Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eMethods 1 Deterministic linkage methods for forming complete child-father-mother triads registry of beneficiaries and birth certificate

The MCHD was developed based on the birth registry of 2004-2014 held by the Department of Household Registration. IDs for foreign parents in the birth registry are sequential numbers assigned by each county, instead of foreign IDs. To facilitate linkage across databases, the Data Science Center collaborated with researchers to replace foreign mother's sequential numbers with foreign IDs.[1] During data screening process, we found that foreign-born parents could have multiple IDs because their foreign IDs would be changed to national IDs after receiving citizenship. However, for foreign mothers, the algorithm used to develop the MCHD only retrieved a single ID from the registry of beneficiaries of the NHIRD or the birth certificate. To decrease the nonlinkages, we retrieved child-parent pairs from the registry of beneficiaries of 2000-2014 using the variable specifying the relationship between the insured and the enrollee. Among the retrieved pairs, if an ID was associated with multiple IDs documented as spouse (or as father/mother) and all these IDs had the same birthdate, then these multiple IDs were considered to belong to the same person.

Among the retrieved spouse and child-parent pairs from the registry of beneficiaries of the NHRID, if an ID was associated with multiple IDs documented as spouse (or as father/mother) and all these IDs had the same birthdate, then these multiple IDs were considered to belong to the same person. We created a unique indicator for these multiple IDs. There were 172,958 female and 13,471 male indicators associated with multiple IDs. Most of these IDs that apparently belonged to the same person did not occur in the registry of beneficiaries for a given year. In the registry of beneficiaries, the sex is recorded as unknown (value: 9) for a foreign ID. We employed several pieces of information to help determine the sex for these IDs: the sex of the other person in the spouse pairs, whether the ID existed as a mother's ID in the birth certificate database, and whether the ID was part of multiple IDs belonging to a same person.

Two deterministic linkage methods were used to form complete child-father-mother triads. In the first method, the spouse pairs were first linked to the birth certificate to retrieve their children's birthdates by matching on mother's ID and father's birthdate. Then these matched records were linked to the child-parent pairs by matching on parent's ID and child's birthdate. In the second method, the child-father pairs and child-mother pairs in the registry of beneficiaries were matched on child's ID. Among the retrieved child-parent pairs, if a child ID was associated with multiple mother's (or father's) IDs, and the birthdates of these parents' IDs were different, then the parent's IDs of the parent-child pairs that appeared later in the registry of beneficiaries were removed. The later- appearing parent's IDs could be stepparent's IDs. Finally, the parent-child pairs/triads of interest were restricted to children born between 2004-2014. Totally, we retrieved 2,225,067 children with Taiwanese citizenship and born between 2004-2014 from the registry of beneficiaries. Most (95%) of the child's IDs also existed in the MCHD.

There were 2,282,532 children associated with at least one parent's ID in the MCHD and/or the registry of beneficiaries. Most of the child's IDs (2,112,714 [92.6%]) existed both in the MCHD and the registry of beneficiaries; and 59,017 (2.6%) and 110,801 (4.9%) only in the MCHD and only in the registry of beneficiaries, respectively. Among the child's IDs only existing in the MCHD, 33,565 (56.9%) could not be linked to the registry of beneficiaries, and 11,301 (19.1%) were associated with a date of birth earlier than 2004. (The date of birth was retrieved from the registry of beneficiaries.) For the child's IDs only existing in the registry of beneficiaries, 38,185 (34.5%) had both mother's and father's IDs retrieved from the registry of beneficiaries, 38,105 (34.4%) only had mother's IDs, and 34,511 (31.1%) only had father's IDs.

The parent's IDs in the MCHD were compared with those in the registry of beneficiaries (see the below table). For child's IDs with a missing parent's ID in the MCHD, 610 and 25,870 had mother's and father's IDs, respectively, retrieved from the registry of beneficiaries. Among child's IDs in the MCHD, 78.1% had a single retrieved mother's ID agreeing with that in the MCHD; 4.7% had multiple retrieved mother's IDs of which one was the same as that in the MCHD; and only 0.4% had different mother's IDs. As for father's IDs, 68.4% of child's IDs had a single retrieved father's ID agreeing with that in the MCHD; 0.1% had multiple father's IDs of which one was the same as that in the MCHD; and only 0.5% had different father's IDs. Overall, parents' IDs retrieved from the registry of beneficiaries were highly concordant with parent's IDs in the MCHD were: 99.5% and 99.2% of the retrieved mother's and father's IDs were the same as those in the MCHD.

Results of comparing parents' IDs in the parent-child pairs between the MCHD and the registry of beneficiaries

Results of comparison		Mother's ID		Father's ID	
		Number of children	%	Number of children	%
ID is missing in both data sources		447	0.02	60,909	2.80
No ID retrieved from the registry of beneficiaries		363,327	16.73	585,470	26.96
Single ID retrieved from the registry of beneficiaries	ID is missing in the MCHD	552	0.03	25,718	1.18
	ID is different in two data sources	6,570	0.30	10,385	0.48
	ID is the same in two data sources	1,696,461	78.12	1,484,679	68.36
Multiple IDs retrieved from the registry of beneficiaries	ID is missing in the MCHD	58	0.00	152	0.01
	The retrieved IDs are different from that in the MCHD	3,063	0.14	1,307	0.06
	One of the retrieved IDs is the same as that in the MCHD	101,253	4.66	3,111	0.14
Sum		2,171,731	100.00	2,171,731	100.00

eMethods 2 Construction of study cohort

Three data sources were used to construct the study cohort: the parent-child pairs/triads in the MCHD, the parent-child pairs/triads retrieved from the registry of beneficiaries, and the birth certificate database. The following table briefly describes characteristics of children in terms of birth years, health insurance enrollment, and nationality in each data source. The sample frame for the study cohort was children (1) with Taiwan citizenship, (2) born 2004-2014, and (3) included either in the MCHD or the registry of beneficiaries.

Data sources for constructing the study cohort

The dark yellow color indicates children with Taiwan citizenship and born 2004-2014.

(1) Parent-child pairs/triads in the MCHD

<table>
<tr><td colspan="2">Children with Taiwan citizenship born between 2004-2014 and enrolled in the NHI program during 2004-2014
N=2,126,865</td><td rowspan="2">Children with Taiwan citizenship but not enrolled in the NHI program during 2004-2014 (unknown children’s birthdates)

N=33,565</td><td rowspan="2">Children with Taiwan citizenship born before 2004

N=11,301</td></tr>
<tr><td>Children having been enrolled as a dependent of one of the parents

N=2,112,714</td><td>Children having not been enrolled as a dependent of one of the parents

N=14,151</td></tr>
</table>

Birthdates for child’s and parent’s IDs in the MCHD were extracted from the registry of beneficiaries.

(2) Parent-child pairs/triads retrieved from the registry of beneficiaries

<table>
<tr><td colspan="2">Children with Taiwan citizenship born during 2004-2014 who had been enrolled as a dependent of one of the parents in the NHI program.

N=2,223,515</td><td rowspan="2">Children (1) had Taiwan citizenship, (2) were born during 2004-2014, (3) had not been enrolled as a dependent of one of the parents in the NHI program, and (4) were not included in the MCHD.

N=1,552</td></tr>
<tr><td>Child’s IDs included in the MCHD
N=2,112,714</td><td>Child’s IDs not included in the MCHD

N=110,801</td></tr>
</table>

(3) Birth certificate

Live-born infants with Taiwan citizenship born in 2004-2014 N=2,225,131	Live-born infants without Taiwan citizenship[#] N=2,977	Stillbirths N=24,456

[#] defined by two variables in the birth certificate: 1. mother’s ID was foreign ID (the variable ID_ROC_M), and 2. father’s original nationality was non-Taiwanese

Exact deterministic linkage was used to match records between the parent-child pairs/triads in the MCHD and/or the registry of beneficiaries and the birth certificate database. We first performed the linking by matching on mother’s ID, child's birthdate, child sex, and father's birthdate; and then by matching on mother’s ID, child's birthdate, child sex for the remaining unmatched records. For child’s IDs in the MCHD that could not retrieve their birthdates from the registry of beneficiaries (n=33,565), we first used mother’s ID and father's birthdate as the key variables to link the data. For the remaining unmatched records, the child’s birth year was estimated from the variables “visit date” and “age” in the inpatient and ambulatory care expenditure datasets; and child’s death year was estimated from the variable “date of death” in the death certificate database. Then we used mother’s ID, child’s birth year (or death year), and/or father's birthdate as the key variables.

For child’s IDs existing in the MCHD, if their father’s IDs in the MCHD were missing or could not be linked to the registry of beneficiaries, the birthdates of the father’s IDs retrieved from the registry of beneficiaries were employed in the above matching process. Similarly, if child’s IDs could not be matched to birth certificate records by using their mother’s IDs in the MCHD, the retrieved mother’s ID from the registry of beneficiaries was used as the key variable.

In the linking process, if the following two conditions were met, then the records were considered unmatched: (1) if a child’s ID was matched to different birth events, or (2) the number of child’s IDs in a birth event was larger than that of records

in a birth event. These two conditions mostly occurred in the situation when children's birthdates were missing, and mother's ID and father's birthdate were used as the key variables.

Most (91%) of the matched records were obtained by matching on mother's ID, child's birthdate, child sex, and father's birthdate. Overall, 96.8% of parent-child pairs/triads had a matched birth certificate record; and 98.7% of livebirth records in the birth certificate database had a matched parent-child pairs/triad. Among the child-parent pairs/triads with a matched birth certificate record, if a child's ID was associated with multiple father's (or mother's) IDs that had different birthdates, we only kept the IDs that had the same birthdate as that in the birth certificate record. If the multiple mother's IDs had the same birthdate, but these IDs co-existed in more than 30 datasets of the registry of beneficiaries, we also only kept the mother's IDs that existed in the birth certificate. In total, there were 2,272,783 unique child's IDs, 1,535,873 unique mother's IDs, and 1,493,683 unique father's IDs. Very few children had multiple father's IDs, and most (98.4%) of the children with multiple mother's IDs were ultimately found to involve foreign-born mothers.

eMethods 3 Characteristics of children of the study cohort and children excluded from the study cohort, 2004-2014

	The study cohort		Children excluded from the study cohort			
			With a matched birth record		Without a matched birth record	
	N	%	N	%	N	%
Birth year						
Missing					*5,427*	
2004-2007	768,330	38.43	56,126	28.13	27,700	40.42
2008-2010	504,907	25.25	45,823	22.97	18,155	26.49
2011-2014	726,085	36.32	97,547	48.90	22,683	33.10
Children's characteristics						
Child sex						
Missing			*2*		*5,427*	
Female	956,988	47.87	96,379	48.31	33,266	48.54
Males	1,042,334	52.13	103,115	51.69	35,272	51.46
Low birthweight						
Missing					*73,965*	
No	1,882,131	94.14	141,499[a]	70.93		
Yes	117,191	5.86	57,997[a]	29.07		
Preterm birth						
Missing					*73,965*	
No	1,860,620	93.06	142,806	71.58		
Yes	138,702	6.94	56,690	28.42		
Birth order						
Missing					*1,684*	
1	1,124,952	56.27	103,123	51.69	47,323	65.47
2	703,780	35.20	68,486	34.33	19,648	27.18
>=3	170,590	8.53	27,887	13.98	5,310	7.35
Complex chronic conditions						
Missing			*10,144*		*4,918*	
No	1,866,333	93.35	169,773	89.66	67,106	97.19
Yes	132,989	6.65	19,579	10.34	1,941	2.81
Parental characteristics						
Paternal age						
Missing			*81,562*		*22,704*	
<25	101,829	5.09	4,654	3.95	1,058	2.06
25-29	438,192	21.92	21,995	18.65	6,931	13.52
30-34	765,790	38.30	44,832	38.01	17,296	33.74
35-39	478,869	23.95	32,091	27.21	14,115	27.54
40-44	159,561	7.98	10,450	8.86	7,009	13.67
>=45	55,081	2.75	3,912	3.32	4,852	9.47
Maternal age						
Missing					*42,967*	
<20	35,620	1.78	8,211	4.12	411	1.33
20-24	262,663	13.14	21,648	10.85	4,306	13.89
25-29	671,482	33.59	53,453	26.79	8,126	26.21
30-34	729,222	36.47	73,900	37.04	11,773	37.98
35-39	263,861	13.20	35,951	18.02	5,351	17.26
>=40	36,474	1.82	6,333	3.17	1,031	3.33
Unmarried mother						
Missing					*73,965*	
No	1,935,304	96.80	137,293	68.82		

