

## Supplementary material

**Table S1. The International Classification of Diseases codes used to identify the diagnoses of interest from the Patient Register and the Cause of Death Register**

| Disease or cause of death | ICD-8                                      | ICD-9   | ICD-10                                |
|---------------------------|--|---|---------------------------------------|
| <b>Medical conditions</b> |  |   |                                       |
| Atrial fibrillation       | 427.92                                     | 427D  | I48                                   |
| CVD                       | 390-458                                    | 390-459   | I00-I99                               |
| Psychiatric disorders     | 290-315                                    | 290-319   | F00-F99                               |
| Hypertension              | 400-404, 63701, 63703, 63704, 63709, 63710 | 401-405, 642A, 642B, 642C, 642D, 642E, 642F, 642G, 642H, 642X | I10-I15, O10, O11, O13, O14, O15, O16 |
| Diabetes                  | 250  | 250, 648A   | E10-E14, O24                          |
| <b>Cause of death</b>     |  |   |                                       |
| Death due to CVDs         | 390-458                                    | 390-459   | I00-I99                               |
| Unnatural death           | 7959, 79621, E800-E999                     | 798, E800-E999  | R95, R96, R98, V01-Y98                |

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CVD=cardiovascular diseases; ICD=International Classification of Diseases.

**Table S2. Characteristics of the study population according to exposure to death of a child**

| Variables                            | Unexposed (n=3,844,088) | Exposed (n=64,628) |
|--------------------------------------|-------------------------|--------------------|
|                                      | N (%)                   | N (%)              |
| Age/Mean (SD), years                 | 31.9 (7.0)              | 34.0 (8.5)         |
| Sex                                  |                         |                    |
| Men                                  | 1,722,385 (44.8)        | 28,577 (44.2)      |
| Women                                | 2,121,703 (55.2)        | 36,051 (55.8)      |
| Country of birth                     |                         |                    |
| Sweden                               | 3,340,191 (86.9)        | 55,898 (86.5)      |
| Other countries                      | 503,897 (13.1)          | 8730 (13.5)        |
| Year of entry in the study           |                         |                    |
| Before 1990                          | 1,801,074 (46.9)        | 48,116 (74.5)      |
| 1990-1999                            | 772,858 (20.1)          | 9924 (15.4)        |
| 2000-2009                            | 815,629 (21.2)          | 5260 (8.1)         |
| After 2009                           | 454,527 (11.8)          | 1328 (2.0)         |
| Marital status at baseline           |                         |                    |
| Married or in registered partnership | 1,599,843 (41.6)        | 32,184 (49.8)      |
| Single, widowed or divorced          | 2,125,313 (55.3)        | 30,879 (47.8)      |
| Missing                              | 118,932 (3.1)           | 1565 (2.4)         |
| Highest education at baseline        |                         |                    |
| 0-9 years                            | 705,468 (18.4)          | 18,987 (29.4)      |
| 10-14 years                          | 2,307,070 (60.0)        | 36,608 (56.6)      |
| ≥15 years                            | 682,969 (17.8)          | 7165 (11.1)        |
| Missing                              | 148,581 (3.9)           | 1868 (2.9)         |
| Household income                     |                         |                    |
| Low tertile                          | 1,254,527 (32.6)        | 23,466 (36.3)      |
| Middle tertile                       | 1,257,518 (32.7)        | 20,428 (31.6)      |

|  |                  |               |
|--|------------------|---------------|
| High tertile                                 | 1,260,533 (32.8) | 19,582 (30.3) |
| Missing                                      | 71,510 (1.9)     | 1152 (1.8)    |
| History of CVD* at baseline                  |                  |               |
| No   | 3,754,719 (97.7) | 62,870 (97.3) |
| Yes  | 89,369 (2.3)     | 1758 (2.7)    |
| History of psychiatric disorders at baseline |                  |               |
| No   | 3,658,067 (95.2) | 60,961 (94.3) |
| Yes  | 186,021 (4.8)    | 3667 (5.7)    |
| Parents' history of CVD                      |                  |               |
| No   | 2,559,294 (66.6) | 37,585 (58.2) |
| Yes  | 908,940 (23.6)   | 19,618 (30.4) |
| Missing                                      | 375,854 (9.8)    | 7425 (11.5)   |
| Sibling's history of CVD                     |                  |               |
| No   | 3,417,458 (88.9) | 56,090 (86.8) |
| Yes  | 50,776 (1.3)     | 1113 (1.7)    |
| Missing                                      | 375,854 (9.8)    | 7425 (11.5)   |
| Hypertension before childbirth *             |                  |               |
| No   | 2,019,876 (95.2) | 34,168 (94.8) |
| Yes  | 87,780 (4.1)     | 1388 (3.9)    |
| Missing                                      | 14,047 (0.7)     | 495 (1.3)     |
| Diabetes before childbirth *                 |                  |               |
| No   | 2,091,467 (98.6) | 35,309 (98.0) |
| Yes  | 16,189 (0.8)     | 247 (0.7)     |
| Missing                                      | 14,047 (0.7)     | 495 (1.3)     |
| Smoking in early pregnancy*                  |                  |               |
| No   | 1,293,886 (61.0) | 14,407 (40.0) |
| Yes  | 262,248 (12.3)   | 6236 (17.3)   |

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|                             |                  |               |
|-----------------------------|------------------|---------------|
| Missing                     | 565,569 (26.7)   | 15,408 (42.7) |
| Obesity in early pregnancy* |                  |               |
| No                          | 1,216,394 (57.3) | 14,825 (41.1) |
| Yes                         | 89,508 (4.2)     | 974 (2.7)     |
| Missing                     | 815,801 (38.5)   | 20,252 (56.2) |

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CVD=cardiovascular diseases, SD=standard deviation.

