**Additional file 1: Supplemental Material**

Residential Particulate Matter and Distance to Roadways in Relation to Mammographic Density: Results from the Nurses’ Health Studies

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**Table S1.** Adjusteda estimates (95% CI) of the difference in square-root transformed mammographic dense area and non-dense area for a 10 µg/m3 increase in particulate matter among pre- and post-menopausal women residing across the U.S. and within regions

|  | Across the U.S. | Northeast | | Midwest | West | South | P for region interaction term |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Dense-area*** | | | | | | | |
| ***Pre-menopausal*** |  |  | |  |  |  |  |
| 1-year prior | n=1,624 | n=577 | | n=554 | n=261 | n=232 |  |
| PM2.5 | 0.08 (-0.31, 0.46) | 0.10 (-0.72, 0.92) | | 0.24 (-0.67, 1.15) | 0.04 (-0.58, 0.66) | 0.06 (-0.87, 1.00) | 0.96 |
| PM2.5-10 | -0.18 (-0.45, 0.10) | 0.15 (-0.84, 1.14) | | -0.38 (-1.02, 0.25) | -0.14 (-0.61, 0.32) | -0.47 (-1.55, 0.60) | 0.83 |
| PM10 | -0.07 (-0.27, 0.13) | 0.07 (-0.42, 0.56) | | -0.15 (-0.63, 0.33) | -0.05 (-0.34, 0.25) | -0.28 (-1.20, 0.63) | 0.90 |
| 3-year average | n=1,624 | n=582 | | n=554 | n=260 | n=228 |  |
| PM2.5 | 0.10 (-0.29, 0.48) | 0.08 (-0.72, 0.89) | | 0.27 (-0.64, 1.18) | 0.07 (-0.57, 0.70) | 0.03 (-0.91, 0.98) | 0.96 |
| PM2.5-10 | -0.16 (-0.44, 0.12) | 0.15 (-0.83, 1.13) | | -0.28 (-0.94, 0.38) | -0.12 (-0.62, 0.38) | -0.71 (-1.78, 0.36) | 0.84 |
| PM10 | -0.06 (-0.26, 0.15) | 0.07 (-0.42, 0.55) | | -0.08 (-0.57, 0.41) | -0.03 (-0.33, 0.27) | -0.50 (-1.42, 0.42) | 0.96 |
| ***Post-menopausal*** |  |  | |  |  |  |  |
| 1-year prior | n=1,634 | n=738 | | n=360 | n=274 | n=262 |  |
| PM2.5 | -0.09 (-0.41, 0.24) | 0.21 (-0.39, 0.81) | | -0.56 (-1.55, 0.43) | -0.24 (-0.73, 0.25) | 0.19 (-0.75, 1.12) | 0.22 |
| PM2.5-10 | -0.14 (-0.36, 0.08) | 0.02 (-0.68, 0.72) | | 0.15 (-0.59, 0.88) | -0.29 (-0.64, 0.07) | 0.26 (-0.65, 1.18) | 0.59 |
| PM10 | -0.10 (-0.26, 0.07) | 0.08 (-0.28, 0.43) | | -0.07 (-0.57, 0.42) | -0.17 (-0.40, 0.06) | 0.32 (-0.46, 1.09) | 0.36 |
| 3-year average | n=1,634 | n=745 | | n=364 | n=272 | n=253 |  |
| PM2.5 | -0.08 (-0.41, 0.25) | 0.21 (-0.41, 0.83) | | -0.40 (-1.39, 0.59) | -0.27 (-0.76, 0.22) | 0.31 (-0.64, 1.26) | 0.22 |
| PM2.5-10 | -0.12 (-0.34, 0.10) | -0.05 (-0.75, 0.65) | | 0.33 (-0.38, 1.05) | -0.29 (-0.65, 0.06) | 0.56 (-0.41, 1.53) | 0.31 |
| PM10 | -0.09 (-0.25, 0.08) | 0.06 (-0.30, 0.41) | | 0.06 (-0.43, 0.54) | -0.18 (-0.40, 0.05) | 0.62 (-0.19, 1.43) | 0.19 |
| ***Non-dense area*** | | | | | | | |
| ***Pre-menopausal*** |  |  |  | |  |  |  |
| 1-year prior | n=1,624 | n=577 | n=554 | | n=261 | n=232 |  |
| PM2.5 | -0.16 (-0.53, 0.21) | -0.16 (-0.90, 0.57) | 0.41 (-0.45, 1.28) | | -0.14 (-0.78, 0.49) | -0.39 (-1.34, 0.56) | 0.23 |
| PM2.5-10 | -0.15 (-0.42, 0.11) | 0.15 (-0.74, 1.04) | -0.23 (-0.83, 0.38) | | -0.42 (-0.90, 0.06) | 0.56 (-0.54, 1.66) | 0.09 |
| PM10 | -0.13 (-0.32, 0.07) | -0.02 (-0.46, 0.42) | -0.01 (-0.47, 0.44) | | -0.20 (-0.50, 0.10) | 0.03 (-0.90, 0.97) | 0.25 |
| 3-year average | n=1,624 | n=582 | n=554 | | n=260 | n=228 |  |
| PM2.5 | -0.15 (-0.53, 0.22) | -0.13 (-0.85, 0.60) | 0.33 (-0.53, 1.20) | | -0.11 (-0.75, 0.53) | -0.58 (-1.55, 0.40) | 0.24 |
| PM2.5-10 | -0.17 (-0.44, 0.10) | 0.13 (-0.75, 1.01) | -0.29 (-0.92, 0.34) | | -0.47 (-0.97, 0.03) | 1.13 (0.03, 2.24) | 0.01 |
| PM10 | -0.13 (-0.33, 0.06) | -0.01 (-0.45, 0.42) | -0.07 (-0.53, 0.40) | | -0.20 (-0.51, 0.11) | 0.29 (-0.67, 1.24) | 0.23 |
| ***Post-menopausal*** |  |  |  | |  |  |  |
| 1-year prior | n=1,634 | n=738 | n=360 | | n=274 | n=262 |  |
| PM2.5 | -0.18 (-0.54, 0.18) | -0.79 (-1.42, -0.16) | -0.14 (-1.24, 0.96) | | 0.01 (-0.60, 0.62) | 0.27 (-0.72, 1.26) | 0.48 |
| PM2.5-10 | -0.13 (-0.37, 0.11) | -0.69 (-1.42, 0.05) | 0.06 (-0.75, 0.87) | | 0.26 (-0.18, 0.71) | -0.86 (-1.83, 0.10) | 0.13 |
| PM10 | -0.12 (-0.30, 0.06) | -0.45 (-0.82, -0.08) | -0.01 (-0.55, 0.54) | | 0.11 (-0.18, 0.39) | -0.43 (-1.25, 0.39) | 0.16 |
| 3-year average | n=1,634 | n=745 | n=364 | | n=272 | n=253 |  |
| PM2.5 | -0.11 (-0.47, 0.25) | -0.76 (-1.41, -0.11) | -0.03 (-1.14, 1.08) | | 0.15 (-0.46, 0.76) | 0.19 (-0.81, 1.19) | 0.29 |
| PM2.5-10 | -0.09 (-0.33, 0.15) | -0.69 (-1.42, 0.05) | 0.15 (-0.65, 0.96) | | 0.30 (-0.13, 0.73) | -0.69 (-1.71, 0.33) | 0.15 |
| PM10 | -0.08 (-0.26, 0.10) | -0.43 (-0.81, -0.06) | 0.06 (-0.48, 0.61) | | 0.15 (-0.12, 0.43) | -0.35 (-1.20, 0.51) | 0.16 |

