

Supplemental Data

eMethods Descriptions of Swedish national registers

eReferences

eTable 1. Inclusion codes used in Swedish Cancer Registry and Patient Register

eTable 2. Interaction between maternal body mass index in early pregnancy and child's sex for risk of childhood acute lymphoblastic leukemia

eTable 3. Sensitivity analysis for maternal body mass index in early pregnancy and risk of childhood acute lymphoblastic leukemia by child's sex

eTable 4. Distribution of child and maternal characteristics in population with and without information on gestational weight gain

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Swedish Medical Birth Register

The Medical Birth Register was established in 1973 and is updated annually.[1] It covers all births in Sweden, with over 4 million birth records by 2018.[2] It contains high-quality information on pregnancies and newborns reported by maternity, obstetric and newborn care services.[1] The data includes maternal data (including height, weight, self-reported obstetric history, smoking habits, etc.) and newborn data (including sex, gestational age, birth weight, etc.).

Swedish Family-Cancer Database

This database links individuals using unique personal identification numbers replaced by pseudonymized serial numbers in several national health registries, including the Cancer Registry, the National Patient Register, the National Population Register, the Multi-generation Register, the Cause of Death Register, and national censuses.[3] It is one of the largest family-cancer databases in the world.

National Cancer Register

The National Cancer Register was founded in 1958 and contains information on primary tumors diagnosed by health care providers in Sweden, including date at diagnosis and tumor characteristics (location and morphology).[4] Its completeness is estimated at 96%.[5] Hematological cancers are identified using the International Classification of Diseases, 8th Revision (ICD-8) and Pathological Anatomical Diagnosis (PAD) codes.

National Patient Register

The National Patient Register has collected nationwide data on diagnoses of diseases from all private and public hospitals since 1964 and visits to specialist physicians in Sweden since 2001.[6, 7] The data includes administrative data, diagnoses and procedures. Diseases such as diabetes and birth defects can be extracted using ICD-8 during 1969-1986, ICD-9 during 1987-1996 and ICD-10 since 1997.

Other nationwide registers

Longitudinal demographic information, such as birth dates, death dates, migration, and employment data, can be obtained from the National Population Register, the Cause of Death Register, and national censuses.[8, 9] We retrieved the pedigree of each individual and derived their first-degree relatives (FDRs including parents, siblings, and children) from the Multi-Generation Register.

eReferences

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eTable 1. Inclusion codes used in Swedish Cancer Registry and Patient Register

Swedish Registers	Diseases	Codes ^a	
Cancer Registry	ALL	ICD-8	204.0
		ICD-O	C910
		PAD	206, 296, 996
		ICD-O	9821.3, 9820.3, 8000.3
Patient Register	Diabetes	ICD-8	250
		ICD-9	250, 648A, 648W
		ICD-10	E10, E11, O240, O241, O243, O244, O249
	Birth defects	ICD-8	740-759
		ICD-9	740-759
		ICD-10	Q00-Q99

ALL=Acute lymphoblastic leukemia; ICD=International Classification of Diseases; ICD-O=International Classification of Diseases for Oncology, revision 2; PAD=Pathological Anatomical Diagnosis

^a All codes are based on Swedish versions.

eTable 2. Interaction between maternal body mass index in early pregnancy and child's sex for risk of childhood acute lymphoblastic leukemia

Maternal BMI in early pregnancy (kg/m ²)	Pregnancies, No.	Girls		Boys		P for interaction
		ALL, No.	HR ^a (95%CI)	ALL, No.	HR ^a (95%CI)	
<18.5	106 039	26	1.1 (0.8-1.7)	34	1.1 (0.8-1.6)	0.97
18.5-24	1 913 933	397	Reference	534	Reference	
≥25	944 841	223	1.2 (1.1-1.5)	232	1.0 (0.8-1.1)	0.02

ALL=Acute lymphoblastic leukemia; BMI=Body mass index; CI=Confidence interval; HR=Hazard ratio.

