,2.488) |        |

**Supplementary Table 31** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 2)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.996(0.978,1.014) |        | 0.997(0.987,1.008) |        | 0.999(0.990,1.008) |        | 1.001(0.990,1.011) |        | 1.002(0.991,1.013) |        | 1.003(0.994,1.012) |        | 1.004(0.994,1.014) |        | 1.005(0.988,1.022) |        |
|                         | Female | 0.989(0.971,1.007) |        | 0.997(0.986,1.008) |        | 1.004(0.995,1.013) |        | 1.009(0.998,1.020) |        | 1.009(0.998,1.020) |        | 1.005(0.995,1.014) |        | 0.998(0.988,1.008) |        | 0.990(0.973,1.007) |        |
|                         | Young  | 1.002(0.984,1.020) |        | 0.995(0.984,1.005) |        | 0.989(0.980,0.997) |        | 0.985(0.974,0.995) |        | 0.984(0.973,0.994) |        | 0.985(0.977,0.994) |        | 0.989(0.979,0.999) |        | 0.994(0.978,1.010) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.994(0.983,1.005) |        | 1.005(0.996,1.014) |        | 1.013(1.002,1.024) |        | 1.016(1.005,1.027) |        | 1.013(1.004,1.022) |        | 1.007(0.996,1.017) |        | 0.998(0.982,1.015) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.996(0.988,1.004) |        | 0.997(0.989,1.004) |        | 0.997(0.989,1.006) |        | 0.998(0.989,1.007) |        | 0.999(0.991,1.006) |        | 0.999(0.991,1.007) |        | 1.000(0.988,1.011) |        |
|                         | Female | 0.989(0.977,1.002) |        | 0.993(0.985,1.001) |        | 0.996(0.988,1.003) |        | 0.998(0.989,1.007) |        | 0.999(0.990,1.008) |        | 0.999(0.991,1.007) |        | 0.998(0.990,1.006) |        | 0.997(0.986,1.008) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.989,1.005) |        | 0.994(0.987,1.001) |        | 0.992(0.984,1.001) |        | 0.992(0.983,1.001) |        | 0.994(0.986,1.001) |        | 0.996(0.988,1.004) |        | 1.000(0.988,1.011) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.995(0.987,1.003) |        | 1.000(0.993,1.007) |        | 1.004(0.995,1.012) |        | 1.005(0.996,1.014) |        | 1.004(0.997,1.012) |        | 1.002(0.994,1.010) |        | 0.999(0.988,1.010) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.984(0.968,1.000) |        | 0.979(0.968,0.989) |        | 0.975(0.965,0.985) |        | 0.973(0.961,0.985) |        | 0.973(0.961,0.985) |        | 0.976(0.966,0.986) |        | 0.980(0.969,0.991) |        | 0.985(0.969,1.001) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.980(0.969,0.991) |        | 0.980(0.970,0.991) |        | 0.980(0.968,0.993) |        | 0.980(0.968,0.992) |        | 0.979(0.969,0.990) |        | 0.979(0.968,0.989) |        | 0.978(0.961,0.994) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.983(0.972,0.994) |        | 0.974(0.964,0.985) |        | 0.969(0.957,0.981) |        | 0.968(0.956,0.980) |        | 0.971(0.961,0.981) |        | 0.977(0.966,0.988) |        | 0.985(0.969,1.002) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.982(0.972,0.993) |        | 0.985(0.975,0.995) |        | 0.987(0.976,0.999) |        | 0.988(0.976,1.000) |        | 0.987(0.977,0.997) |        | 0.986(0.975,0.996) |        | 0.984(0.968,0.999) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.005(0.989,1.020) |        | 0.992(0.983,1.001) |        | 0.981(0.974,0.988) |        | 0.973(0.965,0.982) |        | 0.970(0.961,0.979) |        | 0.970(0.963,0.978) |        | 0.974(0.965,0.983) |        | 0.979(0.965,0.993) |        |
|                         | Female | 1.001(0.985,1.017) |        | 0.992(0.982,1.001) |        | 0.983(0.976,0.991) |        | 0.977(0.968,0.986) |        | 0.974(0.965,0.983) |        | 0.973(0.965,0.981) |        | 0.974(0.965,0.983) |        | 0.976(0.962,0.991) |        |
|                         | Young  | 0.999(0.985,1.015) |        | 0.986(0.977,0.995) |        | 0.974(0.967,0.981) |        | 0.966(0.958,0.974) |        | 0.963(0.954,0.971) |        | 0.964(0.957,0.972) |        | 0.969(0.961,0.978) |        | 0.976(0.962,0.990) |        |
|                         | Old    | 1.010(0.994,1.026) |        | 1.002(0.992,1.011) |        | 0.994(0.987,1.002) |        | 0.988(0.979,0.997) |        | 0.984(0.975,0.993) |        | 0.982(0.974,0.990) |        | 0.981(0.972,0.990) |        | 0.981(0.967,0.996) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.997(0.972,1.023) |        | 0.984(0.967,1.000) |        | 0.972(0.957,0.987) |        | 0.963(0.946,0.980) |        | 0.958(0.941,0.976) |        | 0.958(0.943,0.973) |        | 0.961(0.945,0.977) |        | 0.965(0.942,0.989) |        |
|                         | Female | 0.995(0.969,1.021) |        | 0.985(0.968,1.002) |        | 0.976(0.961,0.991) |        | 0.969(0.951,0.986) |        | 0.964(0.946,0.982) |        | 0.962(0.947,0.977) |        | 0.962(0.946,0.978) |        | 0.962(0.939,0.986) |        |
|                         | Young  | 1.003(0.977,1.030) |        | 0.985(0.969,1.002) |        | 0.970(0.955,0.985) |        | 0.958(0.941,0.976) |        | 0.952(0.935,0.970) |        | 0.952(0.937,0.967) |        | 0.955(0.939,0.971) |        | 0.959(0.936,0.983) |        |
|                         | Old    | 0.992(0.968,1.017) |        | 0.984(0.968,1.000) |        | 0.976(0.962,0.991) |        | 0.970(0.953,0.988) |        | 0.967(0.949,0.984) |        | 0.965(0.950,0.980) |        | 0.965(0.950,0.981) |        | 0.966(0.943,0.989) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.140(1.097,1.183) |        | 1.143(1.116,1.171) |        | 1.145(1.122,1.169) |        | 1.144(1.116,1.172) |        | 1.137(1.109,1.166) |        | 1.125(1.101,1.150) |        | 1.110(1.085,1.135) |        | 1.093(1.058,1.129) |        |
|                         | Female | 1.103(1.061,1.147) |        | 1.126(1.099,1.154) |        | 1.145(1.121,1.169) |        | 1.154(1.126,1.184) |        | 1.151(1.122,1.181) |        | 1.134(1.109,1.159) |        | 1.108(1.083,1.134) |        | 1.079(1.043,1.116) |        |
|                         | Young  | 1.130(1.086,1.175) |        | 1.135(1.107,1.163) |        | 1.138(1.114,1.162) |        | 1.137(1.109,1.166) |        | 1.131(1.102,1.160) |        | 1.119(1.094,1.144) |        | 1.103(1.078,1.129) |        | 1.086(1.049,1.123) |        |
|                         | Old    | 1.091(1.052,1.132) |        | 1.108(1.082,1.134) |        | 1.121(1.098,1.144) |        | 1.127(1.100,1.155) |        | 1.124(1.096,1.152) |        | 1.111(1.087,1.135) |        | 1.091(1.067,1.116) |        | 1.069(1.035,1.104) |        |

**Supplementary Table 32** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 2)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.020(0.937,1.111) |        | 1.033(0.905,1.179) |        | 1.037(0.890,1.208) |        | 1.034(0.878,1.218) |        | 1.025(0.861,1.220) |        | 1.011(0.845,1.211) |        | 0.993(0.835,1.182) |        | 0.972(0.820,1.153) |        |
|                         | Female | 1.055(0.967,1.150) |        | 1.069(0.935,1.222) |        | 1.048(0.898,1.223) |        | 1.007(0.853,1.189) |        | 0.967(0.810,1.154) |        | 0.946(0.788,1.135) |        | 0.954(0.800,1.139) |        | 1.000(0.841,1.190) |        |
|                         | Young  | 0.992(0.912,1.080) |        | 1.017(0.892,1.160) |        | 1.073(0.922,1.248) |        | 1.152(0.980,1.355) |        | 1.244(1.047,1.478) |        | 1.332(1.115,1.591) |        | 1.402(1.181,1.664) |        | 1.443(1.219,1.707) |        |
|                         | Old    | 1.094(1.005,1.192) |        | 1.126(0.987,1.286) |        | 1.099(0.943,1.281) |        | 1.035(0.878,1.220) |        | 0.962(0.807,1.147) |        | 0.906(0.755,1.087) |        | 0.879(0.736,1.049) |        | 0.885(0.744,1.053) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.030(0.958,1.107) |        | 1.055(0.940,1.185) |        | 1.076(0.933,1.241) |        | 1.092(0.925,1.289) |        | 1.104(0.912,1.337) |        | 1.113(0.899,1.377) |        | 1.118(0.892,1.402) |        | 1.120(0.884,1.419) |        |
|                         | Female | 1.064(0.989,1.145) |        | 1.110(0.987,1.249) |        | 1.137(0.984,1.314) |        | 1.150(0.972,1.360) |        | 1.156(0.952,1.402) |        | 1.162(0.937,1.441) |        | 1.174(0.934,1.474) |        | 1.195(0.941,1.517) |        |
|                         | Young  | 0.998(0.926,1.075) |        | 1.016(0.903,1.144) |        | 1.053(0.911,1.217) |        | 1.102(0.933,1.302) |        | 1.154(0.954,1.397) |        | 1.198(0.970,1.480) |        | 1.224(0.979,1.529) |        | 1.226(0.971,1.548) |        |
|                         | Old    | 1.067(0.994,1.146) |        | 1.100(0.981,1.234) |        | 1.100(0.955,1.268) |        | 1.077(0.912,1.272) |        | 1.045(0.862,1.268) |        | 1.019(0.821,1.265) |        | 1.007(0.800,1.268) |        | 1.013(0.796,1.290) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.061(1.001,1.125) |        | 1.146(1.043,1.258) |        | 1.254(1.116,1.410) |        | 1.385(1.206,1.591) |        | 1.528(1.299,1.797) |        | 1.669(1.391,2.002) |        | 1.795(1.479,2.178) |        | 1.894(1.544,2.322) |        |
|                         | Female | 1.076(1.014,1.142) |        | 1.156(1.050,1.272) |        | 1.241(1.102,1.398) |        | 1.333(1.157,1.536) |        | 1.433(1.214,1.692) |        | 1.544(1.282,1.861) |        | 1.669(1.369,2.035) |        | 1.811(1.470,2.230) |        |
|                         | Young  | 1.025(0.964,1.090) |        | 1.091(0.988,1.204) |        | 1.197(1.060,1.352) |        | 1.342(1.163,1.548) |        | 1.509(1.279,1.782) |        | 1.677(1.394,2.018) |        | 1.821(1.497,2.214) |        | 1.920(1.563,2.359) |        |
|                         | Old    | 1.079(1.020,1.141) |        | 1.150(1.050,1.259) |        | 1.213(1.083,1.359) |        | 1.270(1.109,1.454) |        | 1.326(1.130,1.557) |        | 1.389(1.160,1.663) |        | 1.463(1.208,1.772) |        | 1.553(1.269,1.900) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.967(0.865,1.080) |        | 1.023(0.861,1.216) |        | 1.173(0.961,1.432) |        | 1.425(1.152,1.763) |        | 1.779(1.420,2.228) |        | 2.210(1.755,2.782) |        | 2.674(2.143,3.336) |        | 3.118(2.504,3.882) |        |
|                         | Female | 0.994(0.888,1.113) |        | 1.056(0.886,1.259) |        | 1.192(0.974,1.460) |        | 1.409(1.135,1.749) |        | 1.708(1.359,2.147) |        | 2.081(1.648,2.629) |        | 2.512(2.008,3.144) |        | 2.985(2.391,3.726) |        |
|                         | Young  | 1.004(0.901,1.119) |        | 1.112(0.940,1.315) |        | 1.341(1.105,1.628) |        | 1.720(1.399,2.115) |        | 2.261(1.817,2.814) |        | 2.937(2.347,3.674) |        | 3.677(2.966,4.558) |        | 4.383(3.544,5.419) |        |
|                         | Old    | 0.931(0.830,1.044) |        | 0.920(0.770,1.100) |        | 0.960(0.780,1.181) |        | 1.047(0.839,1.306) |        | 1.176(0.930,1.488) |        | 1.341(1.054,1.707) |        | 1.536(1.217,1.940) |        | 1.760(1.396,2.219) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.007(0.948,1.069) |        | 1.046(0.950,1.152) |        | 1.119(0.995,1.258) |        | 1.222(1.067,1.399) |        | 1.349(1.155,1.575) |        | 1.490(1.255,1.769) |        | 1.635(1.365,1.959) |        | 1.777(1.471,2.146) |        |
|                         | Female | 1.012(0.952,1.076) |        | 1.048(0.951,1.156) |        | 1.110(0.985,1.251) |        | 1.196(1.042,1.372) |        | 1.303(1.113,1.525) |        | 1.426(1.199,1.697) |        | 1.563(1.302,1.876) |        | 1.710(1.414,2.069) |        |
|                         | Young  | 0.993(0.934,1.056) |        | 1.028(0.932,1.134) |        | 1.104(0.979,1.244) |        | 1.219(1.062,1.398) |        | 1.366(1.168,1.597) |        | 1.533(1.290,1.822) |        | 1.709(1.426,2.048) |        | 1.882(1.558,2.272) |        |
|                         | Old    | 1.018(0.960,1.080) |        | 1.058(0.963,1.161) |        | 1.118(0.997,1.255) |        | 1.200(1.050,1.371) |        | 1.299(1.114,1.514) |        | 1.411(1.190,1.672) |        | 1.533(1.281,1.833) |        | 1.661(1.377,2.004) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.817(0.771,0.866) |        | 0.664(0.605,0.729) |        | 0.538(0.481,0.602) |        | 0.437(0.385,0.497) |        | 0.359(0.311,0.414) |        | 0.299(0.256,0.349) |        | 0.254(0.216,0.300) |        | 0.222(0.187,0.263) |        |
|                         | Female | 0.859(0.809,0.912) |        | 0.715(0.650,0.787) |        | 0.580(0.517,0.651) |        | 0.465(0.408,0.529) |        | 0.374(0.323,0.433) |        | 0.308(0.262,0.362) |        | 0.263(0.222,0.311) |        | 0.234(0.196,0.279) |        |
|                         | Young  | 0.828(0.780,0.880) |        | 0.681(0.619,0.750) |        | 0.558(0.497,0.626) |        | 0.457(0.402,0.520) |        | 0.378(0.327,0.437) |        | 0.318(0.271,0.372) |        | 0.273(0.231,0.322) |        | 0.240(0.202,0.286) |        |
|                         | Old    | 0.873(0.825,0.925) |        | 0.746(0.681,0.817) |        | 0.625(0.560,0.699) |        | 0.520(0.458,0.590) |        | 0.434(0.376,0.501) |        | 0.369(0.315,0.432) |        | 0.322(0.273,0.381) |        | 0.291(0.244,0.346) |        |