	The study cohort		Children excluded from the study cohort			
			With a matched birth record		Without a matched birth record	
	N	%	N	%	N	%
Yes	64,018	3.20	62,203	31.18		
Foreign-born mother						
Missing					*37,830*	
No	1,804,688	90.26	185,724	93.10	26,563	73.51
Yes	194,634	9.74	13,772	6.90	9,572	26.49
Socio-economic status						
Urbanicity of residence						
Missing	*13*		*22*		*73,965*	
1 (highest urbanicity)	404,799	20.25	42,751	21.43		
2	645,763	32.30	67,635	33.91		
3	471,912	23.60	44,413	22.27		
4	287,070	14.36	25,868	12.97		
5	33,169	1.66	2,659	1.33		
6	69,099	3.46	7,208	3.61		
7	87,497	4.38	8,940	4.48		
Family income						
Missing	*4,037*		*9,530*		*9,724*	
High	360,582	18.07	20,804	10.95	3,680	5.73
Upper-middle	404,735	20.28	17,995	9.47	4,658	7.25
Middle	427,217	21.41	22,819	12.01	7,151	11.13
Lower-middle	401,114	20.10	35,185	18.52	13,959	21.73
Low	401,637	20.13	93,163	49.04	34,793	54.16
Paternal occupation						
Missing	*28,001*		*120,617*		*24,496*	
Civil servants and teachers	111,993	5.68	5,529	7.01	1,856	3.75
Employees, employers and professionals	1,487,630	75.46	59,838	75.86	31,483	63.64
Union members, farmers and fishermen	109,084	5.53	3,681	4.67	3,135	6.34
The unemployed and low-income households	197,877	10.04	7,542	9.56	12,174	24.61
Dependents	64,737	3.28	2,289	2.90	821	1.66
Maternal occupation						
Missing	*8,523*		*15,245*		*47,016*	
Civil servants and teachers	108,535	5.45	9,429	5.12	1,232	4.57
Employees, employers and professionals	1,253,228	62.95	106,205	57.64	10,691	39.67
Union members, farmers and fishermen	69,141	3.47	5,799	3.15	343	1.27
The unemployed and low-income households	135,476	6.81	44,171	23.97	7,505	27.85
Dependents	424,419	21.32	18,647	10.12	7,178	26.64
Parental physical illness						
Paternal Elixhauser index						
Missing			*90,262*		*19,286*	
0	1,871,469	93.61	101,459	92.88	51,488	94.16
1	99,306	4.97	5,955	5.45	2,340	4.28
>1	28,547	1.43	1,820	1.67	851	1.56
Maternal Elixhauser index						
Missing			*4,127*		*37,853*	
0	1,911,647	95.61	183,384	93.87	35,668	98.77
1	78,270	3.91	10,664	5.46	390	1.08
>1	9,405	0.47	1,321	0.68	54	0.15
Death occurred in the first five years of life						

	The study cohort		Children excluded from the study cohort			
			With a matched birth record		Without a matched birth record	
	N	%	N	%	N	%
Paternal death						
No	1,990,599	99.56	199,111	99.81	73,698	99.64
Yes	8,723	0.44	385	0.19	267	0.36
Maternal death						
No	1,996,857	99.88	199,139	99.82	73,940	99.97
Yes	2,465	0.12	357	0.18	25	0.03
Child's death						
No	1,993,379	99.70	194,597	97.54	73,849	99.84
Yes	5,943	0.30	4,899	2.46	116	0.16

[a] For the same-sex multiples, it was difficult to assign birthweight because the MCHD and the registry of beneficiaries had no indicator of birth order for each child's ID. So, birthweight for same-sex twins/triplets was assigned with the mean of their birthweights.

The excluded children were more likely to be born prematurely and have LBW or CCC, which probably resulted from the exclusion of twins/multiples. They were more likely to die during study follow-up (5,051 [1.8%]) compared to children in the study cohort (5,943 [0.3%]). Families of the excluded children tended to have lower income. The presence of maternal SMI was associated with whether a mother-father-child triad could be identified. Among 111,406 mother-child pairs matched to birth certificates that had a missing/unlinkable father's ID, 5.2% had maternal SMI, which was greater than the complete mother-father-child triads (2.9%).

Incidence rates of childhood injury events in the first five years of life, stratified by whether a child was included in the study population or matched to a birth certificate record

	Children[b] (N)	Episodes (n)	Person-years[c]	Incidence rate[d] (95% CI)
Study population	1,999,322	1,993,821	7,741,026.33	257.6 (257.2-257.9)
Matched[a]	199,496	157,855	655,272.85	240.9 (239.7-242.1)
Unmatched[a]	73,965	39,214	276,499.52	141.8 (140.4-143.2)

Abbreviation: CI: Confidence intervals

[a] Matched: children with a matched birth certificate record but not included in the study population; unmatched: children without a matched birth record. The matched group could have a slightly inflated incidence rate because the records in the first 90 days of life could not be assigned exactly to a child's ID.

[b] Number of children with Taiwanese citizenship born in 2004-2014.

[c] Censored when the child died. Otherwise, a person was assumed to have continuous enrollment.

[d] per 1,000 person-years

Children and their parents who were excluded from our study population were more likely to have shorter enrollment time and greater number of enrollment gaps. When we estimated incidence rates of child outcomes, children were assumed to be continuously enrolled until the end of the follow-up period or death. By using the person-years calculated with this method, we found that children excluded had lower incidence rate of injury events than the study population. We suspected that the incidence rates for the excluded children were underestimated because these children were assumed to be continuously enrolled in the health insurance program. Adding these excluded children into the study population requires intensive computation and additional assumptions. For example, we have to consider the actual enrollment time and exclude the enrollment gaps when calculating person-time at risk. Additionally, we have to assume that the probabilities of capturing child outcomes were similar between time periods of enrollment and non-enrollment in the NHI Program. This could be a false assumption since people would be more likely to participate in a health insurance program when they are less healthy. Furthermore, children excluded had lower prevalence and incidence rate of paternal SMI. This could be because fathers of these excluded children were more likely to have shorter enrollment time and missing IDs, which decreased the likelihood of capturing an exposure diagnosis.

eMethods 4 Retrieving child's health records under the parents' coverage

Infants with Taiwanese citizenship can be covered by their parents' insurance for 60 days before joining the NHI program. In this situation, the infants' claims data are associated with their parent's ID, instead of the infant's ID. The following method was adopted to retrieve infants' inpatient/outpatient data under their parents' coverage. We first used parents' ID, ICD-9-CM diagnosis code for newborns and neonates (760-779), coverage indicator (copayment code: 902 and 903), and the age variable ("0-14 days","15-28 days","29 days-less than one year") to retrieve records that belonged to infants. Then, if the visit/admission date of a record was between 30 days prior to and 90 days after the child's birthdate, the child's ID was assigned to that record. We used a slightly longer interval because some children couldn't have their birthdate retrieved from the registry of beneficiaries, and the birthdates retrieved from the birth certificate only have the year and month components. The following table summarizes numbers of records retrieved from parent's claims data and records finally assigned with a child's ID (separated for singletons and multiples). For singleton births, most of the records were successfully assigned to a child's ID.

Numbers of records retrieved from parents' data and assigned with a child's ID

Data sources		Records retrieved from parent's ID	Records matched to child's ID	
			Singletons	Multiples*
Ambulatory care expenditures by visit	Father	52,495	49,880	2,590
	Mother	3,106,795	2,982,993	155,200
Inpatient expenditures by admission	Father	10,560	10,140	757
	Mother	442,607	409,284	57,528

This table included children included in and excluded from the study cohort.

* Figures for multiples were inflated because the records could not be assigned exactly to a child's ID.

eMethods 5 Retrieval of prenatal and well-child visits

The NHI Program offers 10 free prenatal visits; and 7 (8 before 2011) free well-child visits from 0 to 5 years: 4 visits by the age of 1, 2 at the ages of 1-2, 1 at the ages of 2-3, 1 at the ages of 3-4, and 1 at the ages of 4-6. For prenatal visits, we identified records in the ambulatory care expenditures for visits from 2003-2014 that were associated with "sequential numbers of visit" 41-60 (2003) or IC41-IC60 (2004-2014). For each mother, visits on the same day were counted once. Gestational week and child's birthdate were retrieved from the birth certificate and registry of beneficiaries, respectively, to estimate mother's pregnancy start date. Finally, we only kept the records with a visit date within the time period from 3 weeks prior to the pregnancy start date to the child's birthdate. For well-child visits, we identified records in the ambulatory care expenditures for visits from 2004-2014 associated with "sequential numbers of visit" IC11-IC19 or IC71-IC79. We then used child's birthdates to eliminate records that occurred after the age of 5 years. We then calculated numbers of prenatal and well-child visits for each child and obtained the timing of the third and fifth well-child visit.

eMethods 6 Retrieval of covariates

Important covariates were all measured at child's birth. Potential confounders considered included birth year, child sex, birth order, parental age at child's birth, unmarried mother, maternal foreign-born status, urbanicity of residence, monthly family income, parental occupation, parental physical illness (defined by Elixhauser comorbidity index), LBW and preterm birth. Potential mediators included unmarried mother, monthly family income, parental occupation, parental physical illness, LBW and preterm birth.

Children's characteristics

Birth year and child sex were determined by child's birthdate and sex recorded in the registry of beneficiaries. For child's IDs unlinkable to the registry of beneficiaries, we used child's birthdate and sex recorded in the birth certificate if available. Birthweight and gestational age were retrieved from the birth certificate. Birth order was measured by using the sequence in the mother-child pairs in the MCHD and/or the registry of beneficiaries of 2000-2014. For children without mother's IDs, the birth order was defined by the sequence in the father-child pairs.

Parental demographic characteristics

Maternal and paternal ages at birth were calculated from parent's birthdate and child's birthdate recorded in the registry of beneficiaries. For parent's IDs unlinkable to the registry of beneficiaries, we used parent's birthdate recorded in the birth certificate, if available. Unmarried mother was defined by missing or unknown father's household location in the birth certificate. Maternal foreign-born status was determined by the variables: mother's original and current nationality in the birth certificate records, as well as whether a mother had a foreign ID in the registry of beneficiaries. If any of these variables indicated a non-Taiwan national status, we considered the mother as foreign-born.

Socio-economic status

This project used four SES indicators: urbanicity of residence, monthly family income, and maternal and paternal occupation types. Mother's current residence in the birth certificate was used as the proxy of residence. Urbanicity of residence was defined with an index derived by the cluster analysis of the five variables measured for each township in 2005: population density (persons per square kilometer), proportion of people with educational levels of college or above, proportion of people > 65 years, proportion of agricultural workers, and number of physicians per 100,000 people.[2] The variable has seven categories with cluster 1 representing highest urbanicity and cluster 7 least urbanicity.