Abbreviations: U.S., United States; PM2.5, Particulate matter less than 2.5 microns in diameter; PM2.5-10, Particulate matter between 2.5 to 10 microns in diameter; PM10, Particulate matter less than 10 microns in diameter.

aAdjusted for cohort, age at mammogram, body mass index at mammogram, parity and age at 1st birth categories, hormonal therapy use, history of biopsy-confirmed benign breast disease, and date of mammogram.

**Table S2.** Adjusteda estimates of the difference in untransformed mammographic density measures for a 10 µg/m3 increase in PM using bootstrapped robust standard errors to estimate 95% CI

|  | Estimates of differences in Untransformed Mammographic Density Measures (95% CI) |
| --- | --- |
| ***Post-menopausal in the Northeast*** | n=745 |
| Percent Mammographic Density (Percentage points) |  |
| 3-year average PM2.5 | 3.4 (-0.5, 7.3) |
| Non-Dense Area (cm2) |  |
| 3-year average PM2.5 | -17.2 (-36.1, -0.5) |
| ***Post-menopausal in the West*** | n=272 |
| Percent Mammographic Density (Percentage points) |  |
| 3-year average PM2.5-10 | -2.0 (-4.7, 0.6) |

Abbreviations: PM2.5, Particulate matter less than 2.5 microns in diameter; PM2.5-10, Particulate matter between 2.5 to 10 microns in diameter

aAdjusted for cohort, age at mammogram, body mass index at mammogram, parity and age at 1st birth categories, hormonal therapy use, history of biopsy-confirmed benign breast disease, and date of mammogram.