**Supplementary Table 33** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 2)

| pollutant         | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                   |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| CO                | Male   | 1.020(0.937,1.111) |        | 1.012(0.963,1.064) |        | 1.004(0.964,1.046) |        | 0.997(0.949,1.048) |        | 0.991(0.942,1.043) |        | 0.986(0.945,1.029) |        | 0.982(0.936,1.031) |        | 0.979(0.905,1.058) |        |
|                   | Female | 1.055(0.967,1.150) |        | 1.014(0.963,1.066) |        | 0.981(0.941,1.022) |        | 0.961(0.913,1.011) |        | 0.960(0.912,1.011) |        | 0.978(0.937,1.021) |        | 1.009(0.962,1.059) |        | 1.048(0.969,1.134) |        |
|                   | Young  | 0.992(0.912,1.080) |        | 1.025(0.975,1.078) |        | 1.054(1.013,1.097) |        | 1.074(1.023,1.128) |        | 1.080(1.027,1.136) |        | 1.071(1.027,1.117) |        | 1.052(1.004,1.103) |        | 1.029(0.953,1.111) |        |
|                   | Old    | 1.094(1.005,1.192) |        | 1.029(0.979,1.082) |        | 0.976(0.937,1.017) |        | 0.941(0.895,0.990) |        | 0.930(0.883,0.979) |        | 0.942(0.902,0.983) |        | 0.970(0.924,1.018) |        | 1.007(0.932,1.089) |        |
| PM <sub>2.5</sub> | Male   | 1.030(0.958,1.107) |        | 1.025(0.977,1.074) |        | 1.020(0.977,1.065) |        | 1.015(0.965,1.068) |        | 1.011(0.960,1.065) |        | 1.008(0.963,1.054) |        | 1.005(0.959,1.052) |        | 1.002(0.938,1.070) |        |
|                   | Female | 1.064(0.989,1.145) |        | 1.043(0.994,1.094) |        | 1.025(0.981,1.070) |        | 1.011(0.960,1.065) |        | 1.005(0.953,1.059) |        | 1.005(0.960,1.052) |        | 1.010(0.964,1.059) |        | 1.018(0.952,1.088) |        |
|                   | Young  | 0.998(0.926,1.075) |        | 1.018(0.971,1.068) |        | 1.036(0.992,1.081) |        | 1.047(0.995,1.102) |        | 1.048(0.994,1.103) |        | 1.038(0.992,1.086) |        | 1.022(0.975,1.070) |        | 1.002(0.937,1.072) |        |
|                   | Old    | 1.067(0.994,1.146) |        | 1.031(0.984,1.081) |        | 1.000(0.958,1.045) |        | 0.979(0.930,1.030) |        | 0.971(0.921,1.023) |        | 0.975(0.932,1.020) |        | 0.988(0.944,1.035) |        | 1.006(0.942,1.074) |        |
| PM <sub>10</sub>  | Male   | 1.061(1.001,1.125) |        | 1.080(1.039,1.122) |        | 1.095(1.055,1.136) |        | 1.104(1.057,1.153) |        | 1.103(1.056,1.152) |        | 1.092(1.053,1.134) |        | 1.075(1.034,1.118) |        | 1.055(0.995,1.119) |        |
|                   | Female | 1.076(1.014,1.142) |        | 1.075(1.033,1.118) |        | 1.074(1.034,1.115) |        | 1.074(1.027,1.123) |        | 1.075(1.028,1.124) |        | 1.078(1.037,1.119) |        | 1.081(1.039,1.125) |        | 1.085(1.022,1.151) |        |
|                   | Young  | 1.025(0.964,1.090) |        | 1.064(1.022,1.108) |        | 1.098(1.057,1.140) |        | 1.121(1.072,1.171) |        | 1.125(1.076,1.176) |        | 1.111(1.070,1.154) |        | 1.086(1.043,1.130) |        | 1.055(0.993,1.120) |        |
|                   | Old    | 1.079(1.020,1.141) |        | 1.066(1.026,1.107) |        | 1.055(1.017,1.094) |        | 1.047(1.003,1.093) |        | 1.045(1.001,1.090) |        | 1.047(1.010,1.086) |        | 1.053(1.014,1.094) |        | 1.061(1.002,1.123) |        |
| SO <sub>2</sub>   | Male   | 0.967(0.865,1.080) |        | 1.058(0.991,1.130) |        | 1.146(1.088,1.208) |        | 1.215(1.140,1.295) |        | 1.248(1.169,1.332) |        | 1.242(1.175,1.313) |        | 1.210(1.135,1.290) |        | 1.166(1.052,1.293) |        |
|                   | Female | 0.994(0.888,1.113) |        | 1.063(0.994,1.136) |        | 1.129(1.070,1.190) |        | 1.182(1.108,1.261) |        | 1.212(1.135,1.295) |        | 1.218(1.152,1.288) |        | 1.207(1.132,1.288) |        | 1.188(1.070,1.319) |        |
|                   | Young  | 1.004(0.901,1.119) |        | 1.107(1.039,1.180) |        | 1.207(1.147,1.270) |        | 1.283(1.205,1.365) |        | 1.314(1.233,1.401) |        | 1.299(1.231,1.371) |        | 1.252(1.176,1.332) |        | 1.192(1.077,1.319) |        |
|                   | Old    | 0.931(0.830,1.044) |        | 0.988(0.923,1.058) |        | 1.043(0.988,1.101) |        | 1.091(1.021,1.165) |        | 1.123(1.050,1.202) |        | 1.140(1.077,1.207) |        | 1.146(1.073,1.224) |        | 1.146(1.031,1.273) |        |
| NO <sub>2</sub>   | Male   | 1.007(0.948,1.069) |        | 1.039(1.000,1.081) |        | 1.069(1.032,1.107) |        | 1.092(1.048,1.138) |        | 1.104(1.058,1.152) |        | 1.105(1.065,1.146) |        | 1.097(1.056,1.141) |        | 1.087(1.027,1.150) |        |
|                   | Female | 1.012(0.952,1.076) |        | 1.036(0.996,1.078) |        | 1.059(1.022,1.097) |        | 1.077(1.033,1.124) |        | 1.089(1.044,1.137) |        | 1.095(1.055,1.136) |        | 1.096(1.054,1.139) |        | 1.094(1.033,1.159) |        |
|                   | Young  | 0.993(0.934,1.056) |        | 1.035(0.995,1.077) |        | 1.074(1.036,1.113) |        | 1.104(1.059,1.152) |        | 1.121(1.074,1.170) |        | 1.123(1.082,1.165) |        | 1.114(1.072,1.159) |        | 1.101(1.040,1.167) |        |
|                   | Old    | 1.018(0.960,1.080) |        | 1.039(1.000,1.079) |        | 1.058(1.021,1.095) |        | 1.073(1.030,1.118) |        | 1.082(1.038,1.129) |        | 1.086(1.048,1.126) |        | 1.086(1.046,1.128) |        | 1.084(1.026,1.146) |        |
| O <sub>3</sub>    | Male   | 0.817(0.771,0.866) |        | 0.813(0.783,0.844) |        | 0.811(0.785,0.837) |        | 0.812(0.782,0.843) |        | 0.820(0.789,0.852) |        | 0.833(0.806,0.862) |        | 0.851(0.822,0.881) |        | 0.872(0.829,0.917) |        |
|                   | Female | 0.859(0.809,0.912) |        | 0.832(0.801,0.865) |        | 0.811(0.785,0.838) |        | 0.801(0.770,0.832) |        | 0.805(0.773,0.837) |        | 0.824(0.796,0.852) |        | 0.853(0.823,0.884) |        | 0.890(0.844,0.937) |        |
|                   | Young  | 0.828(0.780,0.880) |        | 0.822(0.792,0.854) |        | 0.819(0.793,0.846) |        | 0.820(0.789,0.852) |        | 0.827(0.795,0.860) |        | 0.841(0.812,0.870) |        | 0.859(0.829,0.890) |        | 0.881(0.836,0.928) |        |
|                   | Old    | 0.873(0.825,0.925) |        | 0.854(0.823,0.886) |        | 0.839(0.812,0.866) |        | 0.831(0.801,0.863) |        | 0.835(0.804,0.868) |        | 0.850(0.822,0.879) |        | 0.874(0.844,0.904) |        | 0.902(0.858,0.948) |        |

**Supplementary Table 34** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 4)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.014) |        | 0.993(0.965,1.021) |        | 0.991(0.959,1.024) |        | 0.992(0.957,1.027) |        | 0.993(0.957,1.031) |        | 0.996(0.958,1.035) |        | 1.000(0.963,1.038) |        | 1.005(0.969,1.042) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.986(0.958,1.014) |        | 0.989(0.957,1.023) |        | 0.998(0.963,1.034) |        | 1.006(0.968,1.045) |        | 1.011(0.972,1.051) |        | 1.009(0.971,1.048) |        | 0.999(0.963,1.037) |        |
|                         | Young  | 1.002(0.984,1.020) |        | 0.996(0.968,1.024) |        | 0.985(0.953,1.017) |        | 0.969(0.936,1.004) |        | 0.953(0.919,0.989) |        | 0.939(0.904,0.976) |        | 0.929(0.896,0.964) |        | 0.924(0.891,0.958) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.974(0.947,1.002) |        | 0.979(0.947,1.012) |        | 0.991(0.957,1.027) |        | 1.007(0.969,1.046) |        | 1.020(0.980,1.060) |        | 1.026(0.988,1.066) |        | 1.025(0.988,1.064) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.991(0.971,1.011) |        | 0.987(0.964,1.012) |        | 0.985(0.957,1.013) |        | 0.983(0.951,1.015) |        | 0.981(0.946,1.018) |        | 0.981(0.943,1.019) |        | 0.981(0.942,1.021) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.982(0.963,1.002) |        | 0.978(0.954,1.003) |        | 0.976(0.949,1.005) |        | 0.975(0.944,1.008) |        | 0.974(0.939,1.011) |        | 0.973(0.936,1.011) |        | 0.970(0.931,1.011) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.977,1.018) |        | 0.991(0.967,1.016) |        | 0.983(0.956,1.012) |        | 0.976(0.944,1.008) |        | 0.969(0.935,1.005) |        | 0.966(0.930,1.003) |        | 0.966(0.928,1.005) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.984(0.965,1.003) |        | 0.984(0.960,1.008) |        | 0.987(0.959,1.016) |        | 0.992(0.960,1.025) |        | 0.996(0.960,1.034) |        | 0.998(0.960,1.038) |        | 0.997(0.957,1.039) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.962(0.938,0.988) |        | 0.938(0.908,0.969) |        | 0.912(0.878,0.948) |        | 0.888(0.848,0.929) |        | 0.866(0.823,0.911) |        | 0.849(0.804,0.896) |        | 0.836(0.790,0.885) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.960(0.935,0.986) |        | 0.941(0.910,0.973) |        | 0.923(0.887,0.960) |        | 0.904(0.863,0.947) |        | 0.885(0.840,0.932) |        | 0.866(0.820,0.916) |        | 0.847(0.799,0.898) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.976(0.950,1.003) |        | 0.951(0.919,0.984) |        | 0.921(0.885,0.959) |        | 0.891(0.851,0.933) |        | 0.865(0.822,0.911) |        | 0.846(0.801,0.893) |        | 0.834(0.787,0.883) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.961(0.937,0.986) |        | 0.947(0.917,0.977) |        | 0.935(0.900,0.971) |        | 0.923(0.883,0.965) |        | 0.911(0.867,0.958) |        | 0.898(0.852,0.948) |        | 0.884(0.836,0.935) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.995(0.972,1.020) |        | 0.976(0.950,1.004) |        | 0.950(0.923,0.979) |        | 0.922(0.893,0.951) |        | 0.895(0.866,0.924) |        | 0.871(0.845,0.899) |        | 0.853(0.827,0.879) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.967,1.016) |        | 0.974(0.947,1.002) |        | 0.952(0.924,0.981) |        | 0.927(0.898,0.957) |        | 0.902(0.873,0.932) |        | 0.879(0.852,0.907) |        | 0.858(0.832,0.885) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.984(0.962,1.008) |        | 0.959(0.933,0.985) |        | 0.926(0.900,0.953) |        | 0.892(0.865,0.919) |        | 0.860(0.834,0.887) |        | 0.834(0.809,0.859) |        | 0.814(0.790,0.838) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.010(0.985,1.035) |        | 1.004(0.975,1.033) |        | 0.992(0.962,1.023) |        | 0.976(0.945,1.008) |        | 0.959(0.927,0.991) |        | 0.941(0.911,0.972) |        | 0.923(0.894,0.954) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.996(0.970,1.022) |        | 0.979(0.939,1.020) |        | 0.951(0.904,1.000) |        | 0.916(0.864,0.971) |        | 0.878(0.822,0.939) |        | 0.842(0.782,0.906) |        | 0.810(0.749,0.875) |        | 0.782(0.721,0.848) |        |
|                         | Female | 0.994(0.968,1.020) |        | 0.978(0.938,1.020) |        | 0.954(0.907,1.004) |        | 0.925(0.872,0.981) |        | 0.892(0.834,0.954) |        | 0.858(0.797,0.925) |        | 0.826(0.764,0.893) |        | 0.795(0.733,0.863) |        |
|                         | Young  | 1.002(0.976,1.029) |        | 0.987(0.946,1.030) |        | 0.957(0.910,1.008) |        | 0.918(0.865,0.974) |        | 0.874(0.818,0.935) |        | 0.833(0.773,0.896) |        | 0.795(0.736,0.859) |        | 0.763(0.704,0.827) |        |
|                         | Old    | 0.991(0.966,1.016) |        | 0.974(0.935,1.014) |        | 0.951(0.905,0.999) |        | 0.923(0.871,0.977) |        | 0.892(0.836,0.953) |        | 0.862(0.801,0.927) |        | 0.833(0.771,0.899) |        | 0.805(0.743,0.872) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.141(1.099,1.185) |        | 1.305(1.229,1.386) |        | 1.495(1.391,1.608) |        | 1.710(1.575,1.856) |        | 1.943(1.772,2.131) |        | 2.186(1.975,2.418) |        | 2.426(2.181,2.698) |        | 2.654(2.374,2.966) |        |
|                         | Female | 1.106(1.064,1.150) |        | 1.246(1.172,1.326) |        | 1.427(1.324,1.537) |        | 1.646(1.514,1.791) |        | 1.893(1.722,2.081) |        | 2.145(1.934,2.379) |        | 2.377(2.132,2.650) |        | 2.566(2.289,2.875) |        |
|                         | Young  | 1.132(1.089,1.178) |        | 1.287(1.209,1.369) |        | 1.465(1.359,1.578) |        | 1.665(1.531,1.810) |        | 1.881(1.712,2.066) |        | 2.103(1.898,2.330) |        | 2.320(2.084,2.583) |        | 2.520(2.253,2.819) |        |
|                         | Old    | 1.093(1.053,1.134) |        | 1.211(1.141,1.284) |        | 1.357(1.263,1.457) |        | 1.528(1.409,1.658) |        | 1.717(1.565,1.883) |        | 1.906(1.722,2.111) |        | 2.081(1.868,2.317) |        | 2.226(1.988,2.492) |        |

**Supplementary Table 35** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely low air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 4)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 0.995(0.977,1.014) |        | 0.997(0.986,1.008) |        | 0.999(0.990,1.007) |        | 1.000(0.990,1.011) |        | 1.002(0.991,1.013) |        | 1.003(0.994,1.012) |        | 1.004(0.994,1.014) |        | 1.005(0.988,1.022) |        |
|                         | Female | 0.989(0.970,1.007) |        | 0.997(0.986,1.008) |        | 1.004(0.995,1.013) |        | 1.008(0.997,1.019) |        | 1.008(0.997,1.020) |        | 1.005(0.995,1.014) |        | 0.998(0.988,1.009) |        | 0.990(0.974,1.007) |        |
|                         | Young  | 1.002(0.984,1.020) |        | 0.995(0.984,1.005) |        | 0.988(0.980,0.997) |        | 0.984(0.974,0.995) |        | 0.983(0.973,0.994) |        | 0.985(0.976,0.994) |        | 0.989(0.979,0.999) |        | 0.994(0.978,1.011) |        |
|                         | Old    | 0.981(0.963,0.999) |        | 0.994(0.983,1.004) |        | 1.005(0.996,1.014) |        | 1.013(1.002,1.024) |        | 1.015(1.004,1.027) |        | 1.013(1.004,1.022) |        | 1.007(0.996,1.017) |        | 0.999(0.982,1.016) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 0.995(0.983,1.007) |        | 0.996(0.988,1.004) |        | 0.997(0.989,1.004) |        | 0.997(0.989,1.006) |        | 0.998(0.989,1.007) |        | 0.999(0.991,1.006) |        | 0.999(0.991,1.007) |        | 1.000(0.989,1.011) |        |
|                         | Female | 0.990(0.977,1.002) |        | 0.993(0.985,1.001) |        | 0.996(0.988,1.003) |        | 0.998(0.989,1.007) |        | 0.999(0.990,1.008) |        | 0.999(0.991,1.007) |        | 0.998(0.990,1.006) |        | 0.997(0.986,1.009) |        |
|                         | Young  | 1.000(0.988,1.013) |        | 0.997(0.989,1.005) |        | 0.994(0.987,1.001) |        | 0.992(0.983,1.001) |        | 0.992(0.983,1.001) |        | 0.994(0.986,1.001) |        | 0.996(0.989,1.004) |        | 1.000(0.988,1.012) |        |
|                         | Old    | 0.989(0.977,1.001) |        | 0.995(0.987,1.003) |        | 1.000(0.992,1.007) |        | 1.003(0.995,1.012) |        | 1.005(0.996,1.014) |        | 1.004(0.996,1.012) |        | 1.002(0.994,1.010) |        | 0.999(0.988,1.011) |        |
| <b>PM<sub>10</sub></b>  | Male   | 0.983(0.968,0.999) |        | 0.979(0.968,0.989) |        | 0.975(0.965,0.985) |        | 0.973(0.961,0.984) |        | 0.973(0.961,0.985) |        | 0.976(0.966,0.986) |        | 0.980(0.969,0.991) |        | 0.985(0.970,1.002) |        |
|                         | Female | 0.980(0.964,0.996) |        | 0.980(0.969,0.991) |        | 0.980(0.970,0.991) |        | 0.980(0.968,0.992) |        | 0.980(0.968,0.992) |        | 0.979(0.969,0.990) |        | 0.979(0.968,0.990) |        | 0.978(0.962,0.994) |        |
|                         | Young  | 0.993(0.976,1.010) |        | 0.983(0.972,0.994) |        | 0.974(0.964,0.984) |        | 0.969(0.957,0.981) |        | 0.968(0.956,0.980) |        | 0.971(0.961,0.981) |        | 0.978(0.967,0.989) |        | 0.986(0.969,1.002) |        |
|                         | Old    | 0.979(0.964,0.994) |        | 0.982(0.972,0.993) |        | 0.985(0.975,0.995) |        | 0.987(0.975,0.999) |        | 0.988(0.976,1.000) |        | 0.987(0.977,0.997) |        | 0.986(0.975,0.996) |        | 0.984(0.968,1.000) |        |
| <b>SO<sub>2</sub></b>   | Male   | 1.004(0.988,1.019) |        | 0.992(0.983,1.001) |        | 0.981(0.974,0.988) |        | 0.973(0.965,0.982) |        | 0.970(0.961,0.979) |        | 0.971(0.963,0.978) |        | 0.974(0.965,0.983) |        | 0.979(0.965,0.993) |        |
|                         | Female | 1.000(0.984,1.016) |        | 0.991(0.982,1.000) |        | 0.983(0.976,0.990) |        | 0.977(0.968,0.986) |        | 0.974(0.965,0.983) |        | 0.973(0.966,0.981) |        | 0.974(0.966,0.983) |        | 0.976(0.962,0.991) |        |
|                         | Young  | 0.999(0.984,1.014) |        | 0.986(0.977,0.994) |        | 0.974(0.967,0.981) |        | 0.966(0.958,0.974) |        | 0.963(0.954,0.971) |        | 0.964(0.957,0.972) |        | 0.969(0.961,0.978) |        | 0.976(0.962,0.990) |        |
|                         | Old    | 1.009(0.993,1.025) |        | 1.001(0.992,1.011) |        | 0.994(0.986,1.001) |        | 0.988(0.979,0.997) |        | 0.984(0.975,0.993) |        | 0.982(0.974,0.990) |        | 0.981(0.973,0.990) |        | 0.981(0.967,0.996) |        |
| <b>NO<sub>2</sub></b>   | Male   | 0.996(0.970,1.022) |        | 0.983(0.967,0.999) |        | 0.972(0.957,0.986) |        | 0.963(0.946,0.981) |        | 0.959(0.942,0.977) |        | 0.959(0.944,0.974) |        | 0.962(0.946,0.978) |        | 0.966(0.942,0.989) |        |
|                         | Female | 0.994(0.968,1.020) |        | 0.984(0.968,1.001) |        | 0.976(0.961,0.991) |        | 0.969(0.952,0.987) |        | 0.965(0.947,0.983) |        | 0.963(0.947,0.978) |        | 0.962(0.946,0.978) |        | 0.962(0.939,0.986) |        |
|                         | Young  | 1.002(0.976,1.029) |        | 0.985(0.968,1.002) |        | 0.970(0.955,0.985) |        | 0.959(0.941,0.976) |        | 0.953(0.935,0.970) |        | 0.952(0.937,0.967) |        | 0.955(0.939,0.971) |        | 0.960(0.936,0.984) |        |
|                         | Old    | 0.991(0.966,1.016) |        | 0.983(0.967,0.999) |        | 0.976(0.962,0.991) |        | 0.971(0.954,0.988) |        | 0.967(0.950,0.985) |        | 0.966(0.951,0.981) |        | 0.966(0.950,0.982) |        | 0.967(0.944,0.990) |        |
| <b>O<sub>3</sub></b>    | Male   | 1.141(1.099,1.185) |        | 1.144(1.117,1.172) |        | 1.145(1.122,1.169) |        | 1.143(1.116,1.171) |        | 1.136(1.108,1.165) |        | 1.125(1.101,1.149) |        | 1.110(1.086,1.135) |        | 1.094(1.059,1.130) |        |
|                         | Female | 1.106(1.064,1.150) |        | 1.127(1.100,1.155) |        | 1.145(1.121,1.169) |        | 1.154(1.125,1.183) |        | 1.150(1.121,1.180) |        | 1.133(1.108,1.159) |        | 1.108(1.083,1.134) |        | 1.079(1.044,1.116) |        |
|                         | Young  | 1.132(1.089,1.178) |        | 1.136(1.109,1.165) |        | 1.138(1.115,1.162) |        | 1.137(1.109,1.165) |        | 1.130(1.101,1.159) |        | 1.118(1.094,1.143) |        | 1.103(1.078,1.129) |        | 1.086(1.050,1.124) |        |
|                         | Old    | 1.093(1.053,1.134) |        | 1.108(1.082,1.135) |        | 1.121(1.098,1.144) |        | 1.127(1.100,1.154) |        | 1.123(1.096,1.151) |        | 1.110(1.087,1.135) |        | 1.091(1.068,1.116) |        | 1.070(1.036,1.105) |        |