Monthly family income and occupation type were constructed from two variables in the registry of beneficiaries: salary (salary bands) and characteristics of the company or institution through which an enrollee joined the NHI Program. We first attempted to retrieve the data belonging to an enrollee (the father/ mother) recorded in the year of the child's birth by using enrollee's ID as the key variable. (For children born in 2011-2014, we tried to retrieve data of the birth month first). If there were no data in that year, we collected data recorded in the following year. And if using the enrollee's ID failed to retrieve a relevant record, insured's ID was taken as the key variable to retrieve data belonging to a dependent. The above algorithm generated few duplicate maternal or paternal records in terms of child's ID. For these duplicate records, we chose to keep the records by the following priorities: being retrieved by using enrollee's ID as the key variable, associated with a mother's ID that was the same as that in the birth certificate (for maternal records), and with a time point closer to the child's birth month and year. In total, 12,589 maternal records and 2,499 paternal records were removed. summarizes numbers of records retrieved by each combination of key variable and time point. Finally, 34,292 (1.5%) and 74,023 (3.4%) children with non-missing mother's and father's IDs could not have their parent's data retrieved using the above algorithm. The following table summarizes numbers of records retrieved by each combination of key variable and time point

Numbers of parent records of the registry of beneficiaries retrieved by each combination of key variable and time point relative to the child's birth

Key variable	Time point of data	Maternal data	%	Paternal data	%
Enrollee's ID[a]	The year of childbirth	1,654,697	75.14	1,980,166	94.30
	The following year	97,125	4.41	51,759	2.46
Insured's ID[a]	The year of childbirth	436,081	19.80	63,553	3.03
	The following year	14,184	0.64	4,295	0.20
Sum		**2,202,087**		**2,099,773**	
Missing data		**34,292**		**74,023**	

[a] Enrollee's ID (ID1): the person who paid for the premium; Insured's ID (ID): the person covered by an insurance policy.
This table included all the children retrieved from the MCHD and/or the registry of beneficiaries, regardless of whether they were included in the final study cohort.

If a parent was enrolled as a dependent or unemployed, we assumed the salary to be zero. Monthly family income was then calculated as the sum of parents' salary. To handle the issues that salaries were recorded as salary bands and that some occupation types had no recorded salaries, we divided monthly family income into five income groupings according to quintiles in each birth year. If one of the parents' occupation was the low-income household, and the other had missing occupation type or also belonged to the low-income household, the family income was directly classified as the lowest income group.

Maternal and paternal occupation types were classified according to the characteristics of company or institution through which an enrollee joined the NHI Program. The occupation type was divided into the following categories: (1) civil servants and teachers; (2) employees of enterprises or institutions, employers and professionals; (3) union members*, foreign crew members, farmers, and fishermen, (4) dependents; (5) the unemployed without a working spouse and low-income households. The fourth and fifth categories represent an unemployment status with a difference in whether the insured had a working spouse or parent. In the NHI, if married people are unemployed, they must be enrolled as a dependent of the spouse. If unemployed people cannot be enrolled as a dependent, then they must join the program through a Township/District Office. The low income household status in Taiwan is approved by a local government on the basis of average monthly income for each person in the household, as well as value of movable property and real estate.[3]

* Union members refers to workers of the same occupation in the same city or county who organized and participated in an occupational union. Occupational unions are initially developed as insurance agents for (1) self-employed workers or workers who have no definite employer, (2) employees working in small businesses where there are fewer than 10 employees, and (3) small business owners. The occupation types for occupational unions vary a lot, from farming, fishing, mining, transportation, tourism and catering industry, construction and engineering, news advertising industry, and culture and recreational industry, etc.

Parental physical illness

We used the Elixhauser comorbidity index (EI) as a measurement for parental physical illness. The EI is comprised of 31 comorbidities defined using ICD-9-CM codes.[4] The EI contains several psychiatric disorders, including depression, psychoses, alcohol abuse, and drug abuse.[5] In this project, we removed these 4 comorbidity groups reflecting psychiatric disorders given their overlap or expected collinearity with our exposure of interest. We first identified all outpatient/inpatient data associated with parent IDs that contained ICD-9 diagnostic codes for the comorbidity groups from 13 months before to 1 month after the child's birthdate. We then excluded outpatient diagnostic codes that were reported < 3 times or that all appeared in the same month to avoid counting comorbid disorders due to miscodes. Finally, we used the claims data in the 12 months preceding the child's birthdate to generate EI. The original index does not have a scoring system, so we computed the score by summing individual categories (the presence or absence of a comorbidity).

Child and parental deaths

Child and parental deaths were retrieved from the death certificate database. The death certificate database of 1998-2014 contained 2,353,997 unique IDs. A tiny proportion (0.01%) of these IDs could have been assigned to different persons. Among child's IDs, 11,778 could be linked to a death record. However, 18 records contained a date of death 30 days prior to the child's birthdate; so, we considered these 18 death records invalid. Another 1,347 records had a date of death 15 days earlier or later than the birthdate. This arose because these children did not have a birthdate retrieved from the registry of beneficiaries, and their birthdates were instead retrieved from the birth certificate database, which only have the birth year and month. For these children, we corrected the child's birthdates according to the death date.

For mother's IDs, 4,083 death records were retrieved, among which 28 records with a date of death 16 days earlier than any of the birthdates of the mother's children. For father's IDs, 13,416 death records were retrieved, among which 79 records had a date of death 300 days earlier than any of the birthdates of the father's children. We considered these 28 maternal and 79 paternal death records invalid. Finally, we generated the censored variable that was defined as any parent or child in the parent-child pairs/triad who died in the first five years of life.

eMethods 7 Associations between childhood injury events in the first five years of life and covariates among children in the study cohort

	Follow-up period		Unexposed period		Exposed period	
	Rate[a]	IRR (95% CI)	Events	Rate[a]	Events	Rate[a]
Birth year						
2004-2007	249	ref	909,847	248	41,834	284
2008-2010	265	1.06 (1.06-1.06)	614,968	263	29,634	299
2011-2014	267	1.07 (1.07-1.07)	375,411	265	15,683	318
Children's characteristics						
Child sex						
Males	278	1.18 (1.18-1.19)	1,072,319	277	49,097	319
Female	235	ref	827,907	234	38,054	269
Low birthweight						
No	258	ref	1,797,208	257	81,194	295
Yes	250	0.97 (0.96-0.97)	103,018	248	5,957	288
Preterm birth						
No	257	ref	1,770,453	256	79,437	294
Yes	259	1.01 (1.00-1.01)	129,773	257	7,714	299
Birth order						
1	265	ref	1,120,321	264	52,369	299
2	246	0.93 (0.93-0.93)	627,873	245	26,663	287
≥3	253	0.95 (0.95-0.96)	152,032	251	8,119	295
Complex chronic conditions						
No	256	ref	1,755,568	254	79,484	292
Yes	279	1.09 (1.08-1.10)	144,658	277	7,667	322
Parental characteristics						
Paternal age at birth (years)						
<25	284	1.10 (1.09-1.11)	111,422	283	7,239	307
25-29	272	1.05 (1.05-1.06)	465,759	270	20,584	298
30-34	258	ref	726,231	256	29,742	298
35-39	246	0.95 (0.95-0.96)	418,228	244	19,084	286
40-44	239	0.93 (0.92-0.93)	134,101	236	7,383	288
≥45	234	0.91 (0.90-0.92)	44,485	231	3,119	291
Maternal age at birth (years)						
<20	280	1.11 (1.10-1.12)	39,573	279	2,607	303
20-24	270	1.08 (1.07-1.08)	286,209	269	15,700	297
25-29	264	1.05 (1.05-1.05)	689,112	262	29,880	300
30-34	251	ref	648,040	250	27,073	292
35-39	241	0.96 (0.95-0.96)	210,096	239	10,323	286
≥40	232	0.92 (0.91-0.93)	27,196	230	1,568	274
Unmarried mother						
No	257	ref	1,836,620	256	81,041	295
Yes	264	1.02 (1.02-1.03)	63,606	261	6,110	294
Foreign-born mother						
No	261	ref	1,721,710	259	78,736	298
Yes	232	0.89 (0.89-0.89)	178,516	230	8,415	271
Socio-economic status						
Urbanicity of residence						
1 (highest urbanicity)	241	ref	349,733	239	16,171	281
2	251	1.04 (1.04-1.05)	597,689	249	29,224	286
3	258	1.07 (1.07-1.08)	450,855	257	18,827	293
4	270	1.12 (1.12-1.13)	289,694	269	13,243	308
5	294	1.22 (1.21-1.23)	37,833	292	1,796	335
6	281	1.17 (1.16-1.18)	74,645	279	3,630	329

	Follow-up period		Unexposed period		Exposed period	
	Rate[a]	IRR (95% CI)	Events	Rate[a]	Events	Rate[a]
7	301	1.25 (1.24-1.26)	99,774	299	4,260	348
Family income						
High	243	ref	365,461	242	11,981	281
Upper-middle	256	1.05 (1.05-1.06)	382,686	254	13,760	291
Middle	267	1.10 (1.09-1.10)	425,733	266	18,663	305
Lower-middle	264	1.08 (1.08-1.09)	396,612	262	20,620	302
Low	257	1.06 (1.05-1.06)	324,574	255	21,803	289
Paternal occupation						
Civil servants and teachers	262	1.02 (1.02-1.03)	110,160	261	4,975	314
Employees, employers and professionals	257	ref	1,392,376	255	57,460	294
Union members, farmers and fishermen	276	1.08 (1.07-1.08)	120,627	274	6,392	314
The unemployed and low-income households	250	0.97 (0.97-0.98)	182,755	247	13,370	287
Dependents	249	0.97 (0.96-0.98)	64,629	247	3,581	277
Maternal occupation						
Civil servants and teachers	251	0.98 (0.97-0.98)	102,688	250	3,872	295
Employees, employers and professionals	258	ref	1,156,787	256	44,934	294
Union members, farmers and fishermen	292	1.14 (1.13-1.14)	79,980	291	3,914	337
The unemployed and low-income households	265	1.03 (1.02-1.04)	120,697	262	10,895	301
Dependents	252	0.98 (0.97-0.98)	431,072	250	23,011	288
Parental physical illness						
Paternal Elixhauser index						
0	256	ref	1,777,425	255	78,360	293
1	277	1.08 (1.07-1.09)	96,596	274	6,499	315
>1	278	1.08 (1.07-1.10)	26,205	275	2,292	319
Maternal Elixhauser index						
0	257	ref	1,819,536	255	81,568	293
1	280	1.09 (1.08-1.10)	72,290	277	4,769	328
>1	291	1.14 (1.11-1.16)	8,400	288	814	331
Death occurred in the first five years of life						
Paternal death						
No	258	ref	1,895,396	256	86,651	295
Yes	251	0.97 (0.95-1.00)	4,830	247	500	299
Maternal death						
No	258	ref	1,898,948	256	86,896	295
Yes	261	1.01 (0.96-1.06)	1,278	249	255	340
Child's death						
No	258	ref	1,898,966	256	87,054	295
Yes	266	1.03 (0.98-1.09)	1,260	257	97	478
Censored						
No	258	ref	1,892,960	256	86,321	295
Yes	254	0.99 (0.97-1.01)	7,266	249	830	321

Abbreviation: CI: Confidence intervals; IRR: unadjusted incidence rate ratio.