\*Data are available only for women.

**Table S3. Adjusted incidence rate ratios and 95% confidence intervals for the association between death of a child and risk of atrial fibrillation by gender**

| Exposure  | IRR*(95% CI)     |                  |
|---|------------------|------------------|
|   | Fathers          | Mothers          |
| <b>All deaths</b>                                   | 1.10 (1.04-1.16) | 1.25 (1.16-1.35) |
| <b>Cause of death of the deceased</b>               |                  |                  |
| Death due to CVDs                                   | 1.27 (1.06-1.52) | 1.48 (1.16-1.89) |
| Other natural death                                 | 1.08 (1.01-1.15) | 1.30 (1.18-1.43) |
| Unnatural death                                     | 1.10 (1.00-1.21) | 1.09 (0.95-1.26) |
| <b>Age of the deceased child at loss (in years)</b> |                  |                  |
| ≤1  | 1.04 (0.89-1.23) | 1.64 (1.31-2.04) |
| 2-12  | 0.87 (0.70-1.09) | 1.16 (0.83-1.62) |
| 13-18   | 1.18 (1.00-1.39) | 1.43 (1.13-1.81) |
| >18   | 1.11 (1.05-1.18) | 1.19 (1.09-1.30) |
| <b>Number of remaining live children at loss</b>    |                  |                  |
| 0   | 0.92 (0.75-1.12) | 1.18 (0.92-1.51) |
| 1-2   | 1.09 (1.02-1.17) | 1.16 (1.05-1.28) |
| ≥3  | 1.15 (1.06-1.25) | 1.43 (1.26-1.61) |
| <b>Number of deceased children during follow-up</b> |                  |                  |
| 1   | 1.10 (1.05-1.17) | 1.26 (1.17-1.36) |
| 2 or more   | 0.96 (0.67-1.36) | 0.96 (0.56-1.65) |

IRR=incidence rate ratio; CI=confidence interval; CVD=cardiovascular disease.

\* Adjusted for age at follow-up, calendar year at follow-up, country of birth, marital status, household income, educational attainment, history of psychiatric disorders and cardiovascular diseases.

**Table S4. Adjusted incidence rate ratios and 95% confidence interval for the association between death of a child and the risk of atrial fibrillation in different subgroups**

| Strata                                      | Number of events<br>/person-years | Adjusted IRR<br>(95% CI) |
|---|-----------------------------------|--------------------------|
| <b>Age*</b>                                 |                                   |                          |
| <50 years                                   | 9300/39,415,757                   | 1.25 (1.01-1.55)         |
| ≥50 years                                   | 85,888/33,411,442                 | 1.15 (1.10-1.20)         |
| <b>Education at baseline†</b>               |                                   |                          |
| 0-9 years                                   | 28,241/15,761,241                 | 1.18 (1.10-1.26)         |
| 10-14 years                                 | 51,551/44,892,582                 | 1.12 (1.05-1.19)         |
| ≥15 years                                   | 14,377/10,165,403                 | 1.16 (1.02-1.31)         |
| <b>The first child's birth year*</b>        |                                   |                          |
| Before 1987                                 | 81,457/42,117,441                 | 1.15 (1.10-1.21)         |
| 1987 and afterwards                         | 13,731/30,709,758                 | 1.06 (0.90-1.25)         |
| <b>Calendar year at start of follow-up*</b> |                                   |                          |
| < 2001                                      | 19,697/36,341,339                 | 1.13 (1.00-1.29)         |
| ≥2001                                       | 75,491/36,485,860                 | 1.15 (1.10-1.21)         |

IRR=incident rate ratio; CI=confidence interval.

\* Adjusted for sex, age at follow-up, calendar year at follow-up, country of birth, marital status, household income, educational attainment, history of psychiatric disorders and of cardiovascular diseases.

† Adjusted for sex, age at follow-up, calendar year at follow-up, country of birth, marital status, household income, history of psychiatric disorders and of cardiovascular diseases.

**Table S5. Adjusted incidence rate ratios and 95% confidence intervals for the association between the death of a child and the risk of atrial fibrillation in sensitivity analyses**

| Study participants   | Sensitivity analyses  | N         | Multivariable IRR (95% CI) |
|--|---|-----------|----------------------------|
| Participants who did not lose a child prior to baseline                      | Main model  | 3,877,944 | 1.15 (1.10-1.20)           |
| Participants with linkage to their parents                                   | Main model  | 3,908,716 | 1.17 (1.11-1.22)           |
|  | Main model + family history of CVD                                    | 3,908,716 | 1.17 (1.11-1.22)           |
| All female study participants  | Main model + pregestational and gestational hypertension and diabetes | 2,157,754 | 1.25 (1.16-1.34)           |
| Mothers with information on maternal smoking in early pregnancy at baseline* | Main model  | 1,576,777 | 1.40 (1.21-1.62)           |
|  | Main model + maternal smoking in early pregnancy                      | 1,576,777 | 1.40 (1.21-1.61)           |
| Mothers with information on maternal obesity in early pregnancy at baseline* | Main model  | 1,321,701 | 1.31 (1.11-1.55)           |
|  | Main model + maternal obesity in early pregnancy                      | 1,321,701 | 1.30 (1.10-1.54)           |

IRR=incidence rate ratio; CI=confidence intervals; CVD=cardiovascular diseases.

Main model adjusted for sex, age at follow-up, calendar year at follow-up, country of birth, marital status, household income, educational attainment, history of psychiatric disorders and of cardiovascular diseases.

\*Information on maternal smoking and obesity in early pregnancy was available in the Swedish Medical Birth Register since 1982.