**Supplementary Table 36** Subgroup analysis by gender and age of cumulative lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 4)

| pollutant               | group  | Lag00              |        | Lag01              |        | Lag02              |        | Lag03              |        | Lag04              |        | Lag05              |        | Lag06              |        | Lag07              |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.021(0.938,1.112) |        | 1.035(0.907,1.181) |        | 1.041(0.894,1.213) |        | 1.040(0.883,1.225) |        | 1.032(0.867,1.229) |        | 1.018(0.850,1.220) |        | 1.000(0.840,1.190) |        | 0.977(0.824,1.159) |        |
|                         | Female | 1.055(0.968,1.150) |        | 1.070(0.936,1.224) |        | 1.051(0.900,1.227) |        | 1.012(0.857,1.194) |        | 0.973(0.815,1.161) |        | 0.952(0.793,1.143) |        | 0.960(0.804,1.146) |        | 1.005(0.845,1.195) |        |
|                         | Young  | 0.993(0.912,1.080) |        | 1.019(0.893,1.161) |        | 1.075(0.924,1.251) |        | 1.157(0.983,1.360) |        | 1.250(1.052,1.486) |        | 1.340(1.121,1.601) |        | 1.409(1.187,1.673) |        | 1.448(1.224,1.714) |        |
|                         | Old    | 1.096(1.006,1.193) |        | 1.129(0.990,1.289) |        | 1.104(0.947,1.287) |        | 1.041(0.883,1.227) |        | 0.969(0.812,1.156) |        | 0.913(0.761,1.096) |        | 0.885(0.742,1.057) |        | 0.890(0.748,1.060) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.029(0.958,1.106) |        | 1.055(0.940,1.185) |        | 1.077(0.934,1.242) |        | 1.095(0.927,1.292) |        | 1.108(0.915,1.342) |        | 1.117(0.903,1.383) |        | 1.122(0.895,1.406) |        | 1.122(0.886,1.422) |        |
|                         | Female | 1.063(0.988,1.144) |        | 1.109(0.986,1.248) |        | 1.137(0.984,1.314) |        | 1.151(0.973,1.362) |        | 1.158(0.954,1.405) |        | 1.164(0.939,1.444) |        | 1.175(0.935,1.477) |        | 1.194(0.940,1.516) |        |
|                         | Young  | 0.997(0.926,1.074) |        | 1.016(0.902,1.143) |        | 1.053(0.911,1.217) |        | 1.103(0.933,1.303) |        | 1.156(0.955,1.399) |        | 1.200(0.971,1.482) |        | 1.225(0.980,1.531) |        | 1.225(0.971,1.547) |        |
|                         | Old    | 1.067(0.994,1.145) |        | 1.100(0.981,1.234) |        | 1.101(0.956,1.269) |        | 1.079(0.914,1.275) |        | 1.049(0.864,1.273) |        | 1.023(0.824,1.270) |        | 1.011(0.803,1.272) |        | 1.015(0.797,1.292) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.125) |        | 1.147(1.045,1.260) |        | 1.258(1.119,1.413) |        | 1.390(1.210,1.596) |        | 1.534(1.304,1.805) |        | 1.676(1.397,2.011) |        | 1.802(1.484,2.187) |        | 1.899(1.548,2.329) |        |
|                         | Female | 1.076(1.014,1.142) |        | 1.156(1.051,1.273) |        | 1.243(1.103,1.400) |        | 1.335(1.159,1.539) |        | 1.437(1.217,1.697) |        | 1.548(1.285,1.866) |        | 1.673(1.372,2.039) |        | 1.811(1.470,2.232) |        |
|                         | Young  | 1.025(0.964,1.090) |        | 1.091(0.988,1.204) |        | 1.198(1.060,1.353) |        | 1.343(1.164,1.550) |        | 1.512(1.280,1.785) |        | 1.680(1.396,2.022) |        | 1.823(1.499,2.217) |        | 1.920(1.563,2.359) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.152(1.052,1.261) |        | 1.216(1.085,1.362) |        | 1.274(1.112,1.460) |        | 1.332(1.135,1.563) |        | 1.395(1.165,1.670) |        | 1.469(1.212,1.779) |        | 1.556(1.272,1.905) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.973(0.871,1.088) |        | 1.034(0.870,1.230) |        | 1.187(0.972,1.450) |        | 1.442(1.166,1.785) |        | 1.798(1.435,2.253) |        | 2.230(1.771,2.808) |        | 2.695(2.159,3.363) |        | 3.141(2.522,3.912) |        |
|                         | Female | 1.000(0.893,1.120) |        | 1.067(0.895,1.272) |        | 1.206(0.985,1.478) |        | 1.426(1.149,1.770) |        | 1.728(1.375,2.172) |        | 2.103(1.664,2.657) |        | 2.536(2.026,3.174) |        | 3.011(2.411,3.759) |        |
|                         | Young  | 1.008(0.904,1.124) |        | 1.119(0.946,1.325) |        | 1.353(1.114,1.642) |        | 1.735(1.411,2.134) |        | 2.280(1.831,2.838) |        | 2.959(2.365,3.702) |        | 3.703(2.986,4.591) |        | 4.412(3.568,5.457) |        |
|                         | Old    | 0.938(0.836,1.052) |        | 0.931(0.778,1.114) |        | 0.973(0.791,1.198) |        | 1.061(0.850,1.325) |        | 1.191(0.941,1.506) |        | 1.355(1.065,1.725) |        | 1.550(1.228,1.958) |        | 1.774(1.407,2.237) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.010(0.951,1.073) |        | 1.052(0.955,1.158) |        | 1.125(1.000,1.266) |        | 1.228(1.072,1.407) |        | 1.354(1.159,1.582) |        | 1.493(1.258,1.773) |        | 1.637(1.366,1.960) |        | 1.776(1.471,2.145) |        |
|                         | Female | 1.015(0.955,1.079) |        | 1.053(0.955,1.162) |        | 1.115(0.990,1.257) |        | 1.201(1.046,1.378) |        | 1.306(1.116,1.529) |        | 1.428(1.200,1.699) |        | 1.562(1.302,1.875) |        | 1.708(1.412,2.067) |        |
|                         | Young  | 0.995(0.935,1.058) |        | 1.031(0.934,1.137) |        | 1.107(0.982,1.248) |        | 1.221(1.065,1.401) |        | 1.367(1.169,1.599) |        | 1.533(1.290,1.822) |        | 1.708(1.425,2.046) |        | 1.880(1.557,2.270) |        |
|                         | Old    | 1.022(0.964,1.084) |        | 1.064(0.968,1.169) |        | 1.126(1.003,1.263) |        | 1.207(1.056,1.379) |        | 1.304(1.119,1.521) |        | 1.414(1.193,1.677) |        | 1.534(1.282,1.835) |        | 1.660(1.376,2.003) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.815(0.769,0.864) |        | 0.662(0.603,0.727) |        | 0.537(0.480,0.601) |        | 0.436(0.384,0.495) |        | 0.358(0.310,0.413) |        | 0.298(0.255,0.349) |        | 0.254(0.215,0.299) |        | 0.221(0.186,0.263) |        |
|                         | Female | 0.856(0.806,0.909) |        | 0.711(0.647,0.783) |        | 0.577(0.514,0.648) |        | 0.463(0.406,0.527) |        | 0.373(0.322,0.431) |        | 0.307(0.262,0.361) |        | 0.262(0.222,0.310) |        | 0.233(0.195,0.278) |        |
|                         | Young  | 0.825(0.776,0.877) |        | 0.677(0.615,0.746) |        | 0.554(0.494,0.622) |        | 0.455(0.399,0.518) |        | 0.376(0.326,0.435) |        | 0.317(0.270,0.371) |        | 0.272(0.231,0.321) |        | 0.239(0.201,0.285) |        |
|                         | Old    | 0.872(0.823,0.923) |        | 0.744(0.679,0.815) |        | 0.624(0.558,0.697) |        | 0.519(0.457,0.589) |        | 0.434(0.376,0.500) |        | 0.369(0.315,0.432) |        | 0.322(0.273,0.380) |        | 0.290(0.244,0.345) |        |

**Supplementary Table 37** Subgroup analysis by gender and age of single-day lagged relative risks (RRs) and 95% confidence intervals (CIs) for the impact of extremely high air pollution concentrations on CHD hospitalizations in Henan Province, 2016–2021(df of relative humidity = 4)

| pollutant               | group  | Lag0               |        | Lag1               |        | Lag2               |        | Lag3               |        | Lag4               |        | Lag5               |        | Lag6               |        | Lag7               |        |
|-------------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|--------------------|--------|
|                         |        | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI | RR                 | 95% CI |
| <b>CO</b>               | Male   | 1.021(0.938,1.112) |        | 1.013(0.964,1.066) |        | 1.006(0.966,1.047) |        | 0.999(0.950,1.050) |        | 0.992(0.943,1.044) |        | 0.987(0.946,1.030) |        | 0.982(0.936,1.030) |        | 0.977(0.904,1.056) |        |
|                         | Female | 1.055(0.968,1.150) |        | 1.015(0.964,1.068) |        | 0.982(0.942,1.023) |        | 0.962(0.915,1.013) |        | 0.961(0.913,1.013) |        | 0.979(0.937,1.022) |        | 1.009(0.961,1.059) |        | 1.047(0.967,1.132) |        |
|                         | Young  | 0.993(0.912,1.080) |        | 1.026(0.976,1.079) |        | 1.056(1.014,1.099) |        | 1.076(1.024,1.130) |        | 1.081(1.028,1.137) |        | 1.071(1.027,1.118) |        | 1.052(1.003,1.103) |        | 1.028(0.952,1.110) |        |
|                         | Old    | 1.096(1.006,1.193) |        | 1.031(0.980,1.084) |        | 0.978(0.938,1.019) |        | 0.943(0.896,0.991) |        | 0.931(0.884,0.980) |        | 0.942(0.903,0.984) |        | 0.969(0.924,1.017) |        | 1.005(0.930,1.087) |        |
| <b>PM<sub>2.5</sub></b> | Male   | 1.029(0.958,1.106) |        | 1.025(0.978,1.075) |        | 1.021(0.978,1.066) |        | 1.016(0.966,1.070) |        | 1.012(0.961,1.066) |        | 1.008(0.964,1.055) |        | 1.004(0.959,1.052) |        | 1.000(0.936,1.069) |        |
|                         | Female | 1.063(0.988,1.144) |        | 1.043(0.994,1.094) |        | 1.025(0.982,1.071) |        | 1.012(0.961,1.066) |        | 1.006(0.954,1.060) |        | 1.005(0.961,1.052) |        | 1.010(0.963,1.058) |        | 1.016(0.950,1.086) |        |
|                         | Young  | 0.997(0.926,1.074) |        | 1.018(0.971,1.068) |        | 1.037(0.993,1.082) |        | 1.048(0.996,1.102) |        | 1.048(0.995,1.104) |        | 1.038(0.992,1.086) |        | 1.021(0.974,1.069) |        | 1.000(0.935,1.070) |        |
|                         | Old    | 1.067(0.994,1.145) |        | 1.031(0.984,1.081) |        | 1.001(0.958,1.046) |        | 0.980(0.931,1.032) |        | 0.972(0.922,1.024) |        | 0.976(0.932,1.021) |        | 0.988(0.943,1.034) |        | 1.004(0.941,1.072) |        |
| <b>PM<sub>10</sub></b>  | Male   | 1.062(1.002,1.125) |        | 1.080(1.039,1.123) |        | 1.096(1.056,1.137) |        | 1.105(1.058,1.154) |        | 1.104(1.057,1.153) |        | 1.093(1.053,1.134) |        | 1.075(1.034,1.118) |        | 1.054(0.994,1.117) |        |
|                         | Female | 1.076(1.014,1.142) |        | 1.075(1.033,1.118) |        | 1.075(1.035,1.116) |        | 1.075(1.028,1.124) |        | 1.076(1.029,1.125) |        | 1.078(1.037,1.120) |        | 1.080(1.038,1.124) |        | 1.083(1.020,1.150) |        |
|                         | Young  | 1.025(0.964,1.090) |        | 1.064(1.022,1.108) |        | 1.098(1.058,1.141) |        | 1.121(1.072,1.172) |        | 1.126(1.076,1.177) |        | 1.111(1.070,1.154) |        | 1.085(1.042,1.129) |        | 1.053(0.991,1.119) |        |
|                         | Old    | 1.080(1.021,1.142) |        | 1.067(1.027,1.108) |        | 1.056(1.018,1.095) |        | 1.048(1.004,1.094) |        | 1.045(1.001,1.091) |        | 1.047(1.010,1.087) |        | 1.053(1.013,1.094) |        | 1.060(1.001,1.122) |        |
| <b>SO<sub>2</sub></b>   | Male   | 0.973(0.871,1.088) |        | 1.063(0.995,1.135) |        | 1.148(1.090,1.209) |        | 1.215(1.140,1.295) |        | 1.246(1.168,1.331) |        | 1.240(1.174,1.311) |        | 1.209(1.134,1.288) |        | 1.165(1.051,1.292) |        |
|                         | Female | 1.000(0.893,1.120) |        | 1.067(0.998,1.141) |        | 1.131(1.072,1.192) |        | 1.182(1.108,1.261) |        | 1.212(1.134,1.295) |        | 1.217(1.151,1.287) |        | 1.206(1.131,1.287) |        | 1.187(1.069,1.318) |        |
|                         | Young  | 1.008(0.904,1.124) |        | 1.110(1.042,1.184) |        | 1.208(1.148,1.271) |        | 1.283(1.205,1.366) |        | 1.314(1.232,1.401) |        | 1.298(1.230,1.370) |        | 1.251(1.176,1.332) |        | 1.192(1.077,1.319) |        |
|                         | Old    | 0.938(0.836,1.052) |        | 0.993(0.927,1.063) |        | 1.045(0.990,1.103) |        | 1.090(1.021,1.164) |        | 1.122(1.049,1.200) |        | 1.138(1.075,1.205) |        | 1.144(1.071,1.222) |        | 1.144(1.030,1.272) |        |
| <b>NO<sub>2</sub></b>   | Male   | 1.010(0.951,1.073) |        | 1.041(1.001,1.083) |        | 1.070(1.033,1.108) |        | 1.091(1.047,1.138) |        | 1.103(1.057,1.150) |        | 1.103(1.063,1.144) |        | 1.096(1.054,1.139) |        | 1.085(1.025,1.148) |        |
|                         | Female | 1.015(0.955,1.079) |        | 1.038(0.997,1.080) |        | 1.059(1.022,1.097) |        | 1.076(1.032,1.123) |        | 1.088(1.042,1.136) |        | 1.093(1.053,1.135) |        | 1.094(1.052,1.138) |        | 1.093(1.032,1.158) |        |
|                         | Young  | 0.995(0.935,1.058) |        | 1.036(0.996,1.078) |        | 1.074(1.036,1.113) |        | 1.104(1.058,1.151) |        | 1.120(1.072,1.169) |        | 1.121(1.081,1.164) |        | 1.113(1.071,1.158) |        | 1.101(1.039,1.166) |        |
|                         | Old    | 1.022(0.964,1.084) |        | 1.041(1.002,1.081) |        | 1.058(1.022,1.095) |        | 1.072(1.029,1.117) |        | 1.081(1.037,1.127) |        | 1.084(1.046,1.125) |        | 1.084(1.044,1.126) |        | 1.082(1.024,1.144) |        |
| <b>O<sub>3</sub></b>    | Male   | 0.815(0.769,0.864) |        | 0.812(0.783,0.843) |        | 0.811(0.785,0.837) |        | 0.813(0.783,0.844) |        | 0.820(0.789,0.853) |        | 0.834(0.806,0.862) |        | 0.851(0.822,0.881) |        | 0.871(0.828,0.915) |        |
|                         | Female | 0.856(0.806,0.909) |        | 0.831(0.800,0.863) |        | 0.811(0.785,0.838) |        | 0.801(0.771,0.833) |        | 0.806(0.774,0.838) |        | 0.824(0.796,0.853) |        | 0.853(0.823,0.884) |        | 0.889(0.843,0.936) |        |
|                         | Young  | 0.825(0.776,0.877) |        | 0.821(0.790,0.853) |        | 0.819(0.792,0.846) |        | 0.820(0.789,0.853) |        | 0.828(0.796,0.861) |        | 0.841(0.813,0.871) |        | 0.859(0.829,0.890) |        | 0.880(0.835,0.927) |        |
|                         | Old    | 0.872(0.823,0.923) |        | 0.853(0.823,0.885) |        | 0.839(0.812,0.866) |        | 0.832(0.801,0.863) |        | 0.836(0.804,0.868) |        | 0.851(0.823,0.879) |        | 0.873(0.844,0.904) |        | 0.901(0.857,0.947) |        |

**Supplementary Table 38** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 5)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.988 | (0.972,1.004) | 0.993             | (0.982,1.004) | 0.982            | (0.968,0.996) | 0.999           | (0.985,1.013) | 0.986           | (0.963,1.009) | 1.135          | (1.096,1.174) |
| lag1     | 1.000 | (0.991,1.010) | 0.998             | (0.990,1.006) | 0.979            | (0.968,0.989) | 0.981           | (0.973,0.989) | 0.972           | (0.957,0.988) | 1.140          | (1.116,1.166) |
| lag2     | 1.008 | (0.998,1.018) | 1.001             | (0.993,1.010) | 0.976            | (0.965,0.988) | 0.969           | (0.961,0.977) | 0.962           | (0.946,0.979) | 1.143          | (1.116,1.170) |
| lag3     | 1.007 | (0.997,1.018) | 1.001             | (0.993,1.010) | 0.977            | (0.966,0.989) | 0.966           | (0.958,0.975) | 0.960           | (0.944,0.977) | 1.138          | (1.111,1.166) |
| lag4     | 0.998 | (0.988,1.007) | 0.999             | (0.991,1.006) | 0.981            | (0.970,0.991) | 0.974           | (0.966,0.982) | 0.966           | (0.951,0.981) | 1.127          | (1.103,1.152) |
| lag5     | 0.984 | (0.969,0.999) | 0.995             | (0.985,1.005) | 0.985            | (0.972,1.000) | 0.986           | (0.974,0.999) | 0.975           | (0.954,0.997) | 1.113          | (1.080,1.146) |
| Lag01    | 0.988 | (0.964,1.012) | 0.991             | (0.974,1.009) | 0.961            | (0.939,0.984) | 0.980           | (0.960,1.000) | 0.958           | (0.924,0.994) | 1.294          | (1.227,1.364) |
| Lag02    | 0.996 | (0.968,1.025) | 0.992             | (0.970,1.015) | 0.938            | (0.910,0.968) | 0.949           | (0.927,0.972) | 0.922           | (0.880,0.966) | 1.479          | (1.385,1.578) |
| Lag03    | 1.004 | (0.973,1.035) | 0.994             | (0.967,1.021) | 0.917            | (0.883,0.952) | 0.917           | (0.894,0.941) | 0.885           | (0.837,0.936) | 1.683          | (1.559,1.817) |
| Lag04    | 1.001 | (0.970,1.034) | 0.993             | (0.962,1.023) | 0.899            | (0.861,0.939) | 0.893           | (0.870,0.917) | 0.855           | (0.804,0.910) | 1.897          | (1.742,2.066) |
| Lag05    | 0.985 | (0.954,1.017) | 0.987             | (0.955,1.020) | 0.886            | (0.846,0.928) | 0.881           | (0.858,0.905) | 0.834           | (0.781,0.890) | 2.111          | (1.926,2.314) |