[a] Incidence rate: per 1,000 person-years. Censored when the child or any parent died.

eMethods 8 Associations between injury hospitalization in the first five years of life and covariates among children in the study cohort

	Follow-up period		Unexposed period		Exposed period	
	Rate[a]	IRR (95% CI)	Events	Rate[a]	Events	Rate[a]
Birth year						
2004-2007	4.19	ref	15,086	4.1	890	6
2008-2010	3.55	0.85 (0.83-0.87)	8,135	3.5	522	5.3
2011-2014	3.25	0.78 (0.75-0.80)	4,522	3.2	237	4.8
Children's characteristics						
Child sex						
Males	4.28	1.30 (1.27-1.33)	16,285	4.2	973	6.3
Female	3.29	ref	11,458	3.2	676	4.8
Low birthweight						
No	3.75	ref	25,801	3.7	1,500	5.5
Yes	4.79	1.28 (1.22-1.34)	1,942	4.7	149	7.2
Preterm birth						
No	3.74	ref	25,393	3.7	1,461	5.4
Yes	4.79	1.28 (1.23-1.33)	2,350	4.7	188	7.3
Birth order						
1	3.55	ref	14,805	3.5	883	5
2	3.91	1.10 (1.08-1.13)	9,833	3.8	571	6.1
≥3	5.21	1.47 (1.41-1.52)	3,105	5.1	195	7.1
Complex chronic conditions						
No	3.64	ref	24,674	3.6	1,446	5.3
Yes	5.99	1.64 (1.59-1.71)	3,069	5.9	203	8.5
Parent characteristics						
Paternal age at birth (years)						
<25	5.81	1.66 (1.59-1.73)	2,268	5.8	160	6.8
25-29	4.17	1.19 (1.16-1.23)	7,073	4.1	402	5.8
30-34	3.50	ref	9,747	3.4	511	5.1
35-39	3.45	0.99 (0.96-1.02)	5,802	3.4	344	5.2
40-44	3.73	1.06 (1.02-1.11)	2,053	3.6	156	6.1
≥45	4.31	1.23 (1.15-1.32)	800	4.2	76	7.1
Maternal age at birth (years)						
<20	7.07	2.21 (2.07-2.35)	993	7	72	8.4
20-24	5.32	1.66 (1.61-1.72)	5,568	5.2	373	7.1
25-29	3.87	1.21 (1.17-1.24)	9,960	3.8	577	5.8
30-34	3.20	ref	8,170	3.2	432	4.7
35-39	3.08	0.96 (0.92-1.00)	2,645	3	169	4.7
≥40	3.49	1.09 (0.99-1.20)	407	3.4	26	4.5
Unmarried mother						
No	3.73	ref	26,328	3.7	1,474	5.4
Yes	6.01	1.61 (1.53-1.69)	1,415	5.8	175	8.4
Foreign-born mother						
No	3.71	ref	24,205	3.6	1,419	5.4
Yes	4.67	1.26 (1.22-1.30)	3,538	4.6	230	7.4
Socio-economic status						
Urbanicity of residence						
1 (highest urbanicity)	2.99	ref	4,285	2.9	256	4.4
2	3.33	1.11 (1.07-1.15)	7,806	3.3	499	4.9
3	3.73	1.25 (1.20-1.30)	6,437	3.7	339	5.3
4	4.67	1.56 (1.50-1.63)	4,942	4.6	296	6.9
5	5.70	1.91 (1.77-2.06)	726	5.6	42	7.8
6	5.75	1.93 (1.82-2.04)	1,513	5.7	87	7.9

7	6.25	2.09 (1.99-2.20)	4,285	2.9	256	4.4
Family income						
High	2.51	ref	3,779	2.5	124	2.9
Upper-middle	3.17	1.26 (1.21-1.32)	4,726	3.1	197	4.2
Middle	4.07	1.62 (1.56-1.68)	6,397	4	376	6.2
Lower-middle	4.09	1.79 (1.72-1.86)	6,685	4.4	426	6.2
Low	4.88	1.94 (1.87-2.02)	6,057	4.8	522	6.9
Paternal occupation						
Civil servants and teachers	2.84	0.80 (0.76-0.85)	1,190	2.8	56	3.5
Employees, employers and professionals	3.54	ref	19,041	3.5	977	5
Union members, farmers and fishermen	5.52	1.56 (1.49-1.62)	2,379	5.4	159	7.8
The unemployed and low-income households	4.98	1.40 (1.36-1.45)	3,555	4.8	358	7.7
Dependents	4.24	1.20 (1.13-1.27)	1,091	4.2	72	5.6
Maternal occupation						
Civil servants and teachers	2.34	0.68 (0.64-0.73)	953	2.3	40	3
Employees, employers and professionals	3.42	ref	15,230	3.4	745	4.9
Union members, farmers and fishermen	5.20	1.52 (1.44-1.60)	1,399	5.1	94	8.1
The unemployed and low-income households	5.58	1.63 (1.56-1.70)	2,503	5.4	264	7.3
Dependents	4.41	1.29 (1.26-1.32)	7,474	4.3	492	6.2
Parental physical illness						
Paternal Elixhauser index						
0	3.77	ref	25,896	3.7	1,441	5.4
1	4.28	1.13 (1.08-1.19)	1,449	4.1	145	7
>1	4.49	1.19 (1.09-1.30)	398	4.2	63	8.8
Maternal Elixhauser index						
0	3.77	ref	26,442	3.7	1,531	5.5
1	4.48	1.19 (1.12-1.26)	1,133	4.3	99	6.8
>1	5.91	1.57 (1.36-1.81)	168	5.8	19	7.7
Death occurred in the first five years of life						
Paternal death						
No	3.80	ref	27619	3.73	1626	5.53
Yes	6.92	1.82 (1.55-2.14)	124	6.34	23	1.38
Maternal death						
No	3.80	ref	27685	3.73	1634	5.54
Yes	12.41	3.27 (2.60-4.11)	58	11.31	15	20.01
Child's death						
No	3.77	ref	27456	3.70	1631	5.52
Yes	59.77	15.85 (14.16-17.74)	287	58.58	18	88.66
Censored						
No	3.76	ref	27284	3.69	1596	5.45
Yes	16.09	4.28 (3.92-4.67)	459	15.71	53	20.47

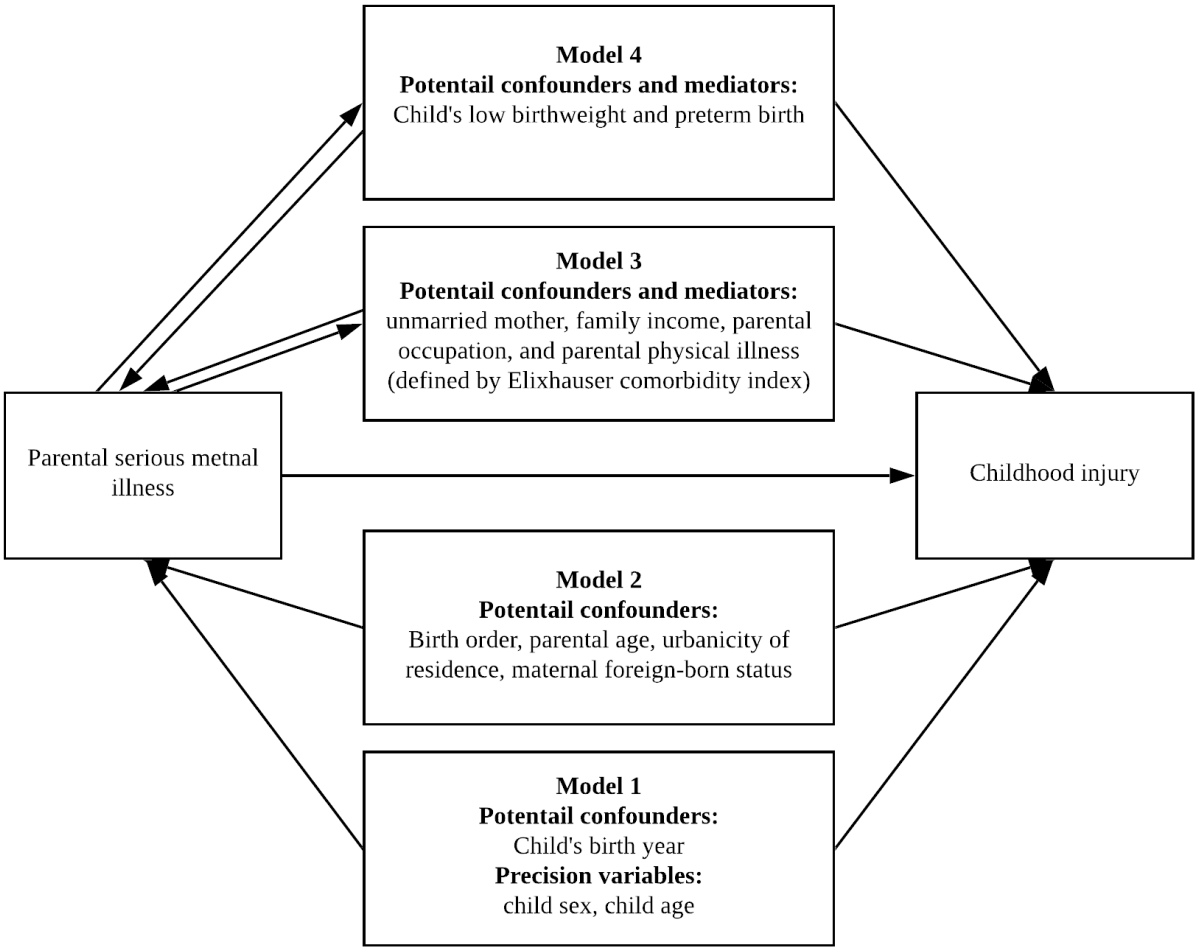
Abbreviation: CI: Confidence intervals; IRR: unadjusted incidence rate ratio.

[a] Incidence rate: per 1,000 person-years. Censored when the child or any parent died.

eMethods 9 Variables used for the adjustment in all models

The base model (model 1) included birth year (three-levels), child sex, child age (five age groups) and interaction terms for parental SMI and child age of exposure. In model 2, we added birth order (three-levels: 1, 2, 3+), maternal and paternal ages at child's birth (continuous variables centered at the mean), foreign-born mother, and urbanicity of residence (seven-levels). In model 3, we added unmarried mother, family income (five-levels), maternal and paternal occupations (five-levels), and maternal and paternal physical illness (defined by Elixhauser comorbidity indices; three-levels: 0, 1, >1). In model 4, we added child's LBW and preterm birth.

Unmarried mother, family income, parental occupation, parental physical illness, child's LBW and preterm birth could be confounders or mediators on the causal pathway between parental SMI and child's injury, therefore, controlling for these variables could yield models that are over-adjusted and bias the risk estimates towards the null. So, our modeling strategy was to start with adjusting for covariates that could be confounders and would not be mediators and then to add covariates that have increasing possibility of mediating effects in regression adjustments.



eMethods 10 Missing data of child's birthweight, gestational age and parental demographics among children in the study cohort

Among the study cohort, 23,964 (1.2%) children had missing paternal occupation and salary, 4,482 (0.2%) missing maternal occupation and salary, 4,037 (0.2%) missing both parents' occupation data, and 14 children missing either birthplace or paternal age. Overall, 98.4% of children do not have any missing data in these variables.

