

Supplementary methods – the additional cohort

The additional cohort included children (1) whose birth weight information was available through the NHSPIC, (2) who completed the first round of the NHSPIC, and (3) who completed at least 1 round from the fourth to the seventh round of the NHSPIC. Children were excluded in they (1) were born before 37 weeks of gestational age, (2) had birth weight less than 2.5 kg or more than 4 kg, or (3) had been admitted to the intensive care unit before 3 months of age. Of the 369,733 children, 97,653 children who had used antibiotics before 3 months of age were assigned to the antibiotic users group, and 272,080 children who had not used antibiotics before 3 months of age were assigned to the antibiotic non-users group as a control group. After 1:1 propensity score matching, 59,443 children were assigned to the antibiotic users group and the same number to the antibiotic non-users group. (Figure S1)

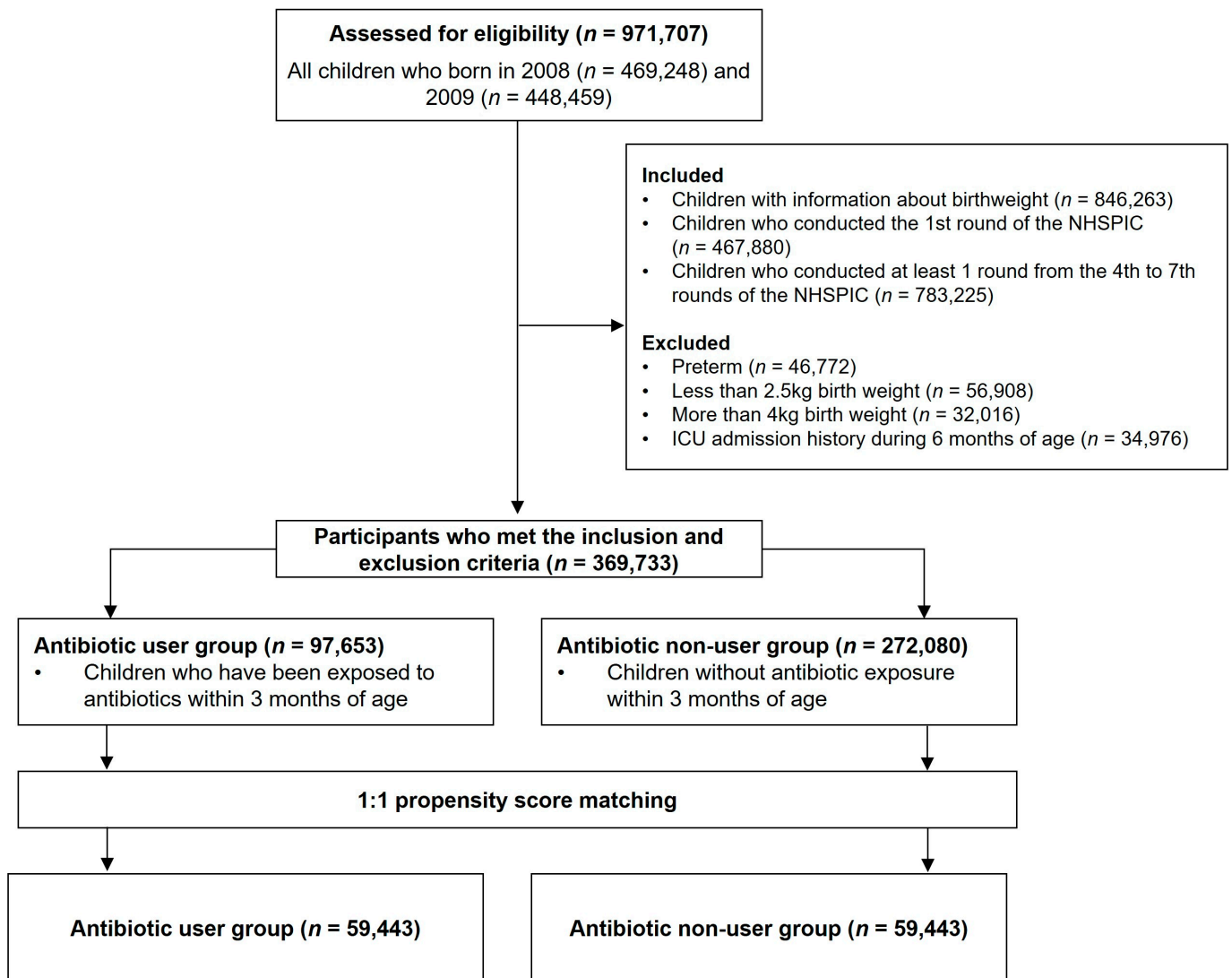


Figure S1. Flow diagram of the additional cohort.