**Supplementary Table 39** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 5)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.060 | (0.983,1.142) | 1.041             | (0.976,1.110) | 1.067            | (1.013,1.124) | 1.010           | (0.914,1.116) | 1.034           | (0.980,1.091) | 0.822          | (0.780,0.867) |
| lag1     | 0.999 | (0.956,1.045) | 1.012             | (0.968,1.059) | 1.081            | (1.041,1.122) | 1.147           | (1.084,1.215) | 1.069           | (1.030,1.109) | 0.816          | (0.789,0.844) |
| lag2     | 0.962 | (0.919,1.007) | 0.993             | (0.946,1.043) | 1.089            | (1.044,1.136) | 1.256           | (1.183,1.334) | 1.094           | (1.051,1.139) | 0.814          | (0.785,0.844) |
| lag3     | 0.966 | (0.922,1.012) | 0.991             | (0.944,1.042) | 1.087            | (1.042,1.134) | 1.279           | (1.203,1.360) | 1.099           | (1.056,1.144) | 0.819          | (0.789,0.850) |
| lag4     | 1.010 | (0.967,1.056) | 1.007             | (0.963,1.053) | 1.073            | (1.033,1.114) | 1.210           | (1.143,1.281) | 1.085           | (1.046,1.125) | 0.831          | (0.804,0.859) |
| lag5     | 1.079 | (1.007,1.157) | 1.031             | (0.971,1.095) | 1.054            | (1.002,1.109) | 1.104           | (1.005,1.212) | 1.060           | (1.007,1.117) | 0.847          | (0.809,0.887) |
| Lag01    | 1.059 | (0.946,1.185) | 1.054             | (0.951,1.169) | 1.153            | (1.060,1.255) | 1.158           | (0.999,1.343) | 1.105           | (1.015,1.203) | 0.671          | (0.619,0.728) |
| Lag02    | 1.019 | (0.893,1.162) | 1.047             | (0.917,1.196) | 1.256            | (1.125,1.403) | 1.455           | (1.228,1.725) | 1.209           | (1.084,1.348) | 0.546          | (0.494,0.604) |
| Lag03    | 0.984 | (0.851,1.138) | 1.038             | (0.884,1.219) | 1.365            | (1.191,1.564) | 1.861           | (1.546,2.242) | 1.329           | (1.166,1.514) | 0.447          | (0.397,0.503) |
| Lag04    | 0.994 | (0.857,1.153) | 1.045             | (0.873,1.251) | 1.464            | (1.255,1.708) | 2.253           | (1.866,2.720) | 1.441           | (1.248,1.665) | 0.371          | (0.326,0.424) |
| Lag05    | 1.073 | (0.926,1.243) | 1.078             | (0.889,1.307) | 1.543            | (1.308,1.821) | 2.486           | (2.057,3.005) | 1.529           | (1.311,1.782) | 0.315          | (0.273,0.363) |

**Supplementary Table 40** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 6)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.989 | (0.973,1.005) | 0.994             | (0.983,1.005) | 0.984            | (0.970,0.999) | 1.002           | (0.988,1.016) | 0.991           | (0.968,1.014) | 1.119          | (1.081,1.158) |
| lag1     | 0.997 | (0.988,1.006) | 0.996             | (0.989,1.004) | 0.981            | (0.971,0.991) | 0.989           | (0.981,0.997) | 0.977           | (0.962,0.991) | 1.137          | (1.112,1.162) |
| lag2     | 1.003 | (0.994,1.012) | 0.999             | (0.991,1.006) | 0.978            | (0.968,0.989) | 0.978           | (0.971,0.985) | 0.965           | (0.951,0.980) | 1.148          | (1.125,1.173) |
| lag3     | 1.005 | (0.995,1.015) | 1.000             | (0.992,1.008) | 0.977            | (0.966,0.989) | 0.971           | (0.963,0.979) | 0.959           | (0.943,0.976) | 1.148          | (1.121,1.175) |
| lag4     | 1.003 | (0.993,1.012) | 1.000             | (0.992,1.008) | 0.978            | (0.968,0.989) | 0.971           | (0.963,0.978) | 0.960           | (0.945,0.975) | 1.130          | (1.106,1.155) |
| lag5     | 0.996 | (0.987,1.005) | 0.998             | (0.991,1.006) | 0.981            | (0.971,0.991) | 0.975           | (0.967,0.982) | 0.967           | (0.952,0.981) | 1.100          | (1.078,1.124) |
| Lag6     | 0.988 | (0.973,1.003) | 0.996             | (0.986,1.007) | 0.985            | (0.970,0.999) | 0.981           | (0.968,0.994) | 0.976           | (0.955,0.997) | 1.066          | (1.035,1.098) |
| Lag01    | 0.986 | (0.962,1.011) | 0.990             | (0.973,1.008) | 0.965            | (0.943,0.988) | 0.991           | (0.970,1.012) | 0.968           | (0.933,1.004) | 1.272          | (1.205,1.342) |
| Lag02    | 0.989 | (0.961,1.018) | 0.989             | (0.967,1.011) | 0.944            | (0.916,0.973) | 0.969           | (0.945,0.993) | 0.934           | (0.893,0.977) | 1.461          | (1.368,1.560) |
| Lag03    | 0.994 | (0.964,1.026) | 0.989             | (0.963,1.015) | 0.923            | (0.890,0.957) | 0.941           | (0.916,0.966) | 0.896           | (0.849,0.945) | 1.676          | (1.554,1.808) |
| Lag04    | 0.997 | (0.964,1.030) | 0.989             | (0.959,1.019) | 0.903            | (0.865,0.942) | 0.913           | (0.888,0.939) | 0.860           | (0.809,0.914) | 1.894          | (1.739,2.063) |
| Lag05    | 0.993 | (0.961,1.026) | 0.987             | (0.955,1.020) | 0.886            | (0.846,0.928) | 0.890           | (0.866,0.915) | 0.832           | (0.779,0.888) | 2.084          | (1.902,2.284) |
| Lag06    | 0.981 | (0.950,1.013) | 0.984             | (0.950,1.018) | 0.872            | (0.831,0.916) | 0.873           | (0.850,0.897) | 0.811           | (0.757,0.870) | 2.221          | (2.018,2.446) |

**Supplementary Table 41** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 6)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.052 | (0.975,1.135) | 1.039             | (0.974,1.108) | 1.058            | (1.004,1.115) | 0.984           | (0.890,1.089) | 1.022           | (0.968,1.078) | 0.840          | (0.797,0.886) |
| lag1     | 1.014 | (0.970,1.060) | 1.021             | (0.978,1.066) | 1.072            | (1.034,1.111) | 1.085           | (1.024,1.150) | 1.057           | (1.020,1.094) | 0.820          | (0.793,0.848) |
| lag2     | 0.986 | (0.947,1.027) | 1.007             | (0.964,1.051) | 1.082            | (1.042,1.124) | 1.177           | (1.117,1.240) | 1.086           | (1.049,1.125) | 0.807          | (0.782,0.834) |
| lag3     | 0.976 | (0.931,1.023) | 0.999             | (0.952,1.050) | 1.086            | (1.041,1.133) | 1.234           | (1.161,1.312) | 1.102           | (1.059,1.147) | 0.808          | (0.779,0.838) |
| lag4     | 0.988 | (0.947,1.031) | 1.001             | (0.957,1.047) | 1.082            | (1.042,1.123) | 1.239           | (1.173,1.309) | 1.099           | (1.060,1.140) | 0.828          | (0.800,0.856) |
| lag5     | 1.018 | (0.975,1.064) | 1.009             | (0.967,1.054) | 1.071            | (1.033,1.110) | 1.203           | (1.136,1.274) | 1.083           | (1.045,1.121) | 0.862          | (0.835,0.891) |
| Lag6     | 1.059 | (0.987,1.135) | 1.021             | (0.961,1.085) | 1.057            | (1.003,1.113) | 1.149           | (1.046,1.262) | 1.059           | (1.006,1.115) | 0.906          | (0.866,0.949) |
| Lag01    | 1.067 | (0.950,1.198) | 1.060             | (0.956,1.176) | 1.135            | (1.043,1.235) | 1.068           | (0.917,1.245) | 1.080           | (0.992,1.175) | 0.689          | (0.634,0.749) |
| Lag02    | 1.052 | (0.920,1.203) | 1.068             | (0.938,1.215) | 1.228            | (1.102,1.367) | 1.257           | (1.054,1.499) | 1.173           | (1.056,1.302) | 0.556          | (0.503,0.616) |
| Lag03    | 1.027 | (0.887,1.189) | 1.067             | (0.914,1.246) | 1.333            | (1.169,1.521) | 1.552           | (1.283,1.877) | 1.292           | (1.141,1.464) | 0.450          | (0.400,0.506) |
| Lag04    | 1.015 | (0.870,1.185) | 1.068             | (0.894,1.276) | 1.442            | (1.238,1.680) | 1.922           | (1.574,2.347) | 1.421           | (1.232,1.638) | 0.372          | (0.326,0.425) |
| Lag05    | 1.034 | (0.887,1.204) | 1.078             | (0.889,1.307) | 1.544            | (1.309,1.821) | 2.312           | (1.902,2.812) | 1.538           | (1.319,1.792) | 0.321          | (0.279,0.370) |
| Lag06    | 1.094 | (0.941,1.272) | 1.101             | (0.898,1.350) | 1.632            | (1.372,1.942) | 2.657           | (2.188,3.227) | 1.629           | (1.386,1.915) | 0.291          | (0.251,0.338) |

**Supplementary Table 42** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 7)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.991 | (0.975,1.007) | 0.994             | (0.983,1.005) | 0.985            | (0.970,0.999) | 1.004           | (0.990,1.018) | 0.996           | (0.973,1.019) | 1.111          | (1.074,1.149) |
| lag1     | 0.995 | (0.985,1.004) | 0.996             | (0.988,1.003) | 0.982            | (0.972,0.992) | 0.993           | (0.985,1.001) | 0.984           | (0.969,0.998) | 1.123          | (1.099,1.147) |
| lag2     | 0.998 | (0.990,1.006) | 0.997             | (0.991,1.004) | 0.980            | (0.971,0.989) | 0.984           | (0.977,0.990) | 0.973           | (0.960,0.986) | 1.131          | (1.111,1.152) |
| lag3     | 1.000 | (0.991,1.010) | 0.998             | (0.991,1.006) | 0.978            | (0.968,0.989) | 0.977           | (0.969,0.985) | 0.965           | (0.950,0.980) | 1.135          | (1.110,1.160) |
| lag4     | 1.001 | (0.991,1.011) | 0.999             | (0.991,1.007) | 0.978            | (0.968,0.989) | 0.973           | (0.965,0.981) | 0.960           | (0.945,0.976) | 1.130          | (1.105,1.156) |
| lag5     | 1.000 | (0.992,1.009) | 1.000             | (0.993,1.006) | 0.980            | (0.971,0.989) | 0.973           | (0.966,0.980) | 0.959           | (0.946,0.973) | 1.117          | (1.096,1.139) |
| Lag6     | 0.999 | (0.990,1.008) | 1.000             | (0.993,1.007) | 0.982            | (0.972,0.991) | 0.975           | (0.968,0.983) | 0.961           | (0.947,0.975) | 1.099          | (1.077,1.121) |
| Lag7     | 0.997 | (0.982,1.012) | 0.999             | (0.989,1.010) | 0.984            | (0.970,0.999) | 0.979           | (0.966,0.991) | 0.963           | (0.942,0.984) | 1.079          | (1.047,1.111) |
| Lag01    | 0.985 | (0.961,1.011) | 0.990             | (0.972,1.007) | 0.967            | (0.944,0.990) | 0.997           | (0.975,1.018) | 0.979           | (0.944,1.016) | 1.247          | (1.182,1.316) |
| Lag02    | 0.983 | (0.955,1.012) | 0.987             | (0.965,1.009) | 0.947            | (0.920,0.975) | 0.980           | (0.956,1.005) | 0.953           | (0.911,0.997) | 1.411          | (1.322,1.506) |
| Lag03    | 0.983 | (0.953,1.015) | 0.985             | (0.960,1.011) | 0.927            | (0.895,0.960) | 0.958           | (0.932,0.984) | 0.919           | (0.873,0.968) | 1.601          | (1.487,1.723) |
| Lag04    | 0.984 | (0.952,1.018) | 0.984             | (0.956,1.014) | 0.907            | (0.871,0.944) | 0.932           | (0.906,0.959) | 0.883           | (0.832,0.937) | 1.809          | (1.665,1.965) |
| Lag05    | 0.985 | (0.951,1.019) | 0.984             | (0.952,1.017) | 0.888            | (0.849,0.930) | 0.907           | (0.881,0.934) | 0.847           | (0.793,0.904) | 2.021          | (1.845,2.213) |
| Lag06    | 0.984 | (0.951,1.017) | 0.984             | (0.950,1.018) | 0.872            | (0.831,0.915) | 0.885           | (0.860,0.910) | 0.813           | (0.759,0.871) | 2.221          | (2.019,2.444) |
| Lag07    | 0.980 | (0.949,1.013) | 0.983             | (0.948,1.019) | 0.859            | (0.816,0.903) | 0.866           | (0.842,0.890) | 0.783           | (0.729,0.842) | 2.396          | (2.168,2.649) |

**Supplementary Table 43** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 7)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.044 | (0.968,1.127) | 1.037             | (0.971,1.106) | 1.057            | (1.003,1.114) | 0.975           | (0.882,1.078) | 1.010           | (0.958,1.066) | 0.850          | (0.806,0.895) |
| lag1     | 1.026 | (0.981,1.073) | 1.026             | (0.984,1.071) | 1.067            | (1.031,1.105) | 1.052           | (0.991,1.116) | 1.039           | (1.004,1.076) | 0.836          | (0.809,0.865) |
| lag2     | 1.010 | (0.974,1.048) | 1.017             | (0.978,1.057) | 1.076            | (1.041,1.112) | 1.125           | (1.074,1.179) | 1.066           | (1.033,1.100) | 0.826          | (0.803,0.850) |
| lag3     | 0.999 | (0.956,1.045) | 1.009             | (0.964,1.057) | 1.081            | (1.040,1.124) | 1.184           | (1.118,1.254) | 1.087           | (1.047,1.128) | 0.822          | (0.795,0.851) |
| lag4     | 0.995 | (0.951,1.042) | 1.005             | (0.959,1.053) | 1.081            | (1.040,1.125) | 1.215           | (1.146,1.289) | 1.099           | (1.058,1.142) | 0.828          | (0.800,0.857) |
| lag5     | 0.998 | (0.961,1.037) | 1.003             | (0.963,1.044) | 1.076            | (1.041,1.113) | 1.216           | (1.157,1.278) | 1.102           | (1.066,1.139) | 0.843          | (0.818,0.868) |
| Lag6     | 1.005 | (0.963,1.049) | 1.002             | (0.962,1.045) | 1.068            | (1.031,1.106) | 1.197           | (1.130,1.267) | 1.098           | (1.061,1.137) | 0.864          | (0.838,0.891) |
| Lag7     | 1.015 | (0.947,1.088) | 1.003             | (0.945,1.065) | 1.058            | (1.004,1.115) | 1.168           | (1.065,1.282) | 1.092           | (1.038,1.148) | 0.889          | (0.850,0.931) |
| Lag01    | 1.071 | (0.952,1.206) | 1.064             | (0.958,1.180) | 1.129            | (1.037,1.228) | 1.025           | (0.877,1.198) | 1.050           | (0.964,1.145) | 0.711          | (0.654,0.772) |
| Lag02    | 1.082 | (0.944,1.241) | 1.082             | (0.951,1.229) | 1.214            | (1.093,1.349) | 1.154           | (0.964,1.381) | 1.120           | (1.008,1.243) | 0.587          | (0.531,0.649) |
| Lag03    | 1.082 | (0.934,1.252) | 1.092             | (0.940,1.267) | 1.313            | (1.159,1.487) | 1.366           | (1.127,1.655) | 1.217           | (1.078,1.374) | 0.483          | (0.431,0.541) |
| Lag04    | 1.077 | (0.921,1.259) | 1.097             | (0.924,1.302) | 1.420            | (1.227,1.643) | 1.660           | (1.354,2.034) | 1.338           | (1.165,1.536) | 0.400          | (0.352,0.454) |
| Lag05    | 1.075 | (0.914,1.263) | 1.100             | (0.908,1.331) | 1.528            | (1.298,1.799) | 2.018           | (1.639,2.485) | 1.474           | (1.265,1.718) | 0.337          | (0.293,0.388) |
| Lag06    | 1.080 | (0.924,1.263) | 1.102             | (0.900,1.350) | 1.633            | (1.373,1.941) | 2.415           | (1.977,2.951) | 1.619           | (1.379,1.902) | 0.291          | (0.251,0.337) |
| Lag07    | 1.097 | (0.941,1.278) | 1.106             | (0.894,1.367) | 1.728            | (1.440,2.073) | 2.821           | (2.314,3.440) | 1.768           | (1.495,2.091) | 0.259          | (0.222,0.302) |