BW	GA	Birthplace	Maternal occupation/ salary	Paternal occupation / salary	Family income	Maternal age	Paternal age	Number of children	%
X	X	X	X	X	X	X	X	1,966,825	98.4
X	X	X	X		X	X	X	23,964	1.2
X	X	X		X	X	X	X	4,482	0.2
X	X	X				X	X	4,037	0.2
X	X		X	X	X	X	X	9	0.0
X	X	X/	X/	X	X	X	X/	5	0.0
Sum								1,999,322	100.0

Abbreviation: BW: birthweight; GA: gestational age; X: non-missing

eMethods 11 ICD-9-CM diagnostic codes of child complex chronic conditions

Category	Subcategories	ICD-9-CM Codes
Neuromuscular	Brain and spinal cord malformations	740.0- 742.9
	Mental retardation	318.0- 318.2
	Central nervous system degeneration and disease	330.0- 330.9, 334.0- 334.2, 335.0- 335.9
	Infantile cerebral palsy	343.0- 343.9
	Muscular dystrophies and myopathies	359.0- 359.3
Cardiovascular	Heart and great vessel malformations	745.0- 747.4
	Cardiomyopathies	425.0- 425.4, 429.1
	Conduction disorders	426.0- 427.4
	Dysrhythmias	427.6- 427.9
Respiratory	Respiratory malformations	748.0- 748.9
	Chronic respiratory disease	770.7
	Cystic fibrosis	277.0
Renal	Congenital anomalies	753.0- 753.9
	Chronic renal failure	585
Gastrointestinal	Congenital anomalies	750.3, 751.1- 751.3, 751.6- 751.9
	Chronic liver disease and cirrhosis	571.4- 571.9
	Inflammatory bowel disease	555.0- 556.9
Hematologic or immunologic	Sickle cell disease	282.5- 282.6
	Hereditary anemias	282.0- 282.4
	Hereditary immunodeficiency	279.00- 279.9, 288.1- 288.2, 446.1
	Acquired immunodeficiency	0420- 0421
Metabolic	Amino acid metabolism	270.0- 270.9
	Carbohydrate metabolism	271.0- 271.9
	Lipid metabolism	272.0- 272.9
	Storage disorders	277.3, 277.5
	Other metabolic disorders	275.0- 275.3, 277.2, 277.4
Other congenital or genetic defect	Chromosomal anomalies	758.0- 758.9
	Bone and joint anomalies	259.4, 737.3, 756.0- 756.5
	Diaphragm and abdominal wall	553.3, 756.6- 756.7
	Other congenital anomalies	759.7- 759.9
Malignancy	Malignant neoplasms	140.0- 208.9, 235.0- 239.9

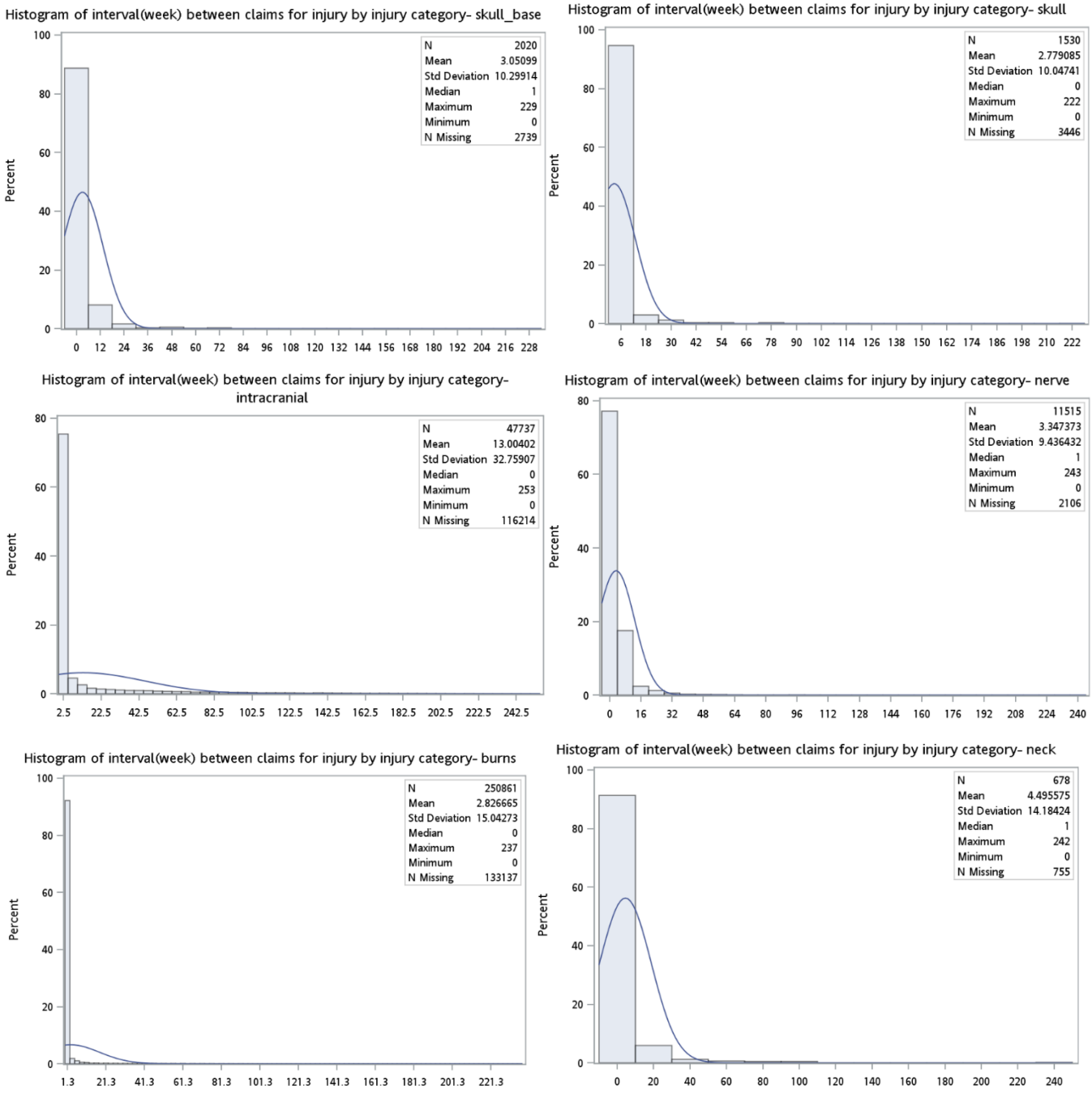
This table was adapted from Feudtner et al.[6]

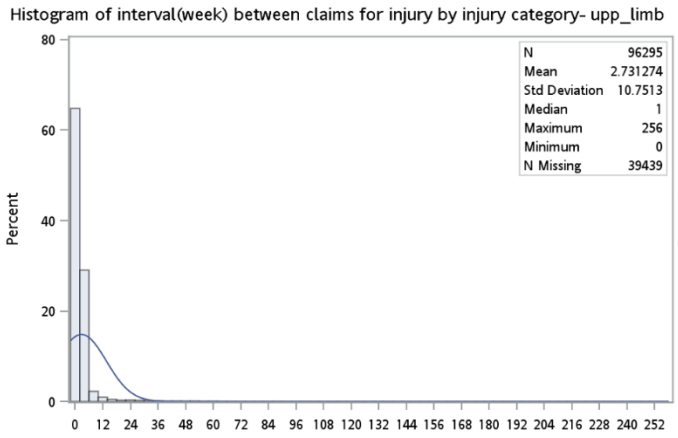
eMethods 12 Number of children and any child injury event excluded in sensitivity analyses

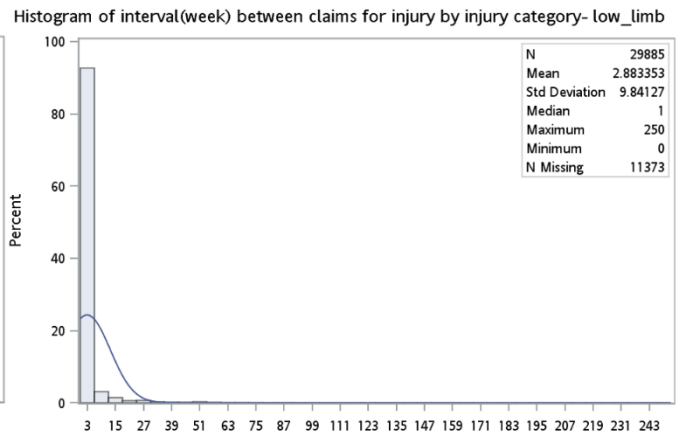
	Number of children excluded (%)[a]	Number of events excluded (%)[b]	
		Unexposed period	Exposed period
Children with complex chronic conditions	132,991 (6.65%)	150,284 (7.89%)	8,485 (9.65%)
Children with a parent having multiple IDs	105,327 (5.27%)	110,330 (5.79%)	5,611 (6.38%)
Children with a parental death before age 5 years	11,181 (0.56%)	6,090 (0.32%)	751(0.85%)

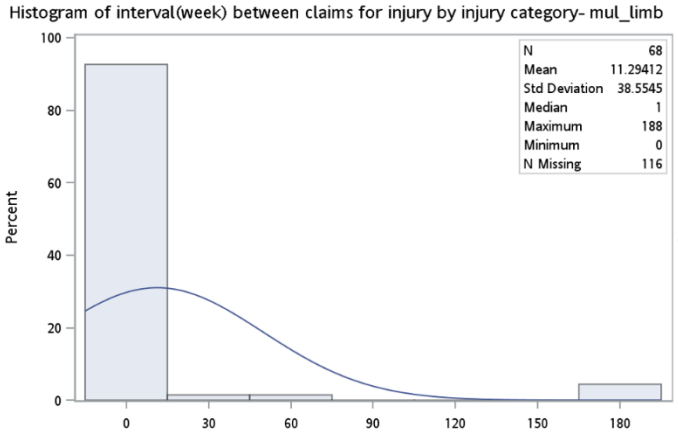
[a] Denominator: number of children in the study cohort.
[b] Denominator: number of episodes in each period.

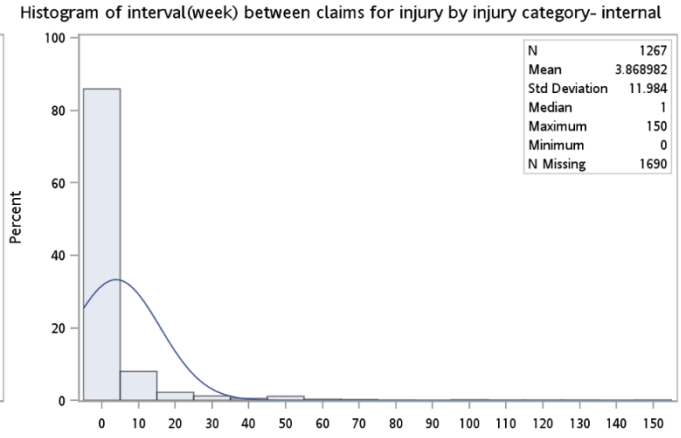
eFigure 1 Interval between two clinical visits (in week) by injury type