^a Adjusted for calendar period, maternal region of residence, socioeconomic status, age at delivery, diabetes, and smoking during pregnancy, and child's birth weight and family history of ALL.

eTable 3. Sensitivity analysis for maternal body mass index in early pregnancy and risk of childhood acute lymphoblastic leukemia by child's sex

Maternal BMI in early pregnancy (kg/m ²)	Pregnancies, No.	Total		Girls		Boys	
		ALL, No.	SIR (95%CI)	ALL, No.	SIR (95%CI)	ALL, No.	SIR (95%CI)
Excluding children with birth defects ^{a,b}							
<18.5	105 899	60	1.1 (0.9-1.4)	26	1.1 (0.7-1.6)	34	1.1 (0.8-1.6)
18.5-24	1 911 793	891	Reference	376	Reference	515	Reference
≥25	943 743	437	1.2 (1.1-1.3)	214	1.4 (1.2-1.6)	223	1.0 (0.9-1.1)
Excluding children with family history of ALL ^a							
<18.5	105 991	60	1.1 (0.8-1.4)	26	1.0 (0.7-1.5)	34	1.1 (0.8-1.5)
18.5-24	1 912 857	930	Reference	397	Reference	533	Reference
≥25	944 132	453	1.1 (1.0-1.3)	221	1.4 (1.2-1.6)	232	1.0 (0.9-1.1)

ALL=Acute lymphoblastic leukemia; BMI=Body mass index; CI=Confidence interval; SIR=Standardized incidence ratio.

^a Adjusted for calendar period, maternal region of residence, socioeconomic status, age at delivery, diabetes, and smoking during pregnancy, and child's sex and birth weight. ^b Additionally adjusted for child's family history of ALL.

eTable 4. Distribution of child and maternal characteristics in population with and without information on gestational weight gain

Characteristics	Information on gestational weight gain	
	Available No. (%)	Not available No. (%)
Total	1 465 159 (49.42)	1 499 654 (50.58)
Children		
Sex		
Male	753 906 (51.46)	770 195 (51.36)
Female	711 253 (48.54)	729 459 (48.64)
Birth year		
1983-1989	522 300 (35.65)	1 (0.00)
1990-1999	286 297 (19.54)	370 389 (24.70)
2000-2009	292 448 (19.96)	563 383 (37.57)
2010-2018	364 114 (24.85)	565 881 (37.73)
Birth weight (g)		
<2500	37 378 (2.55)	49 553 (3.30)
2500-3499	620 796 (42.37)	630 326 (42.03)
3500-4499	749 551 (51.16)	760 652 (50.72)
≥4500	53 694 (3.66)	55 606 (3.71)
Missing	3 740 (0.26)	3 517 (0.23)
Gestational week		
<37	59 470 (4.06)	75 592 (5.04)
37-41	1 299 153 (88.67)	1 318 655 (87.93)
≥42	105 792 (7.22)	105 167 (7.01)
Missing	744 (0.05)	240 (0.02)
Birth order		
1	587 994 (40.13)	557 995 (37.21)
2	478 887 (32.68)	485 825 (32.40)
≥3	278 862 (19.03)	264 012 (17.60)
Missing	119 416 (8.15)	191 822 (12.79)
First-degree relatives with ALL		
No	1 463 413 (99.88)	1 497 866 (99.88)
Yes	1 646 (0.11)	1 698 (0.11)
Missing	100 (0.01)	90 (0.01)
Mothers		
Maternal BMI in early pregnancy (kg/m²)		
<18.5	66 268 (4.52)	39 771 (2.65)
18.5-24	976 452 (66.64)	937 481 (62.51)
25-29	298 719 (20.39)	364 128 (24.28)
≥30	123 720 (8.44)	158 274 (10.55)
Delivery age		
<25	265 881 (18.15)	191 728 (12.78)
25-34	954 525 (65.15)	970 086 (64.69)
≥35	244 753 (16.70)	337 840 (22.53)
Smoking during pregnancy		
No	1 178 766 (80.45)	1 338 367 (89.25)
Yes	243 255 (16.60)	145 817 (9.72)
Missing	43 138 (2.94)	15 470 (1.03)
Maternal diabetes		
No	1 441 042 (98.35)	1 471 191 (98.10)
Yes	24 117 (1.65)	28 463 (1.90)

ALL=Acute lymphoblastic leukemia; BMI=Body mass index.