**Supplementary Table 44** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 8)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.993 | (0.977,1.009) | 0.995             | (0.984,1.006) | 0.986            | (0.972,1.000) | 1.004           | (0.990,1.018) | 0.999           | (0.976,1.022) | 1.105          | (1.068,1.142) |
| lag1     | 0.995 | (0.985,1.005) | 0.996             | (0.989,1.003) | 0.983            | (0.973,0.993) | 0.992           | (0.984,1.000) | 0.984           | (0.970,1.000) | 1.111          | (1.087,1.135) |
| lag2     | 0.997 | (0.989,1.004) | 0.997             | (0.991,1.003) | 0.980            | (0.972,0.989) | 0.981           | (0.975,0.987) | 0.972           | (0.960,0.984) | 1.116          | (1.097,1.136) |
| lag3     | 0.998 | (0.990,1.007) | 0.998             | (0.991,1.005) | 0.979            | (0.969,0.988) | 0.974           | (0.967,0.981) | 0.963           | (0.949,0.977) | 1.120          | (1.098,1.142) |
| lag4     | 0.999 | (0.990,1.009) | 0.999             | (0.991,1.007) | 0.978            | (0.968,0.989) | 0.970           | (0.962,0.978) | 0.958           | (0.943,0.973) | 1.120          | (1.096,1.145) |
| lag5     | 1.000 | (0.991,1.009) | 0.999             | (0.992,1.007) | 0.979            | (0.970,0.989) | 0.972           | (0.965,0.980) | 0.959           | (0.945,0.973) | 1.117          | (1.095,1.141) |
| Lag6     | 1.000 | (0.992,1.007) | 0.999             | (0.993,1.005) | 0.982            | (0.974,0.990) | 0.979           | (0.973,0.985) | 0.964           | (0.952,0.976) | 1.112          | (1.092,1.132) |
| Lag7     | 1.000 | (0.990,1.009) | 0.999             | (0.992,1.006) | 0.985            | (0.976,0.995) | 0.988           | (0.981,0.996) | 0.972           | (0.958,0.987) | 1.104          | (1.082,1.126) |
| Lag8     | 0.999 | (0.985,1.015) | 0.998             | (0.988,1.008) | 0.989            | (0.975,1.003) | 0.999           | (0.987,1.012) | 0.982           | (0.961,1.004) | 1.096          | (1.064,1.128) |
| Lag01    | 0.988 | (0.962,1.013) | 0.990             | (0.973,1.008) | 0.969            | (0.946,0.992) | 0.996           | (0.974,1.018) | 0.983           | (0.947,1.021) | 1.227          | (1.163,1.296) |
| Lag02    | 0.984 | (0.955,1.015) | 0.988             | (0.966,1.010) | 0.950            | (0.922,0.979) | 0.977           | (0.953,1.002) | 0.956           | (0.913,1.001) | 1.370          | (1.283,1.463) |
| Lag03    | 0.982 | (0.951,1.015) | 0.986             | (0.961,1.011) | 0.930            | (0.898,0.962) | 0.951           | (0.926,0.977) | 0.920           | (0.873,0.969) | 1.534          | (1.426,1.651) |
| Lag04    | 0.982 | (0.948,1.016) | 0.985             | (0.957,1.014) | 0.910            | (0.874,0.946) | 0.923           | (0.897,0.950) | 0.881           | (0.831,0.934) | 1.719          | (1.585,1.865) |
| Lag05    | 0.981 | (0.947,1.017) | 0.984             | (0.953,1.017) | 0.891            | (0.852,0.932) | 0.898           | (0.872,0.925) | 0.844           | (0.791,0.901) | 1.921          | (1.756,2.101) |
| Lag06    | 0.981 | (0.946,1.018) | 0.983             | (0.950,1.018) | 0.875            | (0.833,0.918) | 0.879           | (0.853,0.905) | 0.814           | (0.759,0.873) | 2.136          | (1.940,2.351) |
| Lag07    | 0.981 | (0.948,1.015) | 0.982             | (0.947,1.018) | 0.862            | (0.819,0.906) | 0.869           | (0.844,0.894) | 0.792           | (0.737,0.850) | 2.358          | (2.135,2.605) |
| Lag08    | 0.981 | (0.949,1.014) | 0.981             | (0.945,1.018) | 0.852            | (0.809,0.898) | 0.868           | (0.844,0.893) | 0.778           | (0.722,0.837) | 2.584          | (2.331,2.865) |

**Supplementary Table 45** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 8)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.034 | (0.959,1.116) | 1.033             | (0.968,1.102) | 1.052            | (0.999,1.108) | 0.971           | (0.880,1.073) | 1.003           | (0.951,1.058) | 0.857          | (0.814,0.903) |
| lag1     | 1.025 | (0.978,1.074) | 1.024             | (0.981,1.069) | 1.064            | (1.027,1.102) | 1.061           | (0.999,1.127) | 1.037           | (1.001,1.075) | 0.850          | (0.822,0.879) |
| lag2     | 1.016 | (0.982,1.051) | 1.016             | (0.980,1.054) | 1.074            | (1.042,1.107) | 1.146           | (1.098,1.197) | 1.069           | (1.038,1.100) | 0.844          | (0.822,0.866) |
| lag3     | 1.009 | (0.969,1.050) | 1.010             | (0.969,1.053) | 1.081            | (1.043,1.119) | 1.212           | (1.152,1.276) | 1.093           | (1.057,1.131) | 0.839          | (0.815,0.865) |
| lag4     | 1.004 | (0.959,1.050) | 1.006             | (0.961,1.054) | 1.082            | (1.041,1.124) | 1.242           | (1.171,1.317) | 1.106           | (1.065,1.148) | 0.839          | (0.811,0.868) |
| lag5     | 1.001 | (0.960,1.043) | 1.004             | (0.963,1.048) | 1.078            | (1.040,1.116) | 1.223           | (1.159,1.290) | 1.104           | (1.066,1.142) | 0.842          | (0.816,0.869) |
| Lag6     | 1.000 | (0.966,1.036) | 1.005             | (0.969,1.042) | 1.068            | (1.036,1.100) | 1.166           | (1.114,1.220) | 1.089           | (1.057,1.122) | 0.849          | (0.826,0.872) |
| Lag7     | 1.001 | (0.958,1.046) | 1.007             | (0.967,1.048) | 1.055            | (1.019,1.092) | 1.088           | (1.027,1.152) | 1.068           | (1.032,1.105) | 0.858          | (0.832,0.885) |
| Lag8     | 1.002 | (0.935,1.075) | 1.010             | (0.952,1.071) | 1.041            | (0.989,1.095) | 1.004           | (0.917,1.100) | 1.042           | (0.991,1.096) | 0.868          | (0.830,0.908) |
| Lag01    | 1.060 | (0.940,1.196) | 1.058             | (0.952,1.175) | 1.119            | (1.028,1.219) | 1.030           | (0.881,1.206) | 1.040           | (0.953,1.135) | 0.728          | (0.670,0.792) |
| Lag02    | 1.077 | (0.934,1.242) | 1.075             | (0.944,1.224) | 1.202            | (1.081,1.337) | 1.181           | (0.983,1.420) | 1.112           | (0.999,1.238) | 0.614          | (0.555,0.680) |
| Lag03    | 1.087 | (0.933,1.265) | 1.086             | (0.936,1.260) | 1.299            | (1.148,1.469) | 1.432           | (1.179,1.739) | 1.216           | (1.076,1.373) | 0.516          | (0.460,0.578) |
| Lag04    | 1.091 | (0.929,1.281) | 1.092             | (0.923,1.293) | 1.405            | (1.219,1.620) | 1.779           | (1.451,2.180) | 1.344           | (1.172,1.542) | 0.433          | (0.382,0.491) |
| Lag05    | 1.092 | (0.923,1.292) | 1.097             | (0.908,1.327) | 1.514            | (1.289,1.779) | 2.175           | (1.757,2.691) | 1.484           | (1.274,1.728) | 0.364          | (0.317,0.419) |
| Lag06    | 1.092 | (0.922,1.293) | 1.103             | (0.899,1.354) | 1.617            | (1.358,1.925) | 2.535           | (2.046,3.141) | 1.616           | (1.373,1.903) | 0.309          | (0.267,0.359) |
| Lag07    | 1.093 | (0.932,1.282) | 1.111             | (0.899,1.373) | 1.706            | (1.424,2.044) | 2.758           | (2.249,3.381) | 1.725           | (1.459,2.040) | 0.265          | (0.228,0.309) |
| Lag08    | 1.096 | (0.939,1.279) | 1.122             | (0.903,1.394) | 1.775            | (1.472,2.140) | 2.770           | (2.264,3.389) | 1.798           | (1.514,2.136) | 0.230          | (0.196,0.270) |

**Supplementary Table 46** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 9)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.993 | (0.977,1.009) | 0.995             | (0.984,1.006) | 0.986            | (0.972,1.000) | 1.002           | (0.988,1.015) | 0.999           | (0.976,1.022) | 1.097          | (1.062,1.134) |
| lag1     | 0.996 | (0.986,1.006) | 0.996             | (0.989,1.004) | 0.984            | (0.974,0.994) | 0.993           | (0.985,1.002) | 0.986           | (0.971,1.001) | 1.104          | (1.080,1.129) |
| lag2     | 0.999 | (0.992,1.006) | 0.998             | (0.992,1.003) | 0.982            | (0.975,0.990) | 0.986           | (0.980,0.991) | 0.974           | (0.963,0.985) | 1.111          | (1.093,1.129) |
| lag3     | 1.001 | (0.993,1.008) | 0.999             | (0.992,1.005) | 0.981            | (0.973,0.990) | 0.980           | (0.973,0.986) | 0.965           | (0.953,0.977) | 1.116          | (1.096,1.135) |
| lag4     | 1.002 | (0.992,1.011) | 0.999             | (0.992,1.007) | 0.980            | (0.971,0.990) | 0.976           | (0.968,0.984) | 0.959           | (0.945,0.974) | 1.118          | (1.095,1.140) |
| lag5     | 1.002 | (0.992,1.011) | 1.000             | (0.992,1.007) | 0.980            | (0.971,0.990) | 0.975           | (0.968,0.983) | 0.959           | (0.944,0.973) | 1.116          | (1.093,1.139) |
| Lag6     | 1.000 | (0.992,1.008) | 0.999             | (0.993,1.006) | 0.981            | (0.973,0.990) | 0.978           | (0.971,0.984) | 0.963           | (0.950,0.975) | 1.111          | (1.091,1.131) |
| Lag7     | 0.998 | (0.991,1.005) | 0.998             | (0.993,1.004) | 0.983            | (0.975,0.990) | 0.983           | (0.977,0.988) | 0.970           | (0.959,0.982) | 1.103          | (1.085,1.121) |
| Lag8     | 0.996 | (0.986,1.005) | 0.997             | (0.990,1.004) | 0.984            | (0.975,0.994) | 0.989           | (0.981,0.997) | 0.980           | (0.966,0.995) | 1.093          | (1.072,1.115) |
| Lag9     | 0.993 | (0.978,1.008) | 0.996             | (0.986,1.006) | 0.986            | (0.972,1.000) | 0.996           | (0.984,1.009) | 0.991           | (0.970,1.013) | 1.083          | (1.052,1.114) |
| Lag01    | 0.989 | (0.964,1.015) | 0.991             | (0.973,1.009) | 0.970            | (0.947,0.993) | 0.995           | (0.973,1.017) | 0.984           | (0.948,1.022) | 1.212          | (1.148,1.279) |
| Lag02    | 0.988 | (0.957,1.019) | 0.988             | (0.967,1.011) | 0.953            | (0.925,0.982) | 0.980           | (0.955,1.006) | 0.959           | (0.915,1.004) | 1.346          | (1.259,1.439) |
| Lag03    | 0.988 | (0.956,1.021) | 0.987             | (0.963,1.012) | 0.935            | (0.903,0.967) | 0.960           | (0.934,0.987) | 0.925           | (0.879,0.974) | 1.502          | (1.394,1.617) |
| Lag04    | 0.990 | (0.956,1.024) | 0.987             | (0.959,1.015) | 0.916            | (0.882,0.952) | 0.937           | (0.911,0.964) | 0.888           | (0.838,0.940) | 1.678          | (1.548,1.820) |
| Lag05    | 0.991 | (0.956,1.028) | 0.986             | (0.956,1.018) | 0.899            | (0.861,0.938) | 0.914           | (0.887,0.941) | 0.851           | (0.799,0.906) | 1.873          | (1.715,2.046) |
| Lag06    | 0.992 | (0.955,1.029) | 0.985             | (0.952,1.020) | 0.882            | (0.841,0.925) | 0.893           | (0.867,0.921) | 0.819           | (0.765,0.878) | 2.081          | (1.891,2.289) |
| Lag07    | 0.990 | (0.954,1.027) | 0.984             | (0.949,1.020) | 0.866            | (0.824,0.911) | 0.878           | (0.852,0.905) | 0.795           | (0.739,0.854) | 2.294          | (2.075,2.537) |
| Lag08    | 0.985 | (0.952,1.020) | 0.981             | (0.945,1.018) | 0.853            | (0.809,0.898) | 0.868           | (0.844,0.893) | 0.779           | (0.724,0.838) | 2.508          | (2.264,2.779) |
| Lag09    | 0.978 | (0.946,1.011) | 0.977             | (0.941,1.015) | 0.841            | (0.796,0.887) | 0.865           | (0.841,0.890) | 0.772           | (0.716,0.833) | 2.715          | (2.443,3.018) |

**Supplementary Table 47** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(the maximum lag period = 9)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.033 | (0.959,1.113) | 1.032             | (0.968,1.100) | 1.053            | (1.000,1.109) | 0.989           | (0.897,1.090) | 1.003           | (0.951,1.058) | 0.867          | (0.824,0.912) |
| lag1     | 1.019 | (0.972,1.069) | 1.023             | (0.979,1.068) | 1.060            | (1.023,1.098) | 1.051           | (0.989,1.117) | 1.034           | (0.998,1.072) | 0.858          | (0.829,0.887) |
| lag2     | 1.007 | (0.975,1.040) | 1.014             | (0.981,1.049) | 1.066            | (1.036,1.097) | 1.111           | (1.067,1.157) | 1.063           | (1.035,1.093) | 0.850          | (0.829,0.872) |
| lag3     | 0.998 | (0.963,1.034) | 1.008             | (0.971,1.046) | 1.071            | (1.038,1.104) | 1.161           | (1.109,1.215) | 1.087           | (1.055,1.120) | 0.844          | (0.822,0.867) |
| lag4     | 0.992 | (0.950,1.037) | 1.004             | (0.961,1.048) | 1.073            | (1.036,1.112) | 1.192           | (1.127,1.262) | 1.101           | (1.063,1.141) | 0.842          | (0.816,0.869) |
| lag5     | 0.993 | (0.950,1.037) | 1.003             | (0.960,1.047) | 1.073            | (1.036,1.112) | 1.198           | (1.131,1.268) | 1.103           | (1.065,1.143) | 0.844          | (0.817,0.871) |
| Lag6     | 0.998 | (0.962,1.036) | 1.005             | (0.968,1.044) | 1.070            | (1.038,1.104) | 1.176           | (1.121,1.234) | 1.093           | (1.060,1.127) | 0.850          | (0.826,0.874) |
| Lag7     | 1.008 | (0.976,1.042) | 1.010             | (0.977,1.044) | 1.065            | (1.036,1.096) | 1.135           | (1.089,1.183) | 1.073           | (1.044,1.103) | 0.860          | (0.838,0.882) |
| Lag8     | 1.021 | (0.976,1.068) | 1.016             | (0.976,1.059) | 1.059            | (1.023,1.096) | 1.084           | (1.023,1.147) | 1.048           | (1.013,1.084) | 0.871          | (0.845,0.898) |
| Lag9     | 1.035 | (0.965,1.111) | 1.024             | (0.964,1.087) | 1.052            | (1.000,1.107) | 1.028           | (0.940,1.125) | 1.020           | (0.970,1.073) | 0.885          | (0.846,0.924) |
| Lag01    | 1.053 | (0.933,1.188) | 1.055             | (0.949,1.173) | 1.116            | (1.025,1.216) | 1.039           | (0.888,1.215) | 1.038           | (0.950,1.133) | 0.743          | (0.684,0.808) |
| Lag02    | 1.060 | (0.918,1.225) | 1.070             | (0.939,1.220) | 1.190            | (1.069,1.324) | 1.154           | (0.959,1.389) | 1.103           | (0.990,1.229) | 0.632          | (0.570,0.700) |
| Lag03    | 1.058 | (0.907,1.234) | 1.078             | (0.930,1.250) | 1.274            | (1.127,1.440) | 1.340           | (1.102,1.629) | 1.199           | (1.063,1.353) | 0.533          | (0.475,0.598) |
| Lag04    | 1.050 | (0.894,1.233) | 1.082             | (0.918,1.276) | 1.367            | (1.191,1.569) | 1.598           | (1.306,1.954) | 1.321           | (1.156,1.509) | 0.449          | (0.396,0.509) |
| Lag05    | 1.042 | (0.880,1.234) | 1.085             | (0.903,1.304) | 1.468            | (1.257,1.713) | 1.913           | (1.549,2.363) | 1.457           | (1.258,1.689) | 0.379          | (0.330,0.434) |
| Lag06    | 1.040 | (0.873,1.240) | 1.091             | (0.892,1.334) | 1.571            | (1.325,1.863) | 2.250           | (1.806,2.804) | 1.593           | (1.356,1.871) | 0.322          | (0.278,0.373) |
| Lag07    | 1.049 | (0.883,1.247) | 1.101             | (0.890,1.362) | 1.673            | (1.396,2.005) | 2.555           | (2.052,3.180) | 1.710           | (1.444,2.024) | 0.277          | (0.237,0.323) |
| Lag08    | 1.071 | (0.912,1.259) | 1.119             | (0.901,1.391) | 1.772            | (1.470,2.135) | 2.768           | (2.250,3.405) | 1.792           | (1.509,2.127) | 0.241          | (0.206,0.283) |
| Lag09    | 1.109 | (0.948,1.297) | 1.146             | (0.917,1.431) | 1.864            | (1.535,2.262) | 2.846           | (2.319,3.493) | 1.828           | (1.532,2.180) | 0.213          | (0.181,0.251) |

**Supplementary Table 48** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative humidity = 2)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.991 | (0.975,1.007) | 0.994             | (0.983,1.005) | 0.985            | (0.970,0.999) | 1.005           | (0.991,1.019) | 0.997           | (0.974,1.020) | 1.111          | (1.074,1.149) |
| lag1     | 0.995 | (0.985,1.004) | 0.996             | (0.988,1.003) | 0.982            | (0.973,0.992) | 0.994           | (0.985,1.002) | 0.984           | (0.970,0.999) | 1.123          | (1.099,1.147) |
| lag2     | 0.998 | (0.990,1.006) | 0.997             | (0.991,1.004) | 0.980            | (0.971,0.989) | 0.984           | (0.978,0.990) | 0.973           | (0.960,0.986) | 1.132          | (1.111,1.153) |
| lag3     | 1.000 | (0.991,1.010) | 0.999             | (0.991,1.006) | 0.979            | (0.968,0.989) | 0.977           | (0.969,0.985) | 0.965           | (0.949,0.980) | 1.135          | (1.110,1.160) |
| lag4     | 1.001 | (0.991,1.011) | 0.999             | (0.991,1.007) | 0.979            | (0.968,0.989) | 0.973           | (0.965,0.981) | 0.960           | (0.944,0.976) | 1.130          | (1.105,1.156) |
| lag5     | 1.001 | (0.992,1.009) | 1.000             | (0.993,1.007) | 0.980            | (0.971,0.989) | 0.973           | (0.966,0.980) | 0.959           | (0.945,0.972) | 1.117          | (1.096,1.139) |
| Lag6     | 0.999 | (0.990,1.008) | 1.000             | (0.992,1.007) | 0.982            | (0.972,0.991) | 0.975           | (0.967,0.983) | 0.960           | (0.946,0.974) | 1.099          | (1.077,1.121) |
| Lag7     | 0.996 | (0.982,1.011) | 0.999             | (0.989,1.009) | 0.984            | (0.970,0.999) | 0.979           | (0.966,0.991) | 0.963           | (0.942,0.984) | 1.078          | (1.047,1.110) |
| Lag01    | 0.986 | (0.961,1.011) | 0.990             | (0.972,1.007) | 0.967            | (0.945,0.990) | 0.998           | (0.977,1.020) | 0.981           | (0.946,1.018) | 1.247          | (1.181,1.316) |
| Lag02    | 0.984 | (0.956,1.013) | 0.987             | (0.966,1.009) | 0.948            | (0.921,0.976) | 0.982           | (0.958,1.007) | 0.955           | (0.913,0.999) | 1.411          | (1.322,1.506) |
| Lag03    | 0.985 | (0.954,1.016) | 0.986             | (0.961,1.011) | 0.928            | (0.896,0.960) | 0.959           | (0.934,0.985) | 0.921           | (0.875,0.970) | 1.602          | (1.488,1.724) |
| Lag04    | 0.986 | (0.953,1.019) | 0.985             | (0.956,1.014) | 0.908            | (0.872,0.946) | 0.933           | (0.907,0.960) | 0.884           | (0.833,0.938) | 1.810          | (1.666,1.967) |
| Lag05    | 0.986 | (0.953,1.021) | 0.985             | (0.953,1.017) | 0.890            | (0.850,0.931) | 0.908           | (0.882,0.935) | 0.848           | (0.794,0.905) | 2.022          | (1.846,2.214) |
| Lag06    | 0.985 | (0.953,1.019) | 0.984             | (0.951,1.019) | 0.873            | (0.832,0.916) | 0.886           | (0.861,0.911) | 0.814           | (0.760,0.872) | 2.221          | (2.019,2.444) |
| Lag07    | 0.982 | (0.950,1.014) | 0.983             | (0.948,1.020) | 0.859            | (0.817,0.904) | 0.867           | (0.843,0.891) | 0.783           | (0.729,0.842) | 2.394          | (2.166,2.647) |