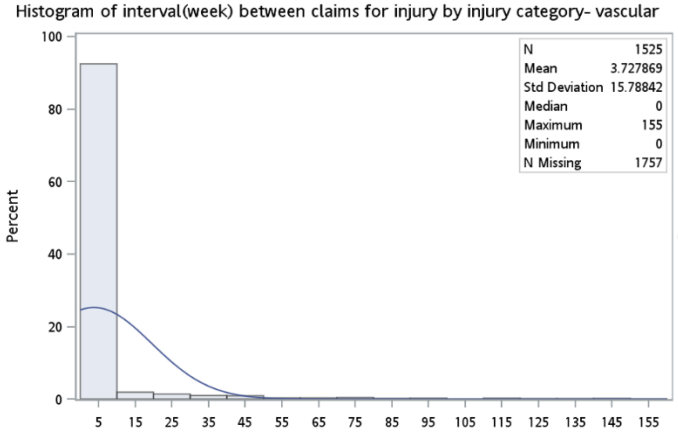


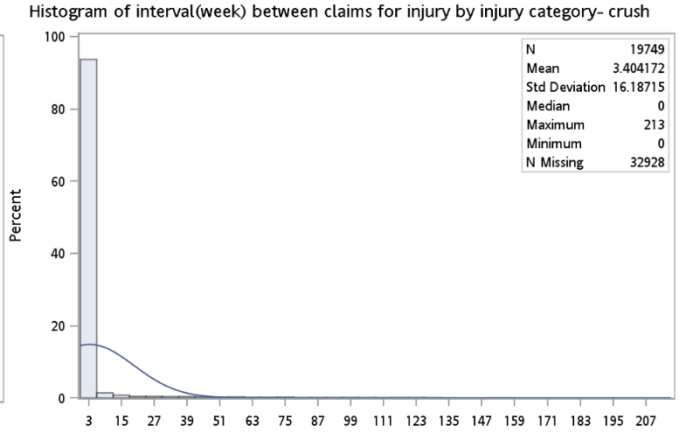


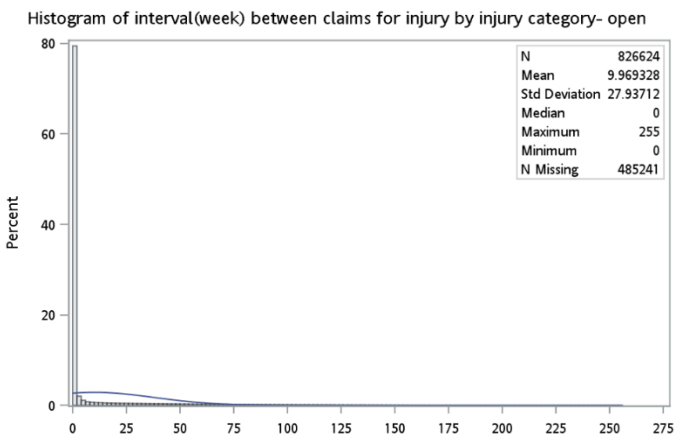


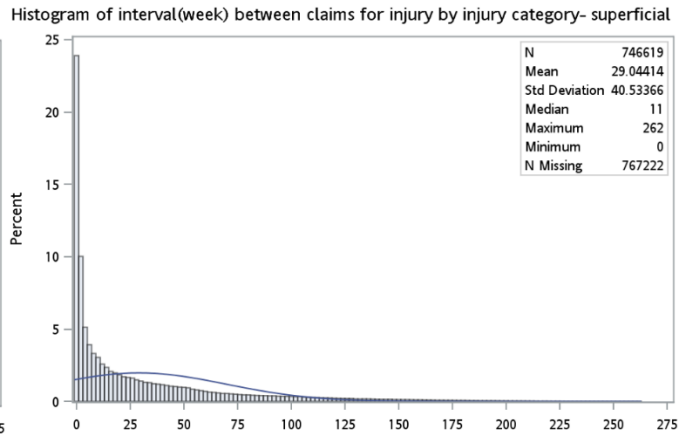


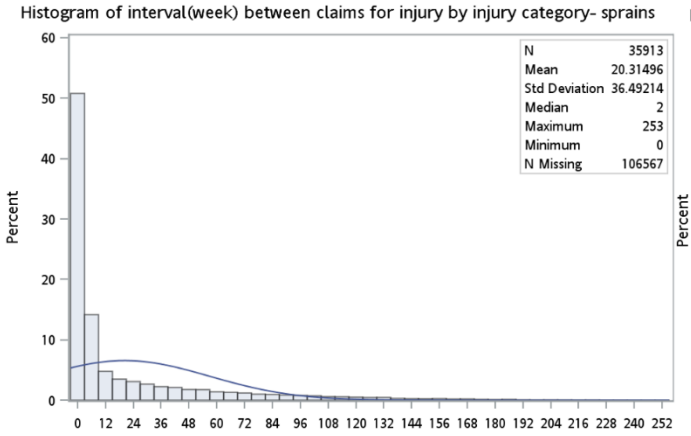


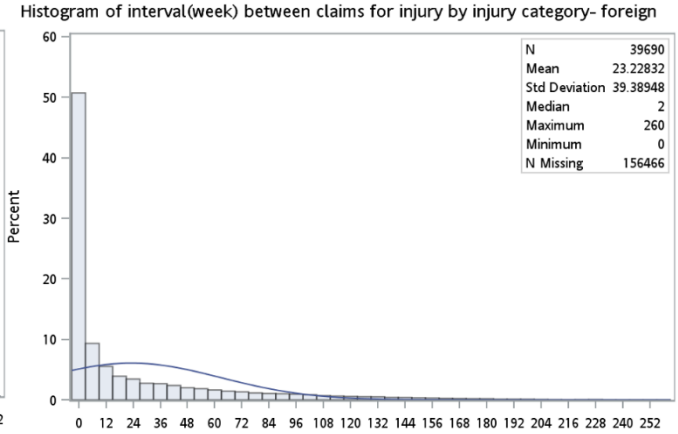


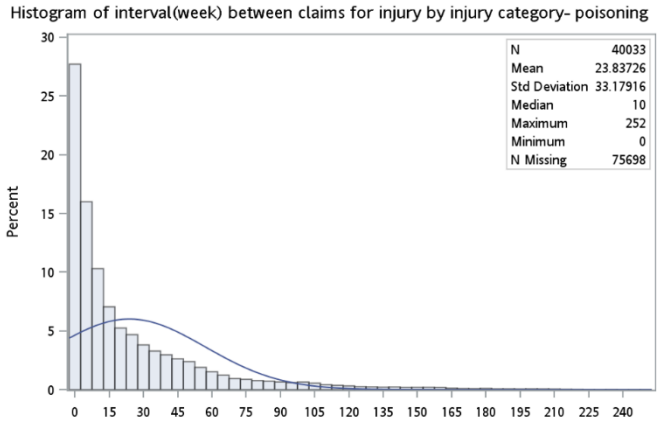




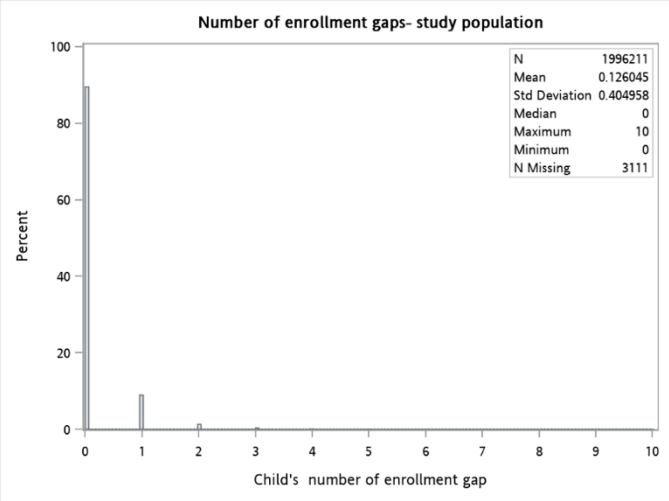


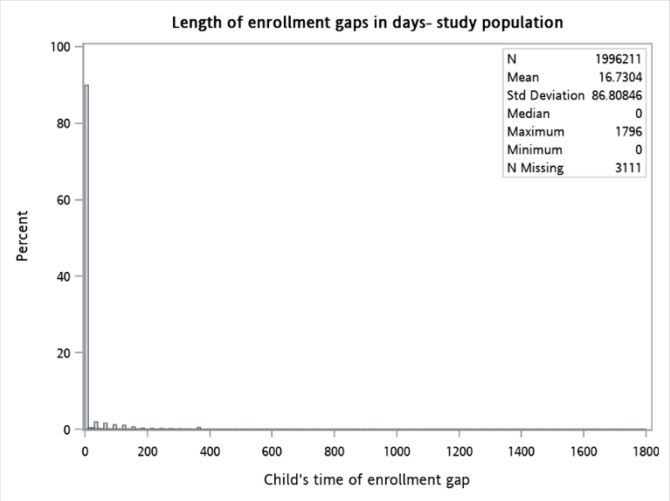


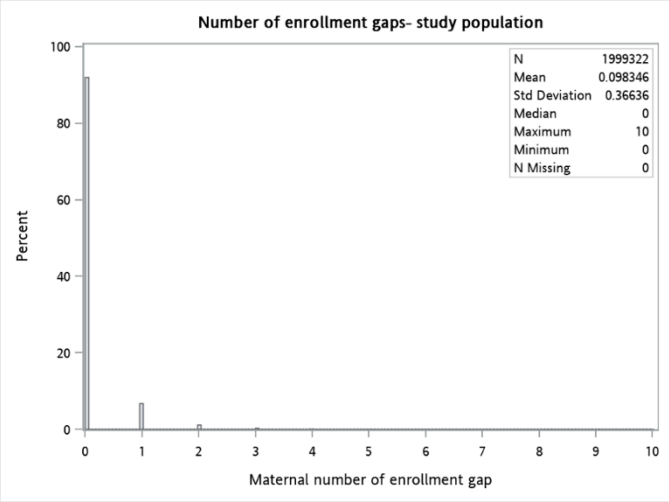


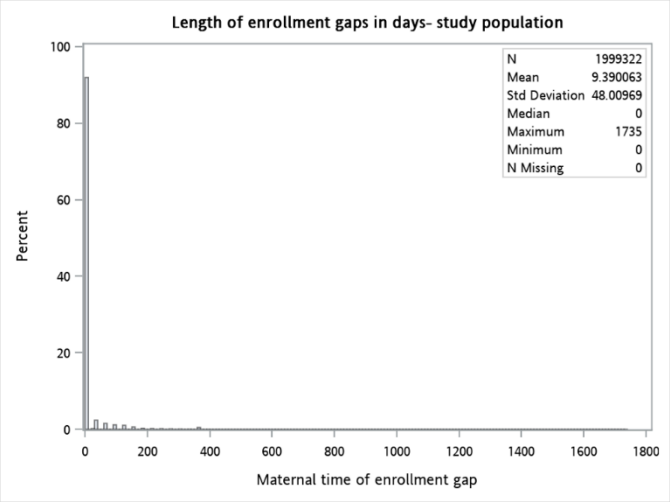


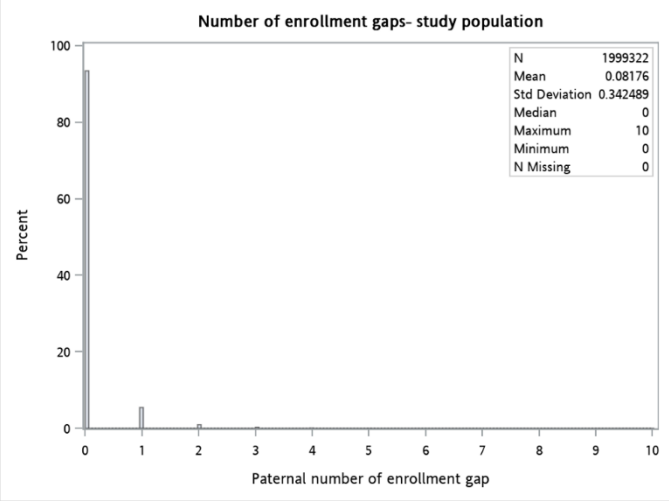
eFigure 2 Numbers and days of enrollment gaps for children and parents in the study cohort