Table S1. Checklist of Recommendations for Reporting of Observational Studies Using the Reporting of Studies Conducted Using Observational Routinely Collected Health Data (RECORD) Guidelines.

| | Item No | Recommendation | Reported |
|--|---------|----------------|----------|
|--|---------|----------------|----------|

| | | | |
|---------------------------|----|--|--|
| Title and abstract | 1 | (a) Indicate the study's design with a commonly used term in the title or the abstract | Abstract |
| | | (b) Provide in the abstract an informative and balanced summary of what was done and what was found | Abstract |
| Introduction | | | |
| Back-ground /rationale | 2 | Explain the scientific background and rationale for the investigation being reported | Introduction |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses | Introduction |
| Methods | | | |
| Study design | 4 | Present key elements of study design early in the paper | Methods - Study Design and Setting |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | Methods - Study Design and Setting, Data sources |
| Participants | 6 | (a) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up | Methods – Study population and Figure 1 |
| | | (b) For matched studies, give matching criteria and number of exposed and unexposed | Methods – Covariates, Statistical analysis; Results - Baseline Characteristics; Tables 1 Table 2, and eTable 2, eTable 3, eTable 4, and eTable 5 |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | Methods - Data Sources; Exposure; Outcome; Covariates |
| Data sources /measurement | 8 | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group | Methods - Data Sources; |
| Bias | 9 | Describe any efforts to address potential sources of bias | Methods – Covariates; Statistical analysis; subgroup analysis and post-hoc analysis Discussion |
| Study size | 10 | Explain how the study size was arrived at | Methods – study population, Figure 1 |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why | Methods – statistical analysis; subgroup analysis and post-hoc analysis |
| Statistical methods | 12 | (a) Describe all statistical methods, including those used to control for confounding | Methods – Covariates; statistical analysis; subgroup analysis and post-hoc analysis |
| | | (b) Describe any methods used to examine subgroups and interactions | Methods – statistical analysis; subgroup analysis and post-hoc analysis |
| | | (c) Explain how missing data were addressed | Table 1 and eTable 4 |
| | | (d) If applicable, explain how loss to follow-up was addressed | Not applicable |
| | | (e) Describe any sensitivity analyses | Methods – Study population, subgroup analysis and post-hoc analysis |

| Results | | | |
|--------------------------|----|--|---|
| Partici- pants | 13 | (a) Report numbers of individuals at each stage of study, e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed | Results - Participants; Figure 1; eFigure 1 |
| | | (b) Give reasons for non-participation at each stage | Figure 1 |
| | | (c) Consider use of a flow diagram | Figure 1 |
| Descrip- tive data | 14 | (a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders | Results - Participants; Table 1, Table 2, eTable 3, eTable 4, and eTable 5 |
| | | (b) Indicate number of participants with missing data for each variable of interest | Methods – Table 1, eTable 4 |
| | | (c) Summarize follow-up time (e.g. average and total amount) | Methods – Data sources |
| Outcome data | 15 | Report numbers of outcome events or summary measures over time | Results – Main outcome, additional outcome, Table 3, Table 5, eTable 6 and eTable 7 |
| Main re- sults | 16 | (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included | Results - Main outcome, additional outcome, Table 3, Table 5, eTable 6 and eTable 7 |
| | | (b) Report category boundaries when continuous variables were categorized | Results – Table 3, Table 4, Table 5, Table 6, eTable 6 and eTable 7 |
| | | (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | Not applicable |
| Other analyses | 17 | Report other analyses done, e.g., analyses of subgroups and interactions, and sensitivity analyses | Results – Figure 4, eTable 8, eTable 9, and eTable 10 |
| Discussion | | | |
| Key result | 18 | Summarize key results with reference to study objectives | Discussion |
| Limitation | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias | Discussion |
| Interpreta- tion | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence | Discussion |
| Generalizability | 21 | Discuss the generalizability (external validity) of the study results | Discussion |
| Other in- formation | | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | Article Information |

Table S2. Covariables in the propensity score matching of the main cohort.