**Supplementary Table 49** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative humidity = 2)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.043 | (0.967,1.126) | 1.037             | (0.972,1.106) | 1.057            | (1.003,1.113) | 0.968           | (0.876,1.070) | 1.007           | (0.955,1.063) | 0.850          | (0.807,0.896) |
| lag1     | 1.024 | (0.979,1.072) | 1.026             | (0.983,1.070) | 1.067            | (1.030,1.104) | 1.048           | (0.987,1.111) | 1.037           | (1.002,1.074) | 0.836          | (0.809,0.865) |
| lag2     | 1.009 | (0.973,1.046) | 1.016             | (0.977,1.056) | 1.075            | (1.040,1.111) | 1.124           | (1.072,1.178) | 1.065           | (1.033,1.099) | 0.826          | (0.803,0.850) |
| lag3     | 0.998 | (0.954,1.043) | 1.008             | (0.963,1.055) | 1.080            | (1.039,1.123) | 1.184           | (1.118,1.254) | 1.088           | (1.048,1.129) | 0.822          | (0.795,0.850) |
| lag4     | 0.994 | (0.950,1.041) | 1.004             | (0.958,1.051) | 1.081            | (1.039,1.124) | 1.217           | (1.147,1.290) | 1.100           | (1.060,1.143) | 0.828          | (0.799,0.857) |
| lag5     | 0.998 | (0.960,1.036) | 1.002             | (0.962,1.044) | 1.076            | (1.041,1.113) | 1.218           | (1.159,1.280) | 1.104           | (1.068,1.140) | 0.843          | (0.818,0.868) |
| Lag6     | 1.006 | (0.964,1.050) | 1.003             | (0.962,1.045) | 1.069            | (1.032,1.107) | 1.198           | (1.132,1.269) | 1.100           | (1.063,1.138) | 0.865          | (0.838,0.892) |
| Lag7     | 1.017 | (0.948,1.090) | 1.005             | (0.947,1.066) | 1.060            | (1.005,1.117) | 1.169           | (1.065,1.282) | 1.093           | (1.040,1.150) | 0.890          | (0.851,0.932) |
| Lag01    | 1.069 | (0.950,1.203) | 1.063             | (0.958,1.180) | 1.127            | (1.036,1.226) | 1.014           | (0.868,1.185) | 1.045           | (0.959,1.138) | 0.711          | (0.654,0.773) |
| Lag02    | 1.078 | (0.940,1.235) | 1.080             | (0.950,1.228) | 1.211            | (1.091,1.345) | 1.140           | (0.952,1.364) | 1.113           | (1.002,1.236) | 0.587          | (0.531,0.649) |
| Lag03    | 1.075 | (0.929,1.245) | 1.089             | (0.938,1.264) | 1.309            | (1.156,1.482) | 1.350           | (1.114,1.635) | 1.211           | (1.073,1.366) | 0.483          | (0.431,0.541) |
| Lag04    | 1.069 | (0.915,1.250) | 1.093             | (0.920,1.298) | 1.414            | (1.223,1.636) | 1.642           | (1.341,2.012) | 1.332           | (1.160,1.530) | 0.399          | (0.351,0.454) |
| Lag05    | 1.066 | (0.908,1.253) | 1.095             | (0.905,1.326) | 1.522            | (1.293,1.791) | 2.001           | (1.625,2.463) | 1.470           | (1.262,1.713) | 0.337          | (0.292,0.387) |
| Lag06    | 1.073 | (0.918,1.254) | 1.098             | (0.897,1.345) | 1.626            | (1.368,1.934) | 2.398           | (1.963,2.929) | 1.617           | (1.377,1.899) | 0.291          | (0.251,0.337) |
| Lag07    | 1.090 | (0.936,1.271) | 1.104             | (0.892,1.364) | 1.723            | (1.436,2.067) | 2.803           | (2.299,3.417) | 1.768           | (1.495,2.091) | 0.259          | (0.222,0.303) |

**Supplementary Table 50** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative humidity = 4)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.991 | (0.975,1.007) | 0.994             | (0.983,1.005) | 0.985            | (0.970,0.999) | 1.004           | (0.990,1.018) | 0.996           | (0.973,1.019) | 1.113          | (1.076,1.151) |
| lag1     | 0.995 | (0.985,1.004) | 0.996             | (0.988,1.003) | 0.982            | (0.973,0.992) | 0.993           | (0.985,1.001) | 0.984           | (0.969,0.998) | 1.124          | (1.100,1.148) |
| lag2     | 0.998 | (0.990,1.006) | 0.997             | (0.991,1.004) | 0.980            | (0.971,0.989) | 0.984           | (0.977,0.990) | 0.973           | (0.960,0.986) | 1.132          | (1.111,1.153) |
| lag3     | 1.000 | (0.991,1.010) | 0.998             | (0.991,1.006) | 0.978            | (0.968,0.989) | 0.977           | (0.969,0.985) | 0.965           | (0.950,0.980) | 1.135          | (1.110,1.160) |
| lag4     | 1.001 | (0.991,1.011) | 0.999             | (0.991,1.007) | 0.978            | (0.968,0.989) | 0.973           | (0.965,0.981) | 0.960           | (0.945,0.976) | 1.129          | (1.104,1.155) |
| lag5     | 1.000 | (0.992,1.009) | 1.000             | (0.993,1.007) | 0.980            | (0.971,0.989) | 0.973           | (0.966,0.980) | 0.959           | (0.946,0.973) | 1.117          | (1.095,1.139) |
| Lag6     | 0.999 | (0.990,1.008) | 1.000             | (0.993,1.007) | 0.982            | (0.972,0.991) | 0.975           | (0.968,0.983) | 0.960           | (0.946,0.975) | 1.099          | (1.077,1.121) |
| Lag7     | 0.997 | (0.982,1.012) | 1.000             | (0.989,1.010) | 0.984            | (0.970,0.999) | 0.979           | (0.966,0.991) | 0.963           | (0.942,0.984) | 1.079          | (1.047,1.111) |
| Lag01    | 0.985 | (0.961,1.011) | 0.990             | (0.972,1.007) | 0.967            | (0.945,0.990) | 0.997           | (0.975,1.018) | 0.979           | (0.944,1.016) | 1.250          | (1.184,1.320) |
| Lag02    | 0.983 | (0.955,1.013) | 0.987             | (0.965,1.009) | 0.948            | (0.920,0.976) | 0.980           | (0.956,1.005) | 0.953           | (0.911,0.997) | 1.415          | (1.326,1.510) |
| Lag03    | 0.983 | (0.953,1.015) | 0.985             | (0.961,1.011) | 0.927            | (0.896,0.960) | 0.958           | (0.932,0.984) | 0.920           | (0.873,0.969) | 1.605          | (1.491,1.728) |
| Lag04    | 0.984 | (0.952,1.018) | 0.985             | (0.956,1.014) | 0.907            | (0.871,0.945) | 0.932           | (0.906,0.959) | 0.883           | (0.832,0.937) | 1.813          | (1.669,1.970) |
| Lag05    | 0.985 | (0.951,1.020) | 0.984             | (0.952,1.017) | 0.889            | (0.849,0.930) | 0.907           | (0.881,0.934) | 0.847           | (0.793,0.905) | 2.025          | (1.848,2.217) |
| Lag06    | 0.984 | (0.951,1.017) | 0.984             | (0.950,1.018) | 0.873            | (0.831,0.916) | 0.885           | (0.860,0.910) | 0.814           | (0.760,0.872) | 2.225          | (2.022,2.448) |
| Lag07    | 0.981 | (0.949,1.013) | 0.983             | (0.948,1.020) | 0.859            | (0.816,0.904) | 0.866           | (0.842,0.890) | 0.784           | (0.729,0.842) | 2.400          | (2.171,2.653) |

**Supplementary Table 51** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative humidity = 4)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.044 | (0.967,1.127) | 1.036             | (0.971,1.106) | 1.057            | (1.003,1.114) | 0.974           | (0.881,1.077) | 1.010           | (0.957,1.066) | 0.848          | (0.804,0.893) |
| lag1     | 1.026 | (0.981,1.073) | 1.026             | (0.983,1.070) | 1.067            | (1.031,1.105) | 1.052           | (0.991,1.116) | 1.039           | (1.004,1.076) | 0.835          | (0.808,0.863) |
| lag2     | 1.010 | (0.974,1.048) | 1.017             | (0.978,1.057) | 1.076            | (1.041,1.112) | 1.126           | (1.074,1.180) | 1.066           | (1.033,1.100) | 0.826          | (0.803,0.850) |
| lag3     | 0.999 | (0.956,1.045) | 1.009             | (0.964,1.056) | 1.081            | (1.040,1.124) | 1.184           | (1.118,1.254) | 1.087           | (1.047,1.128) | 0.823          | (0.795,0.851) |
| lag4     | 0.995 | (0.951,1.042) | 1.005             | (0.959,1.052) | 1.081            | (1.040,1.124) | 1.216           | (1.146,1.289) | 1.099           | (1.058,1.141) | 0.828          | (0.800,0.858) |
| lag5     | 0.998 | (0.961,1.037) | 1.002             | (0.963,1.044) | 1.076            | (1.041,1.113) | 1.217           | (1.158,1.279) | 1.102           | (1.066,1.139) | 0.843          | (0.818,0.869) |
| Lag6     | 1.005 | (0.963,1.049) | 1.002             | (0.962,1.045) | 1.068            | (1.031,1.106) | 1.197           | (1.130,1.268) | 1.099           | (1.062,1.137) | 0.864          | (0.838,0.892) |
| Lag7     | 1.015 | (0.947,1.088) | 1.003             | (0.945,1.064) | 1.058            | (1.004,1.115) | 1.168           | (1.065,1.282) | 1.092           | (1.038,1.149) | 0.889          | (0.850,0.931) |
| Lag01    | 1.071 | (0.951,1.205) | 1.063             | (0.958,1.180) | 1.128            | (1.037,1.227) | 1.024           | (0.877,1.197) | 1.050           | (0.963,1.144) | 0.708          | (0.651,0.770) |
| Lag02    | 1.082 | (0.943,1.240) | 1.081             | (0.951,1.229) | 1.213            | (1.092,1.348) | 1.153           | (0.963,1.380) | 1.119           | (1.007,1.242) | 0.585          | (0.529,0.647) |
| Lag03    | 1.081 | (0.934,1.251) | 1.091             | (0.940,1.266) | 1.312            | (1.158,1.486) | 1.366           | (1.127,1.655) | 1.216           | (1.077,1.372) | 0.481          | (0.429,0.539) |
| Lag04    | 1.076 | (0.920,1.258) | 1.096             | (0.923,1.301) | 1.418            | (1.226,1.641) | 1.660           | (1.355,2.034) | 1.336           | (1.163,1.534) | 0.398          | (0.350,0.453) |
| Lag05    | 1.074 | (0.914,1.262) | 1.098             | (0.907,1.330) | 1.527            | (1.297,1.797) | 2.020           | (1.640,2.487) | 1.472           | (1.263,1.716) | 0.336          | (0.292,0.387) |
| Lag06    | 1.080 | (0.924,1.262) | 1.101             | (0.899,1.348) | 1.631            | (1.371,1.939) | 2.418           | (1.979,2.954) | 1.617           | (1.377,1.900) | 0.290          | (0.250,0.337) |
| Lag07    | 1.096 | (0.940,1.277) | 1.104             | (0.893,1.365) | 1.725            | (1.438,2.070) | 2.824           | (2.316,3.444) | 1.766           | (1.493,2.090) | 0.258          | (0.221,0.302) |

**Supplementary Table 52** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative temperature = 2)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.991 | (0.975,1.007) | 0.994             | (0.983,1.005) | 0.985            | (0.970,0.999) | 1.004           | (0.990,1.018) | 0.996           | (0.973,1.019) | 1.110          | (1.073,1.149) |
| lag1     | 0.995 | (0.985,1.004) | 0.996             | (0.989,1.003) | 0.982            | (0.972,0.992) | 0.993           | (0.985,1.001) | 0.984           | (0.969,0.998) | 1.122          | (1.098,1.146) |
| lag2     | 0.998 | (0.990,1.006) | 0.997             | (0.991,1.004) | 0.980            | (0.971,0.989) | 0.984           | (0.977,0.990) | 0.973           | (0.960,0.986) | 1.131          | (1.110,1.152) |
| lag3     | 1.000 | (0.990,1.010) | 0.998             | (0.991,1.006) | 0.978            | (0.968,0.989) | 0.977           | (0.969,0.985) | 0.965           | (0.949,0.980) | 1.135          | (1.110,1.160) |
| lag4     | 1.001 | (0.991,1.011) | 0.999             | (0.991,1.007) | 0.978            | (0.968,0.989) | 0.973           | (0.965,0.981) | 0.960           | (0.945,0.976) | 1.130          | (1.105,1.156) |
| lag5     | 1.000 | (0.992,1.008) | 0.999             | (0.993,1.006) | 0.980            | (0.971,0.989) | 0.973           | (0.966,0.980) | 0.959           | (0.946,0.973) | 1.117          | (1.096,1.139) |
| Lag6     | 0.999 | (0.990,1.008) | 1.000             | (0.992,1.007) | 0.982            | (0.972,0.991) | 0.975           | (0.968,0.983) | 0.960           | (0.946,0.975) | 1.099          | (1.077,1.121) |
| Lag7     | 0.997 | (0.982,1.012) | 0.999             | (0.989,1.010) | 0.984            | (0.970,0.999) | 0.979           | (0.966,0.991) | 0.963           | (0.942,0.984) | 1.079          | (1.048,1.111) |
| Lag01    | 0.986 | (0.961,1.011) | 0.990             | (0.972,1.008) | 0.967            | (0.944,0.990) | 0.996           | (0.975,1.018) | 0.979           | (0.944,1.016) | 1.246          | (1.180,1.315) |
| Lag02    | 0.983 | (0.955,1.013) | 0.987             | (0.966,1.009) | 0.947            | (0.920,0.975) | 0.980           | (0.956,1.005) | 0.953           | (0.911,0.997) | 1.409          | (1.320,1.504) |
| Lag03    | 0.983 | (0.953,1.015) | 0.986             | (0.961,1.011) | 0.927            | (0.895,0.960) | 0.957           | (0.932,0.983) | 0.919           | (0.873,0.968) | 1.599          | (1.485,1.721) |
| Lag04    | 0.984 | (0.952,1.018) | 0.985             | (0.956,1.014) | 0.907            | (0.871,0.944) | 0.932           | (0.906,0.959) | 0.883           | (0.832,0.937) | 1.807          | (1.663,1.963) |
| Lag05    | 0.985 | (0.951,1.019) | 0.984             | (0.952,1.017) | 0.888            | (0.849,0.930) | 0.907           | (0.881,0.934) | 0.847           | (0.793,0.904) | 2.018          | (1.843,2.211) |
| Lag06    | 0.983 | (0.951,1.017) | 0.984             | (0.950,1.018) | 0.872            | (0.831,0.915) | 0.885           | (0.860,0.910) | 0.813           | (0.759,0.871) | 2.219          | (2.016,2.441) |
| Lag07    | 0.980 | (0.948,1.013) | 0.983             | (0.948,1.019) | 0.859            | (0.816,0.903) | 0.866           | (0.842,0.890) | 0.783           | (0.728,0.841) | 2.393          | (2.165,2.645) |

**Supplementary Table 53** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative temperature = 2)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 1.043 | (0.967,1.126) | 1.035             | (0.970,1.104) | 1.057            | (1.003,1.114) | 0.975           | (0.882,1.078) | 1.010           | (0.957,1.066) | 0.851          | (0.807,0.896) |
| lag1     | 1.026 | (0.980,1.073) | 1.025             | (0.983,1.070) | 1.067            | (1.031,1.105) | 1.052           | (0.992,1.116) | 1.039           | (1.004,1.076) | 0.837          | (0.810,0.865) |
| lag2     | 1.010 | (0.974,1.048) | 1.017             | (0.978,1.057) | 1.076            | (1.041,1.112) | 1.126           | (1.074,1.180) | 1.066           | (1.033,1.100) | 0.827          | (0.803,0.851) |
| lag3     | 1.000 | (0.956,1.046) | 1.010             | (0.965,1.057) | 1.081            | (1.040,1.124) | 1.184           | (1.118,1.254) | 1.087           | (1.048,1.129) | 0.823          | (0.795,0.851) |
| lag4     | 0.996 | (0.952,1.043) | 1.005             | (0.959,1.053) | 1.081            | (1.040,1.125) | 1.215           | (1.146,1.289) | 1.100           | (1.059,1.142) | 0.828          | (0.800,0.857) |
| lag5     | 0.999 | (0.961,1.038) | 1.003             | (0.963,1.045) | 1.076            | (1.041,1.113) | 1.216           | (1.157,1.278) | 1.102           | (1.067,1.139) | 0.842          | (0.817,0.868) |
| Lag6     | 1.006 | (0.964,1.050) | 1.003             | (0.962,1.045) | 1.068            | (1.031,1.106) | 1.197           | (1.130,1.268) | 1.099           | (1.062,1.137) | 0.864          | (0.838,0.891) |
| Lag7     | 1.016 | (0.947,1.089) | 1.003             | (0.945,1.065) | 1.058            | (1.004,1.115) | 1.168           | (1.065,1.282) | 1.092           | (1.039,1.149) | 0.889          | (0.850,0.931) |
| Lag01    | 1.070 | (0.951,1.204) | 1.061             | (0.956,1.178) | 1.129            | (1.037,1.228) | 1.026           | (0.878,1.199) | 1.050           | (0.963,1.144) | 0.712          | (0.655,0.774) |
| Lag02    | 1.081 | (0.943,1.239) | 1.079             | (0.949,1.226) | 1.215            | (1.093,1.349) | 1.155           | (0.964,1.382) | 1.119           | (1.008,1.243) | 0.588          | (0.532,0.651) |
| Lag03    | 1.081 | (0.934,1.251) | 1.089             | (0.938,1.264) | 1.313            | (1.160,1.487) | 1.367           | (1.128,1.657) | 1.217           | (1.078,1.373) | 0.484          | (0.432,0.542) |
| Lag04    | 1.077 | (0.921,1.259) | 1.095             | (0.922,1.300) | 1.420            | (1.228,1.643) | 1.661           | (1.356,2.036) | 1.338           | (1.165,1.537) | 0.401          | (0.352,0.455) |
| Lag05    | 1.075 | (0.915,1.264) | 1.099             | (0.907,1.330) | 1.529            | (1.299,1.799) | 2.021           | (1.641,2.488) | 1.475           | (1.266,1.719) | 0.338          | (0.293,0.389) |
| Lag06    | 1.082 | (0.926,1.265) | 1.102             | (0.899,1.349) | 1.633            | (1.373,1.941) | 2.419           | (1.980,2.955) | 1.621           | (1.380,1.904) | 0.292          | (0.252,0.338) |
| Lag07    | 1.099 | (0.943,1.280) | 1.105             | (0.894,1.367) | 1.727            | (1.440,2.072) | 2.825           | (2.317,3.445) | 1.771           | (1.497,2.094) | 0.259          | (0.222,0.303) |