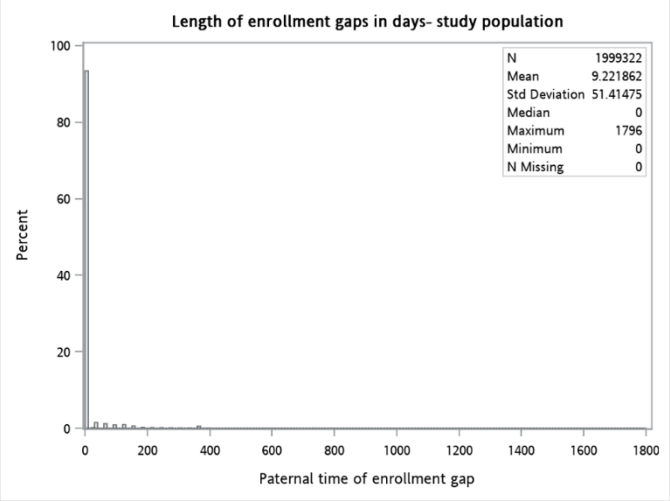












eTable 1 Incidence rates of injury healthcare visits among children in the study cohort, stratified by child age and by exposure to parental serious mental illness

Age (years)	Unexposed period		Exposed period		Rate difference (95% CI)	Unadjusted IRR (95% CI)
	Visits[a]	Rate[b] (95% CI)	Visits[a]	Rate[b] (95% CI)		
0-<1	405,152	218.8 (218.1-219.5)	15,566	264.8 (260.7-269.0)	46.0 (41.8-50.2)	1.21 (1.19-1.23)
1-<2	972,907	581.2 (580.0-582.3)	40,497	666.5 (660.1-673.0)	85.4 (78.8-92.0)	1.15 (1.14-1.16)
2-<3	826,359	556.8 (555.6-558.0)	38,937	638.5 (632.2-644.9)	81.7 (75.2-88.2)	1.15 (1.14-1.16)
3-<4	562,021	433.5 (432.3-434.6)	29,714	496.0 (490.4-501.7)	62.6 (56.8-68.3)	1.14 (1.13-1.16)
4-<5	425,239	374.3 (373.1-375.4)	24,162	416.5 (411.3-421.8)	42.2 (36.9-47.6)	1.11 (1.10-1.13)

Abbreviation: CI: Confidence intervals; IRR: incidence rate ratio.

[a] Visits: including injury-related outpatient/inpatient visits. Visits on the same day were counted once. Child age was determined by the age when an episode occurred.

[b] Incidence rate: per 1,000 person-years. The follow-up time was censored when the child died

eTable 2 Incidence rates of injury events among children in the study cohort, stratified by child age and by exposure to parental serious mental illness for each injury type

Age	Unexposed period		Exposed period		Rate difference	Unadjusted IRR
(years)	Events	Rate[a](95% CI)	Events	Rate[a] (95% CI)	(95% CI)	(95% CI)
Fracture skull vault/base						
0-<1	1,069	0.58 (0.54-0.61)	45	0.77 (0.57-1.03)	0.19 (-0.04-0.41)	1.33 (0.98-1.79)
1-<2	585	0.35 (0.32-0.38)	24	0.40 (0.26-0.59)	0.05 (-0.11-0.21)	1.13 (0.75-1.70)
2-<3	304	0.20 (0.18-0.23)	24	0.39 (0.26-0.59)	0.19 (0.03-0.35)	1.92 (1.27-2.91)
3-<4	235	0.18 (0.16-0.21)	15	0.25 (0.15-0.42)	0.07 (-0.06-0.2)	1.38 (0.82-2.33)
4-<5	193	0.17 (0.15-0.20)	15	0.26 (0.16-0.43)	0.09 (-0.04-0.22)	1.52 (0.90-2.57)
Fracture skull (apart from vault/base)						
0-<1	773	0.42 (0.39-0.45)	16	0.27 (0.17-0.44)	-0.15 (-0.28--0.01)	0.65 (0.40-1.07)
1-<2	742	0.44 (0.41-0.48)	37	0.61 (0.44-0.84)	0.17 (-0.03-0.36)	1.37 (0.99-1.91)
2-<3	587	0.40 (0.36-0.43)	34	0.56 (0.40-0.78)	0.16 (-0.03-0.35)	1.41 (1.00-1.99)
3-<4	444	0.34 (0.31-0.38)	31	0.52 (0.36-0.74)	0.18 (-0.01-0.36)	1.51 (1.05-2.17)
4-<5	425	0.37 (0.34-0.41)	26	0.45 (0.31-0.66)	0.07 (-0.10-0.25)	1.20 (0.81-1.78)
Intracranial injury						
0-<1	30,109	16.26 (16.08-16.45)	1,429	24.31 (23.08-25.60)	8.05 (6.78-9.32)	1.50 (1.42-1.58)
1-<2	31,864	19.03 (18.83-19.24)	1,500	24.69 (23.47-25.97)	5.65 (4.39-6.92)	1.30 (1.23-1.37)
2-<3	21,734	14.64 (14.45-14.84)	1,146	18.79 (17.74-19.91)	4.15 (3.04-5.25)	1.28 (1.21-1.36)
3-<4	13,705	10.57 (10.39-10.75)	765	12.77 (11.90-13.71)	2.20 (1.28-3.12)	1.21 (1.12-1.30)
4-<5	9,256	8.15 (7.98-8.31)	602	10.38 (9.58-11.24)	2.23 (1.39-3.08)	1.27 (1.17-1.38)
Nerve and spinal cord						
0-<1	807	0.44 (0.41-0.47)	21	0.36 (0.23-0.55)	-0.08 (-0.23-0.08)	0.82 (0.53-1.26)
1-<2	450	0.27 (0.25-0.29)	12	0.20 (0.11-0.35)	-0.07 (-0.19-0.04)	0.73 (0.41-1.30)
2-<3	431	0.29 (0.26-0.32)	29	0.48 (0.33-0.68)	0.19 (0.01-0.36)	1.64 (1.12-2.38)
3-<4	282	0.22 (0.19-0.24)	11	0.18 (0.10-0.33)	-0.03 (-0.15-0.08)	0.84 (0.46-1.54)
4-<5	235	0.21 (0.18-0.24)	15	0.26 (0.16-0.43)	0.05 (-0.08-0.19)	1.25 (0.74-2.11)
Burn						
0-<1	13,412	7.24 (7.12-7.37)	531	9.03 (8.30-9.84)	1.79 (1.01-2.57)	1.25 (1.14-1.36)
1-<2	45,524	27.19 (26.95-27.44)	1,999	32.90 (31.49-34.38)	5.71 (4.24-7.17)	1.21 (1.16-1.27)
2-<3	34,263	23.09 (22.84-23.33)	1,794	29.42 (28.09-30.81)	6.33 (4.95-7.72)	1.27 (1.22-1.34)
3-<4	18,414	14.20 (14.00-14.41)	1,056	17.63 (16.60-18.72)	3.43 (2.34-4.51)	1.24 (1.17-1.32)
4-<5	11,523	10.14 (9.96-10.33)	690	11.89 (11.04-12.82)	1.75 (0.85-2.66)	1.17 (1.09-1.27)
Fracture- neck and trunk						
0-<1	154	0.08 (0.07-0.10)	8	0.14 (0.07-0.27)	0.05 (-0.04-0.15)	1.64 (0.80-3.33)
1-<2	155	0.09 (0.08-0.11)	3	0.05 (0.02-0.15)	-0.04 (-0.1-0.01)	0.53 (0.17-1.67)
2-<3	153	0.10 (0.09-0.12)	6	0.10 (0.04-0.22)	0 (-0.09-0.08)	0.95 (0.42-2.16)
3-<4	114	0.09 (0.07-0.11)	7	0.12 (0.06-0.25)	0.03 (-0.06-0.12)	1.33 (0.62-2.85)
4-<5	96	0.08 (0.07-0.10)	9	0.16 (0.08-0.30)	0.07 (-0.03-0.17)	1.84 (0.93-3.64)
Fracture- upper limb						
0-<1	5,334	2.88 (2.80-2.96)	168	2.86 (2.46-3.32)	-0.02 (-0.46-0.42)	0.99 (0.85-1.16)
1-<2	8,086	4.83 (4.73-4.94)	316	5.20 (4.66-5.81)	0.37 (-0.21-0.95)	1.08 (0.96-1.20)
2-<3	8,421	5.67 (5.55-5.80)	354	5.81 (5.23-6.44)	0.13 (-0.49-0.75)	1.02 (0.92-1.14)
3-<4	7,503	5.79 (5.66-5.92)	367	6.13 (5.53-6.79)	0.34 (-0.30-0.98)	1.06 (0.95-1.18)
4-<5	6,987	6.15 (6.01-6.30)	347	5.98 (5.38-6.65)	-0.17 (-0.81-0.48)	0.97 (0.87-1.08)
Fracture- lower limb						
0-<1	932	0.50 (0.47-0.54)	46	0.78 (0.59-1.04)	0.28 (0.05-0.51)	1.55 (1.16-2.09)
1-<2	2,327	1.39 (1.33-1.45)	81	1.33 (1.07-1.66)	-0.06 (-0.35-0.24)	0.96 (0.77-1.20)
2-<3	2,989	2.01 (1.94-2.09)	148	2.43 (2.07-2.85)	0.41 (0.02-0.81)	1.21 (1.02-1.42)
3-<4	2,245	1.73 (1.66-1.80)	120	2.00 (1.68-2.40)	0.27 (-0.09-0.64)	1.16 (0.96-1.39)
4-<5	1,959	1.72 (1.65-1.80)	118	2.03 (1.70-2.44)	0.31 (-0.06-0.68)	1.18 (0.98-1.42)