**Supplementary Table 54** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely low concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative temperature = 4)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95% CI        |
| lag0     | 0.991 | (0.975,1.007) | 0.994             | (0.983,1.005) | 0.985            | (0.970,0.999) | 1.004           | (0.990,1.018) | 0.996           | (0.973,1.019) | 1.111          | (1.074,1.150) |
| lag1     | 0.995 | (0.985,1.004) | 0.996             | (0.988,1.003) | 0.982            | (0.972,0.992) | 0.993           | (0.985,1.001) | 0.984           | (0.969,0.998) | 1.123          | (1.099,1.147) |
| lag2     | 0.998 | (0.990,1.006) | 0.997             | (0.991,1.004) | 0.980            | (0.971,0.989) | 0.984           | (0.977,0.990) | 0.973           | (0.960,0.986) | 1.131          | (1.111,1.152) |
| lag3     | 1.000 | (0.991,1.010) | 0.998             | (0.991,1.006) | 0.978            | (0.968,0.989) | 0.977           | (0.969,0.985) | 0.965           | (0.950,0.980) | 1.135          | (1.110,1.160) |
| lag4     | 1.001 | (0.991,1.011) | 0.999             | (0.991,1.007) | 0.978            | (0.968,0.989) | 0.973           | (0.965,0.981) | 0.960           | (0.945,0.976) | 1.130          | (1.105,1.156) |
| lag5     | 1.000 | (0.992,1.009) | 1.000             | (0.993,1.006) | 0.980            | (0.971,0.989) | 0.973           | (0.966,0.980) | 0.959           | (0.946,0.973) | 1.117          | (1.095,1.139) |
| Lag6     | 0.999 | (0.990,1.008) | 1.000             | (0.993,1.007) | 0.982            | (0.972,0.991) | 0.975           | (0.968,0.983) | 0.961           | (0.947,0.975) | 1.099          | (1.077,1.121) |
| Lag7     | 0.997 | (0.982,1.012) | 0.999             | (0.989,1.010) | 0.984            | (0.970,0.999) | 0.979           | (0.966,0.991) | 0.963           | (0.942,0.984) | 1.079          | (1.047,1.111) |
| Lag01    | 0.985 | (0.961,1.011) | 0.990             | (0.972,1.007) | 0.967            | (0.944,0.990) | 0.997           | (0.975,1.018) | 0.979           | (0.944,1.016) | 1.248          | (1.182,1.317) |
| Lag02    | 0.983 | (0.955,1.012) | 0.987             | (0.965,1.009) | 0.947            | (0.920,0.975) | 0.980           | (0.956,1.005) | 0.953           | (0.911,0.997) | 1.411          | (1.323,1.506) |
| Lag03    | 0.983 | (0.953,1.015) | 0.985             | (0.960,1.011) | 0.927            | (0.895,0.960) | 0.958           | (0.932,0.984) | 0.919           | (0.873,0.968) | 1.602          | (1.488,1.724) |
| Lag04    | 0.984 | (0.952,1.018) | 0.984             | (0.956,1.014) | 0.907            | (0.871,0.944) | 0.932           | (0.906,0.959) | 0.883           | (0.832,0.937) | 1.809          | (1.665,1.966) |
| Lag05    | 0.985 | (0.951,1.019) | 0.984             | (0.952,1.017) | 0.888            | (0.849,0.930) | 0.907           | (0.881,0.934) | 0.847           | (0.793,0.904) | 2.021          | (1.846,2.214) |
| Lag06    | 0.984 | (0.951,1.017) | 0.983             | (0.950,1.018) | 0.872            | (0.831,0.915) | 0.885           | (0.860,0.910) | 0.813           | (0.759,0.871) | 2.221          | (2.019,2.445) |
| Lag07    | 0.980 | (0.949,1.013) | 0.983             | (0.948,1.019) | 0.859            | (0.816,0.903) | 0.866           | (0.842,0.890) | 0.783           | (0.729,0.842) | 2.396          | (2.168,2.649) |

**Supplementary Table 55** Relative risks (RRs) and 95% confidence intervals (CIs) of coronary heart disease hospitalizations associated with extremely high concentrations of each pollutant in Henan Province from 2016 to 2021(df of relative temperature = 4)

| Lag days | CO    |               | PM <sub>2.5</sub> |               | PM <sub>10</sub> |               | SO <sub>2</sub> |               | NO <sub>2</sub> |               | O <sub>3</sub> |               |
|----------|-------|---------------|-------------------|---------------|------------------|---------------|-----------------|---------------|-----------------|---------------|----------------|---------------|
|          | RR    | 95% CI        | RR                | 95% CI        | RR               | 95% CI        | RR              | 95% CI        | RR              | 95% CI        | RR             | 95%CI         |
| lag0     | 1.044 | (0.968,1.127) | 1.037             | (0.971,1.106) | 1.057            | (1.003,1.114) | 0.975           | (0.882,1.077) | 1.010           | (0.957,1.066) | 0.849          | (0.806,0.895) |
| lag1     | 1.026 | (0.981,1.073) | 1.026             | (0.984,1.071) | 1.067            | (1.031,1.105) | 1.052           | (0.991,1.116) | 1.039           | (1.004,1.076) | 0.836          | (0.809,0.864) |
| lag2     | 1.010 | (0.974,1.048) | 1.017             | (0.978,1.057) | 1.076            | (1.041,1.112) | 1.125           | (1.074,1.179) | 1.066           | (1.033,1.100) | 0.826          | (0.803,0.850) |
| lag3     | 0.999 | (0.956,1.045) | 1.009             | (0.964,1.057) | 1.081            | (1.040,1.124) | 1.184           | (1.118,1.254) | 1.087           | (1.047,1.128) | 0.823          | (0.795,0.851) |
| lag4     | 0.995 | (0.951,1.042) | 1.005             | (0.959,1.053) | 1.081            | (1.040,1.125) | 1.215           | (1.146,1.289) | 1.099           | (1.058,1.142) | 0.828          | (0.800,0.857) |
| lag5     | 0.998 | (0.961,1.037) | 1.003             | (0.963,1.044) | 1.076            | (1.041,1.113) | 1.216           | (1.157,1.278) | 1.102           | (1.066,1.139) | 0.843          | (0.818,0.868) |
| Lag6     | 1.005 | (0.963,1.049) | 1.003             | (0.962,1.045) | 1.068            | (1.031,1.106) | 1.197           | (1.130,1.268) | 1.098           | (1.061,1.137) | 0.864          | (0.838,0.891) |
| Lag7     | 1.015 | (0.947,1.088) | 1.003             | (0.945,1.065) | 1.058            | (1.004,1.115) | 1.168           | (1.065,1.282) | 1.092           | (1.038,1.148) | 0.889          | (0.850,0.931) |
| Lag01    | 1.071 | (0.952,1.206) | 1.064             | (0.958,1.180) | 1.129            | (1.037,1.228) | 1.025           | (0.877,1.198) | 1.050           | (0.964,1.144) | 0.710          | (0.653,0.772) |
| Lag02    | 1.082 | (0.944,1.241) | 1.082             | (0.951,1.229) | 1.215            | (1.093,1.349) | 1.153           | (0.963,1.381) | 1.119           | (1.008,1.243) | 0.587          | (0.531,0.649) |
| Lag03    | 1.082 | (0.934,1.252) | 1.092             | (0.940,1.267) | 1.313            | (1.159,1.487) | 1.366           | (1.127,1.655) | 1.217           | (1.078,1.374) | 0.483          | (0.431,0.541) |
| Lag04    | 1.077 | (0.921,1.259) | 1.097             | (0.924,1.303) | 1.420            | (1.227,1.643) | 1.659           | (1.354,2.034) | 1.338           | (1.165,1.536) | 0.400          | (0.352,0.454) |
| Lag05    | 1.075 | (0.914,1.263) | 1.100             | (0.908,1.332) | 1.528            | (1.298,1.799) | 2.018           | (1.639,2.485) | 1.474           | (1.265,1.718) | 0.337          | (0.293,0.388) |
| Lag06    | 1.080 | (0.924,1.263) | 1.102             | (0.900,1.350) | 1.633            | (1.373,1.941) | 2.416           | (1.977,2.951) | 1.619           | (1.379,1.902) | 0.291          | (0.251,0.337) |
| Lag07    | 1.097 | (0.941,1.278) | 1.106             | (0.894,1.368) | 1.728            | (1.440,2.073) | 2.822           | (2.314,3.441) | 1.768           | (1.495,2.091) | 0.259          | (0.222,0.302) |

**Supplementary Table 56** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(the maximum lag period = 5)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.113(1.051,1.175)*</b><br><b>RERI:0.094(0.048,0.141)*</b> | <b>IRR:1.245(1.176,1.314)*</b><br><b>RERI:0.196(0.153,0.239)*</b> | IRR:0.960(0.910,1.010)<br>RERI:-0.037(-0.089,0.016) | <b>IRR:1.065(1.007,1.123)*</b><br><b>RERI:0.060(0.019,0.101)*</b>    | IRR:1.006(0.949,1.063)<br>RERI:0.004(-0.037,0.045)        |
| NO <sub>2</sub>   | <b>IRR:1.113(1.051,1.174)*</b><br><b>RERI:0.091(0.047,0.135)*</b> |                                                                   | IRR:1.026(0.969,1.083)<br>RERI:0.015(-0.029,0.059)                | IRR:0.983(0.930,1.036)<br>RERI:-0.017(-0.069,0.035) | IRR:1.034(0.975,1.093)<br>RERI:0.031(-0.010,0.072)                   | IRR:1.034(0.974,1.094)<br>RERI:0.032(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.173,1.312)*</b><br><b>RERI:0.196(0.151,0.241)*</b> | IRR:1.037(0.979,1.094)<br>RERI:0.028(-0.019,0.075)                |                                                                   | IRR:0.996(0.943,1.049)<br>RERI:-0.001(-0.055,0.052) | IRR:1.049(0.994,1.103)<br><b>RERI:0.047(0.003,0.092)*</b>            | IRR:1.023(0.971,1.075)<br>RERI:0.021(-0.024,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.939(0.889,0.989)*</b><br>RERI:-0.044(-0.096,0.008)       | IRR:0.954(0.902,1.006)<br>RERI:-0.046(-0.100,0.007)               | IRR:0.975(0.923,1.027)<br>RERI:-0.009(-0.060,0.043)               |                                                     | <b>IRR:0.934(0.885,0.983)*</b><br><b>RERI:-0.061(-0.111,-0.012)*</b> | IRR:0.951(0.901,1.002)<br>RERI:-0.047(-0.097,0.002)       |
| PM <sub>10</sub>  | <b>IRR:1.060(1.002,1.118)*</b><br><b>RERI:0.054(0.012,0.095)*</b> | IRR:1.025(0.966,1.083)<br>RERI:0.023(-0.021,0.067)                | IRR:1.041(0.987,1.095)<br>RERI:0.037(-0.006,0.080)                | IRR:0.954(0.904,1.003)<br>RERI:-0.046(-0.097,0.004) |                                                                      | IRR:1.068(0.994,1.143)<br><b>RERI:0.064(0.028,0.100)*</b> |
| PM <sub>2.5</sub> | IRR:1.004(0.948,1.061)<br>RERI:0.002(-0.040,0.043)                | IRR:1.027(0.967,1.086)<br>RERI:0.026(-0.018,0.070)                | IRR:1.021(0.969,1.073)<br>RERI:0.017(-0.028,0.062)                | IRR:0.977(0.925,1.028)<br>RERI:-0.023(-0.075,0.028) | IRR:1.072(0.997,1.146)<br><b>RERI:0.066(0.029,0.103)*</b>            |                                                           |

**Supplementary Table 57** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(the maximum lag period = 6)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.114(1.053,1.176)*</b><br><b>RERI:0.095(0.050,0.141)*</b> | <b>IRR:1.246(1.177,1.315)*</b><br><b>RERI:0.197(0.154,0.240)*</b> | IRR:0.961(0.910,1.011)<br>RERI:-0.035(-0.087,0.017) | <b>IRR:1.065(1.007,1.124)*</b><br><b>RERI:0.060(0.020,0.101)*</b>    | IRR:1.006(0.949,1.063)<br>RERI:0.004(-0.037,0.045)        |
| NO <sub>2</sub>   | <b>IRR:1.115(1.053,1.176)*</b><br><b>RERI:0.092(0.049,0.136)*</b> |                                                                   | IRR:1.025(0.968,1.082)<br>RERI:0.014(-0.029,0.057)                | IRR:0.982(0.929,1.035)<br>RERI:-0.018(-0.070,0.034) | IRR:1.035(0.976,1.094)<br>RERI:0.032(-0.009,0.072)                   | IRR:1.034(0.974,1.094)<br>RERI:0.032(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.244(1.175,1.314)*</b><br><b>RERI:0.197(0.153,0.242)*</b> | IRR:1.038(0.980,1.096)<br>RERI:0.029(-0.017,0.075)                |                                                                   | IRR:0.997(0.944,1.049)<br>RERI:0.001(-0.052,0.054)  | IRR:1.050(0.996,1.104)<br><b>RERI:0.049(0.005,0.092)*</b>            | IRR:1.023(0.971,1.075)<br>RERI:0.021(-0.024,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.939(0.889,0.989)*</b><br>RERI:-0.045(-0.096,0.007)       | IRR:0.953(0.902,1.005)<br>RERI:-0.047(-0.100,0.006)               | IRR:0.975(0.923,1.026)<br>RERI:-0.009(-0.061,0.042)               |                                                     | <b>IRR:0.934(0.885,0.983)*</b><br><b>RERI:-0.061(-0.111,-0.012)*</b> | IRR:0.951(0.901,1.002)<br>RERI:-0.047(-0.097,0.002)       |
| PM <sub>10</sub>  | <b>IRR:1.062(1.004,1.120)*</b><br><b>RERI:0.055(0.013,0.096)*</b> | IRR:1.027(0.968,1.086)<br>RERI:0.026(-0.017,0.069)                | IRR:1.041(0.987,1.094)<br>RERI:0.036(-0.006,0.079)                | IRR:0.953(0.904,1.003)<br>RERI:-0.046(-0.096,0.004) |                                                                      | IRR:1.068(0.994,1.143)<br><b>RERI:0.064(0.028,0.100)*</b> |
| PM <sub>2.5</sub> | IRR:1.006(0.950,1.063)<br>RERI:0.003(-0.039,0.045)                | IRR:1.029(0.969,1.088)<br>RERI:0.028(-0.015,0.071)                | IRR:1.021(0.969,1.073)<br>RERI:0.017(-0.028,0.061)                | IRR:0.973(0.922,1.025)<br>RERI:-0.027(-0.078,0.024) | IRR:1.072(0.997,1.146)<br><b>RERI:0.066(0.029,0.103)*</b>            |                                                           |

**Supplementary Table 58** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(the maximum lag period = 7)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.115(1.053,1.177)*</b><br><b>RERI:0.096(0.051,0.141)*</b> | <b>IRR:1.247(1.178,1.317)*</b><br><b>RERI:0.198(0.155,0.241)*</b> | IRR:0.962(0.912,1.012)<br>RERI:-0.033(-0.085,0.019) | <b>IRR:1.065(1.007,1.123)*</b><br><b>RERI:0.060(0.019,0.100)*</b>    | IRR:1.007(0.950,1.063)<br>RERI:0.005(-0.036,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.116(1.054,1.178)*</b><br><b>RERI:0.093(0.050,0.137)*</b> |                                                                   | IRR:1.024(0.967,1.081)<br>RERI:0.013(-0.030,0.056)                | IRR:0.985(0.932,1.038)<br>RERI:-0.016(-0.067,0.036) | IRR:1.032(0.973,1.091)<br>RERI:0.029(-0.011,0.069)                   | IRR:1.034(0.974,1.094)<br>RERI:0.033(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.174,1.312)*</b><br><b>RERI:0.196(0.152,0.241)*</b> | IRR:1.037(0.979,1.094)<br>RERI:0.028(-0.018,0.074)                |                                                                   | IRR:0.998(0.946,1.051)<br>RERI:0.002(-0.050,0.055)  | IRR:1.051(0.996,1.105)<br><b>RERI:0.049(0.005,0.093)*</b>            | IRR:1.023(0.971,1.075)<br>RERI:0.021(-0.024,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.938(0.888,0.987)*</b><br>RERI:-0.046(-0.098,0.006)       | IRR:0.956(0.904,1.007)<br>RERI:-0.045(-0.098,0.008)               | IRR:0.976(0.924,1.028)<br>RERI:-0.008(-0.059,0.043)               |                                                     | <b>IRR:0.934(0.885,0.983)*</b><br><b>RERI:-0.062(-0.111,-0.012)*</b> | IRR:0.950(0.900,1.001)<br>RERI:-0.048(-0.097,0.002)       |
| PM <sub>10</sub>  | <b>IRR:1.063(1.005,1.121)*</b><br><b>RERI:0.055(0.014,0.097)*</b> | IRR:1.024(0.966,1.083)<br>RERI:0.023(-0.020,0.066)                | IRR:1.040(0.987,1.094)<br>RERI:0.036(-0.006,0.079)                | IRR:0.955(0.905,1.004)<br>RERI:-0.045(-0.095,0.005) |                                                                      | IRR:1.068(0.994,1.142)<br><b>RERI:0.063(0.027,0.099)*</b> |
| PM <sub>2.5</sub> | IRR:1.008(0.951,1.065)<br>RERI:0.004(-0.037,0.046)                | IRR:1.028(0.968,1.087)<br>RERI:0.027(-0.016,0.070)                | IRR:1.021(0.969,1.073)<br>RERI:0.017(-0.028,0.061)                | IRR:0.972(0.921,1.023)<br>RERI:-0.028(-0.078,0.023) | IRR:1.072(0.998,1.147)<br><b>RERI:0.067(0.030,0.103)*</b>            |                                                           |