Age (years)	Unexposed period		Exposed period		Rate difference (95% CI)	Unadjusted IRR (95% CI)
	Events	Rate[a](95% CI)	Events	Rate[a] (95% CI)		
Multiple fractures of limbs						
0-<1	49	0.03 (0.02-0.04)	0	0		
1-<2	47	0.03 (0.02-0.04)	0	0		
2-<3	10	0.007 (0.004-0.013)	0	0		
3-<4	3	0.002 (0.001-0.007)	0	0		
4-<5	6	0.005 (0.002-0.012)	0	0		
Internal trauma						
0-<1	295	0.16 (0.14-0.18)	19	0.32 (0.21-0.51)	0.16 (0.02-0.31)	2.03 (1.28-3.23)
1-<2	351	0.21 (0.19-0.23)	20	0.33 (0.21-0.51)	0.12 (-0.03-0.27)	1.57 (1.00-2.46)
2-<3	316	0.21 (0.19-0.24)	19	0.31 (0.20-0.49)	0.10 (-0.04-0.24)	1.46 (0.92-2.32)
3-<4	290	0.22 (0.20-0.25)	17	0.28 (0.18-0.46)	0.06 (-0.08-0.20)	1.27 (0.78-2.07)
4-<5	249	0.22 (0.19-0.25)	16	0.28 (0.17-0.45)	0.06 (-0.08-0.19)	1.26 (0.76-2.09)
Vascular injury						
0-<1	424	0.23 (0.21-0.25)	9	0.15 (0.08-0.29)	-0.08 (-0.18-0.03)	0.67 (0.35-1.29)
1-<2	528	0.32 (0.29-0.34)	16	0.26 (0.16-0.43)	-0.05 (-0.18-0.08)	0.83 (0.51-1.37)
2-<3	312	0.21 (0.19-0.23)	20	0.33 (0.21-0.51)	0.12 (-0.03-0.26)	1.56 (0.99-2.45)
3-<4	209	0.16 (0.14-0.18)	19	0.32 (0.20-0.50)	0.16 (0.01-0.30)	1.97 (1.23-3.15)
4-<5	148	0.13 (0.11-0.15)	17	0.29 (0.18-0.47)	0.16 (0.02-0.30)	2.25 (1.36-3.72)
Crush injury						
0-<1	1,766	0.95 (0.91-1.00)	77	1.31 (1.05-1.64)	0.36 (0.06-0.65)	1.37 (1.09-1.73)
1-<2	8,764	5.24 (5.13-5.35)	360	5.93 (5.34-6.57)	0.69 (0.07-1.31)	1.13 (1.02-1.26)
2-<3	8,400	5.66 (5.54-5.78)	392	6.43 (5.82-7.10)	0.77 (0.12-1.42)	1.14 (1.03-1.26)
3-<4	6,072	4.68 (4.57-4.80)	313	5.23 (4.68-5.84)	0.54 (-0.05-1.13)	1.12 (1.00-1.25)
4-<5	4,275	3.76 (3.65-3.88)	242	4.17 (3.68-4.73)	0.41 (-0.13-0.95)	1.11 (0.97-1.26)
Open wounds						
0-<1	35,729	19.3 (19.1-19.5)	1,455	24.75 (23.51-26.06)	5.46 (4.17-6.75)	1.28 (1.22-1.35)
1-<2	154,020	92.00 (91.55-92.46)	6,595	108.55 (105.96-111.20)	16.54 (13.88-19.20)	1.18 (1.15-1.21)
2-<3	145,398	97.97 (97.47-98.48)	6,868	112.63 (109.99-115.32)	14.65 (11.94-17.36)	1.15 (1.12-1.18)
3-<4	106,281	81.97 (81.48-82.46)	5,589	93.30 (90.89-95.78)	11.33 (8.83-13.83)	1.14 (1.11-1.17)
4-<5	77,511	68.22 (67.74-68.70)	4,433	76.41 (74.2-78.7)	8.19 (5.89-10.49)	1.12 (1.09-1.15)
Superficial injuries and contusion						
0-<1	186,262	100.59 (100.14-101.05)	6,978	118.72 (115.96-121.53)	18.12 (15.30-20.95)	1.18 (1.15-1.21)
1-<2	296,918	177.36 (176.73-178.00)	11,951	196.70 (193.21-200.26)	19.34 (15.75-22.92)	1.11 (1.09-1.13)
2-<3	210,211	141.64 (141.04-142.25)	9,723	159.44 (156.31-162.64)	17.80 (14.57-21.03)	1.13 (1.10-1.15)
3-<4	140,933	108.70 (108.13-109.26)	7,407	123.65 (120.86-126.50)	14.95 (12.08-17.83)	1.14 (1.11-1.16)
4-<5	109,548	96.42 (95.85-96.99)	6,278	108.22 (105.57-110.93)	11.80 (9.06-14.54)	1.12 (1.09-1.15)
Dislocations, strains, and sprains						
0-<1	9,721	5.25 (5.15-5.36)	366	6.23 (5.62-6.90)	0.98 (0.33-1.62)	1.19 (1.07-1.32)
1-<2	27,289	16.3 (16.11-16.5)	1,000	16.46 (15.47-17.51)	0.16 (-0.88-1.20)	1.01 (0.95-1.08)
2-<3	28,741	19.37 (19.14-19.59)	1,277	20.94 (19.82-22.12)	1.57 (0.40-2.74)	1.08 (1.02-1.14)
3-<4	19,370	14.94 (14.73-15.15)	958	15.99 (15.01-17.04)	1.05 (0.02-2.09)	1.07 (1.00-1.14)
4-<5	16,804	14.79 (14.57-15.02)	915	15.77 (14.78-16.83)	0.98 (-0.06-2.03)	1.07 (1.00-1.14)
Foreign body						
0-<1	13,272	7.17 (7.05-7.29)	473	8.05 (7.35-8.81)	0.88 (0.14-1.61)	1.12 (1.02-1.23)
1-<2	26,072	15.57 (15.39-15.76)	1,160	19.09 (18.02-20.22)	3.52 (2.40-4.63)	1.23 (1.16-1.30)
2-<3	40,820	27.51 (27.24-27.77)	1,831	30.03 (28.68-31.43)	2.52 (1.12-3.92)	1.09 (1.04-1.14)

Age (years)	Unexposed period		Exposed period		Rate difference (95% CI)	Unadjusted IRR (95% CI)
	Events	Rate[a](95% CI)	Events	Rate[a] (95% CI)		
3-<4	36,911	28.47 (28.18-28.76)	1,837	30.67 (29.30-32.10)	2.20 (0.77-3.63)	1.08 (1.03-1.13)
4-<5	29,804	26.23 (25.94-26.53)	1,594	27.48 (26.16-28.86)	1.25 (-0.14-2.63)	1.05 (1.00-1.10)
Poisoning						
0-<1	20,257	10.94 (10.79-11.09)	752	12.79 (11.91-13.74)	1.85 (0.93-2.78)	1.17 (1.09-1.26)
1-<2	28,692	17.14 (16.94-17.34)	1,268	20.87 (19.75-22.05)	3.73 (2.57-4.90)	1.22 (1.15-1.29)
2-<3	15,978	10.77 (10.6-10.93)	823	13.50 (12.60-14.45)	2.73 (1.79-3.67)	1.25 (1.17-1.34)
3-<4	8,568	6.61 (6.47-6.75)	511	8.53 (7.82-9.30)	1.92 (1.17-2.67)	1.29 (1.18-1.41)
4-<5	5,667	4.99 (4.86-5.12)	321	5.53 (4.96-6.17)	0.55 (-0.07-1.16)	1.11 (0.99-1.24)

Abbreviation: CI: Confidence intervals. IRR: Incidence rate ratio

[a] Incidence rate: per 1,000 person-years. Censored when the child died. Otherwise, a person was assumed to have continuous enrolment.

eTable 3 Sensitivity analyses of associations between parental serious mental illness and any childhood injury event

	Adjusted incidence rate ratio (95% confidence intervals)		
Child age (years)	**Model 1**	**Model 2**	**Model 3**
Excluding children with complex chronic conditions			
0-<1	1.21 (1.18-1.23)	1.20 (1.18-1.22)	1.20 (1.18-1.22)
1-<2	1.14 (1.12-1.16)	1.13 (1.12-1.15)	1.13 (1.12-1.15)
2-<3	1.14 (1.12-1.16)	1.13 (1.11-1.15)	1.13 (1.11-1.15)
3-<4	1.13 (1.11-1.15)	1.13 (1.11-1.14)	1.13 (1.11-1.14)
4-<5	1.10 (1.08-1.12)	1.10 (1.08-1.12)	1.10 (1.08-1.12)
Excluding children with a parent having multiple IDs			
0-<1	1.20 (1.18-1.22)	1.19 (1.17-1.22)	1.19 (1.17-1.22)
1-<2	1.14 (1.12-1.16)	1.13 (1.12-1.15)	1.13 (1.12-1.15)
2-<3	1.14 (1.12-1.16)	1.13 (1.12-1.15)	1.13 (1.11-1.15)
3-<4	1.13 (1.11-1.15)	1.12 (1.10-1.14)	1.12 (1.10-1.14)
4-<5	1.12 (1.10-1.14)	1.11 (1.09-1.13)	1.11 (1.09-1.13)
Excluding children with a parental death before age 5 years			
0-<1	1.20 (1.18-1.23)	1.20 (1.18-1.22)	1.20 (1.17-1.22)
1-<2	1.14 (1.13-1.16)	1.13 (1.12-1.15)	1.13 (1.12-1.15)
2-<3	1.14 (1.13-1.16)	1.13 (1.12-1.15)	1.14 (1.12-1.15)
3-<4	1.13 (1.11-1.15)	1.12 (1.10-1.14)	1.12 (1.10-1.14)
4-<5	1.11 (1.09-1.13)	1.10 (1.08-1.12)	1.10 (1.08-1.13)

Model 1: adjusted for birth year, child sex, child age, birth order, maternal and paternal ages, foreign-born mother, and urbanicity of residence.
Model 2: adjusted for the above variables and unmarried mother, family income, maternal and paternal occupations, and maternal and paternal Elixhauser indexes.
Model 3: adjusted for the above variables and child's LBW and preterm birth.

eTable 4 ICD-9 E codes for individual hospitalization associated with injury ICD-9 diagnostic codes

External causes	ICD-9-CM E codes	N	%
Accidental falls	E880- E888	6,169	28.6
Transport accidents	E800- E849	3,791	17.6
Accident caused by hot substance or object caustic or corrosive material and steam	E924	3,717	17.2
Accidental poisoning	E850- E869	1,496	6.9
Accidents caused by submersion, suffocation, and foreign bodies	E910- E915	1,255	5.8
Other and unspecified environmental and accidental causes	E928	1,216	5.6
Striking against or struck accidentally by objects or persons	E917	623	2.9
Accidents caused by cutting and piercing instruments or objects	E920	549	2.5
Caught accidentally in or between objects	E918	329	1.5
Homicide and injury purposely inflicted by other persons	E960- E969	215	1.0
Accidents caused by machinery	E919	193	0.9
Accidents caused by fire and flames	E890- E899	146	0.7
Suicide and self-inflicted injury	E950- E959	0	0.0
Other		1864	8.6
Sum		20,057	100

E-codes are only mandatory to be reported in traffic accidents. Only about 70% of injury-related hospitalizations had E-codes reported.

eTable 5 ICD-9 external causes of injury deaths

External causes	ICD-9-CM E codes	ICD-10 codes	N	%
Accidents caused by submersion, suffocation, and foreign bodies	E910- E915	W65-W84,	385	45
Transport accidents	E800- E849	V01-V99	194	23
Accidental falls	E880- E888	W00-W19	70	8
Homicide and injury purposely inflicted by other persons	E960- E969	X85-Y09	66	8
Other accidents	E916-E28	W49-W64, W85-W99 X50-X59	48	6
Accidents caused by fire and flames	E890- E899	X00-X19	36	4
Accidents due to natural and environmental factors	E900- E909	X20-X39	23	3
Activity	E001- E030	W20-W64	18	2
Undetermined	E980- E989	Y10-Y34	11	1
Accidental poisoning	E850- E869	X40-X49	5	1
Suicide and self-inflicted injury	E950- E959	X60-X84	0	0
Sum			**856**	**100**

Children in the study cohort had 878 injury deaths (824 retrieved from death certificate and 176 from inpatient data).
Missing E code: 22 (2.5%)

eTable 6 Utilization of preventive health services among children in the study cohort born in 2004-2009

	Without parental SMI[a] (N=1,068,926)			With parental SMI[a] (N=57,327)		
	Mean	**SD**		**Mean**	**SD**	
Prenatal visits (n)	8.17	2.47		8.09	2.50	
Well-child visits (n)	5.80	2.21		5.70	2.24	
	Median	**IQR**	**Missing (%)**	**Median**	**IQR**	**Missing (%)**
Days to the 3rd well-child visit	229	186-376	92,621 (8.6)	240	186-382	5,377 (9.4)
Days to the 5th well-child visit	552	386-759	256,152 (24.0)	553	389-771	14,822 (25.6)
Correlation between	**Pearson r**	**95% CI**		**Pearson r**	**95% CI**	
number of injury events and						
Number of prenatal visits	0.04	0.04-0.04		0.03	0.02-0.07	
Number of well-child visits	0.08	0.08-0.08		0.08	0.07-0.09	

Abbreviation: SMI: serious mental illness; SD: standard deviation; IQR: interquartile range; CI: confidence intervals
[a] At least one parent with SMI in the period from 6 years prior to childbirth to 5 years following childbirth.

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