**Supplementary Table 59** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(the maximum lag period = 8)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.114(1.053,1.176)*</b><br><b>RERI:0.095(0.050,0.140)*</b> | <b>IRR:1.247(1.178,1.316)*</b><br><b>RERI:0.198(0.155,0.240)*</b> | IRR:0.965(0.915,1.016)<br>RERI:-0.031(-0.082,0.021) | <b>IRR:1.066(1.008,1.124)*</b><br><b>RERI:0.061(0.020,0.101)*</b>    | IRR:1.007(0.951,1.064)<br>RERI:0.005(-0.035,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.117(1.055,1.179)*</b><br><b>RERI:0.094(0.051,0.137)*</b> |                                                                   | IRR:1.025(0.968,1.082)<br>RERI:0.014(-0.029,0.057)                | IRR:0.987(0.934,1.040)<br>RERI:-0.013(-0.065,0.038) | IRR:1.032(0.974,1.091)<br>RERI:0.030(-0.010,0.070)                   | IRR:1.034(0.974,1.094)<br>RERI:0.033(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.174,1.312)*</b><br><b>RERI:0.196(0.152,0.241)*</b> | IRR:1.038(0.980,1.095)<br>RERI:0.029(-0.017,0.074)                |                                                                   | IRR:1.004(0.951,1.057)<br>RERI:0.007(-0.046,0.060)  | IRR:1.051(0.997,1.106)<br><b>RERI:0.049(0.006,0.093)*</b>            | IRR:1.023(0.971,1.076)<br>RERI:0.021(-0.023,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.937(0.887,0.986)*</b><br>RERI:-0.047(-0.099,0.005)       | IRR:0.955(0.903,1.006)<br>RERI:-0.046(-0.099,0.007)               | IRR:0.976(0.924,1.027)<br>RERI:-0.008(-0.060,0.043)               |                                                     | <b>IRR:0.933(0.884,0.982)*</b><br><b>RERI:-0.063(-0.112,-0.014)*</b> | IRR:0.950(0.900,1.001)<br>RERI:-0.048(-0.098,0.001)       |
| PM <sub>10</sub>  | <b>IRR:1.065(1.007,1.123)*</b><br><b>RERI:0.057(0.016,0.098)*</b> | IRR:1.025(0.966,1.084)<br>RERI:0.024(-0.019,0.066)                | IRR:1.041(0.987,1.095)<br>RERI:0.037(-0.006,0.079)                | IRR:0.960(0.910,1.010)<br>RERI:-0.039(-0.089,0.011) |                                                                      | IRR:1.068(0.994,1.142)<br><b>RERI:0.064(0.028,0.099)*</b> |
| PM <sub>2.5</sub> | IRR:1.010(0.953,1.066)<br>RERI:0.006(-0.036,0.047)                | IRR:1.027(0.967,1.086)<br>RERI:0.026(-0.017,0.068)                | IRR:1.022(0.969,1.074)<br>RERI:0.017(-0.027,0.061)                | IRR:0.978(0.926,1.029)<br>RERI:-0.022(-0.072,0.029) | IRR:1.073(0.998,1.147)<br><b>RERI:0.067(0.031,0.103)*</b>            |                                                           |

**Supplementary Table 60** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(the maximum lag period = 9)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.115(1.053,1.177)*</b><br><b>RERI:0.096(0.051,0.140)*</b> | <b>IRR:1.246(1.177,1.315)*</b><br><b>RERI:0.197(0.154,0.240)*</b> | IRR:0.964(0.914,1.014)<br>RERI:-0.032(-0.083,0.020) | <b>IRR:1.066(1.008,1.124)*</b><br><b>RERI:0.061(0.020,0.101)*</b>    | IRR:1.008(0.951,1.065)<br>RERI:0.006(-0.035,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.118(1.056,1.180)*</b><br><b>RERI:0.095(0.051,0.138)*</b> |                                                                   | IRR:1.025(0.968,1.081)<br>RERI:0.013(-0.030,0.057)                | IRR:0.982(0.930,1.035)<br>RERI:-0.018(-0.070,0.033) | IRR:1.033(0.974,1.092)<br>RERI:0.030(-0.010,0.070)                   | IRR:1.034(0.974,1.094)<br>RERI:0.033(-0.007,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.174,1.312)*</b><br><b>RERI:0.196(0.152,0.240)*</b> | IRR:1.038(0.980,1.096)<br>RERI:0.029(-0.017,0.074)                |                                                                   | IRR:1.002(0.950,1.055)<br>RERI:0.006(-0.046,0.059)  | IRR:1.051(0.996,1.105)<br><b>RERI:0.049(0.006,0.092)*</b>            | IRR:1.024(0.971,1.076)<br>RERI:0.022(-0.023,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.935(0.886,0.985)*</b><br>RERI:-0.048(-0.100,0.003)       | IRR:0.955(0.903,1.006)<br>RERI:-0.046(-0.098,0.007)               | IRR:0.976(0.924,1.027)<br>RERI:-0.008(-0.060,0.043)               |                                                     | <b>IRR:0.932(0.883,0.981)*</b><br><b>RERI:-0.064(-0.113,-0.015)*</b> | IRR:0.950(0.899,1.000)<br>RERI:-0.049(-0.098,0.000)       |
| PM <sub>10</sub>  | <b>IRR:1.066(1.008,1.124)*</b><br><b>RERI:0.058(0.017,0.099)*</b> | IRR:1.026(0.967,1.084)<br>RERI:0.024(-0.018,0.066)                | IRR:1.040(0.987,1.094)<br>RERI:0.036(-0.007,0.078)                | IRR:0.954(0.904,1.003)<br>RERI:-0.046(-0.095,0.004) |                                                                      | IRR:1.069(0.994,1.143)<br><b>RERI:0.064(0.029,0.100)*</b> |
| PM <sub>2.5</sub> | IRR:1.011(0.954,1.068)<br>RERI:0.007(-0.035,0.048)                | IRR:1.027(0.967,1.086)<br>RERI:0.026(-0.016,0.068)                | IRR:1.021(0.969,1.074)<br>RERI:0.017(-0.027,0.061)                | IRR:0.970(0.919,1.021)<br>RERI:-0.030(-0.080,0.020) | IRR:1.074(0.999,1.148)<br><b>RERI:0.068(0.032,0.104)*</b>            |                                                           |

**Supplementary Table 61** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(df of temperature = 2)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.114(1.052,1.175)*</b><br><b>RERI:0.095(0.050,0.140)*</b> | <b>IRR:1.245(1.176,1.314)*</b><br><b>RERI:0.197(0.154,0.239)*</b> | IRR:0.963(0.913,1.014)<br>RERI:-0.033(-0.084,0.018) | <b>IRR:1.063(1.005,1.121)*</b><br><b>RERI:0.058(0.018,0.099)*</b>    | IRR:1.006(0.949,1.063)<br>RERI:0.004(-0.037,0.045)        |
| NO <sub>2</sub>   | <b>IRR:1.114(1.053,1.176)*</b><br><b>RERI:0.092(0.048,0.135)*</b> |                                                                   | IRR:1.025(0.968,1.082)<br>RERI:0.014(-0.029,0.057)                | IRR:0.988(0.935,1.041)<br>RERI:-0.013(-0.064,0.039) | IRR:1.031(0.972,1.090)<br>RERI:0.028(-0.012,0.069)                   | IRR:1.033(0.973,1.093)<br>RERI:0.032(-0.008,0.072)        |
| SO <sub>2</sub>   | <b>IRR:1.241(1.172,1.310)*</b><br><b>RERI:0.195(0.150,0.239)*</b> | IRR:1.038(0.980,1.095)<br>RERI:0.029(-0.017,0.075)                |                                                                   | IRR:0.999(0.947,1.052)<br>RERI:0.002(-0.050,0.054)  | IRR:1.050(0.996,1.105)<br><b>RERI:0.048(0.005,0.092)*</b>            | IRR:1.023(0.971,1.076)<br>RERI:0.021(-0.023,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.939(0.889,0.988)*</b><br>RERI:-0.046(-0.097,0.005)       | IRR:0.958(0.907,1.010)<br>RERI:-0.042(-0.095,0.010)               | IRR:0.977(0.925,1.028)<br>RERI:-0.009(-0.059,0.042)               |                                                     | <b>IRR:0.937(0.888,0.986)*</b><br><b>RERI:-0.059(-0.107,-0.010)*</b> | IRR:0.953(0.902,1.004)<br>RERI:-0.046(-0.094,0.003)       |
| PM <sub>10</sub>  | <b>IRR:1.061(1.003,1.119)*</b><br><b>RERI:0.054(0.013,0.095)*</b> | IRR:1.024(0.965,1.082)<br>RERI:0.023(-0.020,0.065)                | IRR:1.040(0.986,1.094)<br>RERI:0.036(-0.007,0.078)                | IRR:0.958(0.908,1.007)<br>RERI:-0.042(-0.091,0.007) |                                                                      | IRR:1.068(0.994,1.142)<br><b>RERI:0.063(0.028,0.099)*</b> |
| PM <sub>2.5</sub> | IRR:1.007(0.951,1.064)<br>RERI:0.004(-0.038,0.045)                | IRR:1.027(0.968,1.087)<br>RERI:0.026(-0.017,0.069)                | IRR:1.021(0.969,1.073)<br>RERI:0.017(-0.028,0.061)                | IRR:0.975(0.923,1.026)<br>RERI:-0.025(-0.075,0.025) | IRR:1.072(0.998,1.147)<br><b>RERI:0.067(0.030,0.103)*</b>            |                                                           |

**Supplementary Table 62** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(df of temperature = 4)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.115(1.053,1.177)*</b><br><b>RERI:0.096(0.051,0.141)*</b> | <b>IRR:1.247(1.178,1.317)*</b><br><b>RERI:0.198(0.155,0.241)*</b> | IRR:0.962(0.912,1.012)<br>RERI:-0.034(-0.086,0.019) | <b>IRR:1.064(1.006,1.122)*</b><br><b>RERI:0.059(0.019,0.100)*</b>    | IRR:1.006(0.950,1.063)<br>RERI:0.005(-0.036,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.116(1.054,1.178)*</b><br><b>RERI:0.093(0.050,0.137)*</b> |                                                                   | IRR:1.024(0.968,1.081)<br>RERI:0.013(-0.030,0.057)                | IRR:0.985(0.932,1.038)<br>RERI:-0.015(-0.067,0.036) | IRR:1.032(0.973,1.091)<br>RERI:0.029(-0.011,0.070)                   | IRR:1.034(0.974,1.094)<br>RERI:0.033(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.174,1.312)*</b><br><b>RERI:0.196(0.152,0.241)*</b> | IRR:1.037(0.979,1.094)<br>RERI:0.028(-0.018,0.074)                |                                                                   | IRR:0.998(0.946,1.051)<br>RERI:0.002(-0.050,0.055)  | IRR:1.051(0.996,1.105)<br><b>RERI:0.049(0.005,0.093)*</b>            | IRR:1.023(0.971,1.076)<br>RERI:0.021(-0.024,0.066)        |
| O <sub>3</sub>    | <b>IRR:0.938(0.888,0.987)*</b><br>RERI:-0.046(-0.098,0.006)       | IRR:0.956(0.904,1.007)<br>RERI:-0.045(-0.098,0.008)               | IRR:0.976(0.924,1.028)<br>RERI:-0.008(-0.059,0.043)               |                                                     | <b>IRR:0.934(0.885,0.983)*</b><br><b>RERI:-0.062(-0.111,-0.012)*</b> | IRR:0.950(0.900,1.001)<br>RERI:-0.048(-0.098,0.001)       |
| PM <sub>10</sub>  | <b>IRR:1.062(1.004,1.120)*</b><br><b>RERI:0.055(0.014,0.096)*</b> | IRR:1.024(0.966,1.083)<br>RERI:0.023(-0.019,0.066)                | IRR:1.041(0.987,1.094)<br>RERI:0.036(-0.006,0.079)                | IRR:0.955(0.905,1.004)<br>RERI:-0.045(-0.095,0.005) |                                                                      | IRR:1.068(0.994,1.143)<br><b>RERI:0.064(0.028,0.099)*</b> |
| PM <sub>2.5</sub> | IRR:1.008(0.951,1.065)<br>RERI:0.004(-0.038,0.046)                | IRR:1.028(0.968,1.087)<br>RERI:0.027(-0.016,0.070)                | IRR:1.021(0.969,1.073)<br>RERI:0.017(-0.027,0.061)                | IRR:0.972(0.921,1.023)<br>RERI:-0.028(-0.078,0.023) | IRR:1.073(0.998,1.147)<br><b>RERI:0.067(0.030,0.104)*</b>            |                                                           |

**Supplementary Table 63** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(df of relative humidity = 2)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.115(1.053,1.176)*</b><br><b>RERI:0.096(0.051,0.141)*</b> | <b>IRR:1.248(1.178,1.317)*</b><br><b>RERI:0.198(0.155,0.241)*</b> | IRR:0.963(0.913,1.013)<br>RERI:-0.033(-0.085,0.019) | <b>IRR:1.067(1.009,1.125)*</b><br><b>RERI:0.061(0.021,0.102)*</b>    | IRR:1.007(0.951,1.064)<br>RERI:0.005(-0.036,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.115(1.053,1.177)*</b><br><b>RERI:0.093(0.049,0.136)*</b> |                                                                   | IRR:1.023(0.967,1.080)<br>RERI:0.012(-0.031,0.056)                | IRR:0.980(0.928,1.033)<br>RERI:-0.020(-0.072,0.032) | IRR:1.030(0.971,1.089)<br>RERI:0.028(-0.013,0.068)                   | IRR:1.031(0.971,1.091)<br>RERI:0.030(-0.011,0.070)        |
| SO <sub>2</sub>   | <b>IRR:1.243(1.174,1.312)*</b><br><b>RERI:0.196(0.152,0.241)*</b> | IRR:1.036(0.979,1.093)<br>RERI:0.027(-0.019,0.073)                |                                                                   | IRR:0.996(0.944,1.049)<br>RERI:0.000(-0.053,0.053)  | IRR:1.049(0.995,1.104)<br><b>RERI:0.048(0.004,0.091)*</b>            | IRR:1.022(0.970,1.075)<br>RERI:0.021(-0.024,0.065)        |
| O <sub>3</sub>    | <b>IRR:0.939(0.889,0.989)*</b><br>RERI:-0.045(-0.097,0.007)       | IRR:0.952(0.901,1.003)<br>RERI:-0.049(-0.102,0.004)               | IRR:0.973(0.922,1.025)<br>RERI:-0.010(-0.062,0.041)               |                                                     | <b>IRR:0.931(0.882,0.979)*</b><br><b>RERI:-0.065(-0.114,-0.016)*</b> | IRR:0.949(0.899,0.999)<br>RERI:-0.049(-0.099,0.000)       |
| PM <sub>10</sub>  | <b>IRR:1.065(1.007,1.123)*</b><br><b>RERI:0.057(0.016,0.098)*</b> | IRR:1.023(0.964,1.082)<br>RERI:0.022(-0.021,0.064)                | IRR:1.039(0.985,1.092)<br>RERI:0.035(-0.008,0.077)                | IRR:0.951(0.902,1.001)<br>RERI:-0.048(-0.098,0.002) |                                                                      | IRR:1.066(0.992,1.141)<br><b>RERI:0.062(0.026,0.098)*</b> |
| PM <sub>2.5</sub> | IRR:1.009(0.952,1.066)<br>RERI:0.005(-0.036,0.047)                | IRR:1.025(0.966,1.085)<br>RERI:0.025(-0.018,0.068)                | IRR:1.020(0.968,1.072)<br>RERI:0.016(-0.028,0.060)                | IRR:0.971(0.920,1.022)<br>RERI:-0.029(-0.080,0.021) | IRR:1.071(0.996,1.145)<br><b>RERI:0.065(0.029,0.102)*</b>            |                                                           |

**Supplementary Table 64** Interaction analysis between various air pollutants on coronary heart disease hospitalizations in Henan Province from 2016 to 2021(df of relative humidity = 4)

| pollutant         | CO                                                                | NO <sub>2</sub>                                                   | SO <sub>2</sub>                                                   | O <sub>3</sub>                                      | PM <sub>10</sub>                                                     | PM <sub>2.5</sub>                                         |
|-------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------|
| CO                |                                                                   | <b>IRR:1.115(1.054,1.177)*</b><br><b>RERI:0.096(0.051,0.141)*</b> | <b>IRR:1.246(1.177,1.316)*</b><br><b>RERI:0.197(0.155,0.240)*</b> | IRR:0.961(0.911,1.011)<br>RERI:0.034(-0.087,0.018)  | <b>IRR:1.065(1.006,1.123)*</b><br><b>RERI:0.059(0.019,0.100)*</b>    | IRR:1.007(0.950,1.064)<br>RERI:0.005(-0.036,0.046)        |
| NO <sub>2</sub>   | <b>IRR:1.116(1.054,1.178)*</b><br><b>RERI:0.093(0.050,0.137)*</b> |                                                                   | IRR:1.025(0.968,1.082)<br>RERI:0.014(-0.029,0.057)                | IRR:0.983(0.930,1.036)<br>RERI:-0.018(-0.070,0.034) | IRR:1.032(0.973,1.091)<br>RERI:0.029(-0.011,0.070)                   | IRR:1.034(0.974,1.094)<br>RERI:0.033(-0.008,0.073)        |
| SO <sub>2</sub>   | <b>IRR:1.242(1.173,1.312)*</b><br><b>RERI:0.196(0.151,0.240)*</b> | IRR:1.038(0.980,1.095)<br>RERI:0.029(-0.017,0.075)                |                                                                   | IRR:0.996(0.944,1.049)<br>RERI:0.000(-0.052,0.053)  | IRR:1.050(0.996,1.105)<br><b>RERI:0.049(0.005,0.092)*</b>            | IRR:1.022(0.970,1.074)<br>RERI:0.020(-0.025,0.065)        |
| O <sub>3</sub>    | <b>IRR:0.937(0.888,0.987)*</b><br>RERI:-0.047(-0.098,0.005)       | IRR:0.954(0.903,1.006)<br>RERI:-0.046(-0.099,0.007)               | IRR:0.974(0.922,1.026)<br>RERI:-0.010(-0.061,0.042)               |                                                     | <b>IRR:0.933(0.884,0.982)*</b><br><b>RERI:-0.062(-0.112,-0.013)*</b> | IRR:0.949(0.898,1.000)<br>RERI:-0.049(-0.099,0.000)       |
| PM <sub>10</sub>  | <b>IRR:1.062(1.004,1.120)*</b><br><b>RERI:0.055(0.014,0.096)*</b> | IRR:1.025(0.966,1.083)<br>RERI:0.023(-0.019,0.066)                | IRR:1.040(0.986,1.094)<br>RERI:0.035(-0.007,0.078)                | IRR:0.953(0.904,1.003)<br>RERI:-0.046(-0.096,0.004) |                                                                      | IRR:1.067(0.993,1.142)<br><b>RERI:0.063(0.027,0.099)*</b> |
| PM <sub>2.5</sub> | IRR:1.008(0.951,1.065)<br>RERI:0.004(-0.038,0.046)                | IRR:1.028(0.968,1.087)<br>RERI:0.027(-0.016,0.070)                | IRR:1.020(0.968,1.072)<br>RERI:0.015(-0.029,0.060)                | IRR:0.970(0.919,1.021)<br>RERI:-0.030(-0.081,0.021) | IRR:1.072(0.997,1.146)<br><b>RERI:0.066(0.030,0.103)*</b>            |                                                           |