| Characteristic | Database | Variables |
|-----------------------|-----------------|---|
| Demographics | NHIS | Age, sex, income quintile, residence at birth |

| | | |
|----------------------------|--------------------|---|
| | NHSPIC | Birth weight, type of feeding (breastmilk, formula, mixed, or special milk) until 3-6 months of life, whether infant received additional complementary feeding before 3 months of age |
| Comorbidities | | |
| Health Care Use | NHIS | Any hospitalization, ICU admission |
| Perinatal condition | NHIS (ICD-10 code) | |
| | P00–P04 | Fetus and newborn affected by maternal factors and by complications of pregnancy, labor and delivery |
| | P05–P08 | Disorders related to length of gestation and fetal growth |
| | P10–P15 | Birth trauma |
| | P20–P29 | Respiratory and cardiovascular disorders specific to the perinatal period |
| | P35–P39 | Infections specific to the perinatal period |
| | P50–P61 | Hemorrhagic and hematological disorders of fetus and newborn |
| | P70–P74 | Transitory endocrine and metabolic disorders specific to fetus and newborn |
| | P75–P78 | Digestive system disorders of fetus and newborn |
| | P80–P83 | Conditions involving the integument and temperature regulation of fetus and newborn |
| | P90–P96 | Other disorders originating in the perinatal period |
| | Q00–Q99 | Congenital malformations, deformations and chromosomal abnormalities |
| Prevalent disease exposure | NHIS (ICD-10 code) | |
| | Z38.0 | Singleton, born in hospital |
| | A08.4 | Viral intestinal infection, unspecified |
| | A09.0 | Other and unspecified gastroenteritis and colitis of infectious origin |
| | A09.9 | Gastroenteritis and colitis of unspecified origin |
| | B37.0 | Candidal stomatitis |
| | H10.0 | Mucopurulent conjunctivitis |
| | H10.2 | Other acute conjunctivitis |
| | H10.3 | Acute conjunctivitis |
| | H10.9 | Conjunctivitis, unspecified |
| | H66.0 | Acute suppurative otitis media |
| | J00 | Acute nasopharyngitis |
| | J10.0 | Influenza due to other identified influenza virus with pneumonia |
| | J01.9 | Acute sinusitis, unspecified |
| | J02.9 | Acute pharyngitis, unspecified |
| | J03.9 | Acute tonsillitis, unspecified |
| | J06.0 | Acute laryngopharyngitis |
| | J06.8 | Other acute upper respiratory infections of multiple sites |
| | J06.9 | Acute upper respiratory infection, unspecified |
| | J18.9 | Pneumonia, unspecified |
| | J20.9 | Acute bronchitis |
| | J21.9 | Acute bronchiolitis |
| | J22.0 | Unspecified acute lower respiratory infection |
| | J30.4 | Allergic rhinitis |
| | J45.9 | Other and unspecified asthma |
| | K21.9 | Gastro-esophageal reflux disease without esophagitis |
| | K30 | Functional dyspepsia |
| | K52.9 | Noninfective gastroenteritis and colitis, unspecified |
| | K59.0 | Constipation |
| | K59.1 | Functional diarrhea |
| | K59.9 | Functional intestinal disorder, unspecified |

| | | |
|---------------|---------------------------------|--|
| | L01.0 | Impetigo [any organism] [any site] |
| | L20.8 | Other atopic dermatitis |
| | L20.9 | Atopic dermatitis |
| | L21.1 | Seborrheic infantile dermatitis |
| | L21.9 | Seborrheic dermatitis |
| | L22 | Diaper dermatitis |
| | L23.9 | Allergic contact dermatitis |
| | L24.9 | Irritant contact dermatitis, unspecified cause |
| | L30.9 | Dermatitis |
| | L98.0 | Pyogenic granuloma |
| | N39.0 | Urinary tract infection, site not specified |
| | R10.4 | Other and unspecified abdominal pain |
| | R11 | Nausea and vomiting |
| | R50.9 | Fever, unspecified |
| | R68.1 | Nonspecific symptoms peculiar to infancy |
| | E40-E46 | Malnutrition |
| Drug exposure | NHIS (drug classification code) | |
| | 112 | Sedative-hypnotics |
| | 113 | Antiepileptics |
| | 114 | Antipyretics |
| | 117 | Psycho-nervous system drug |
| | 123 | Automatic nervous system drugs |
| | 124 | Antispasmodics |
| | 141 | Antihistamine |
| | 149 | Other allergic drug |
| | 211-219 | Circulatory system drugs |
| | 221-229 | Respiratory system drugs |
| | 231-239 | Digestive system drugs |
| | 241-249 | Hormone drugs |
| | 245 | Steroid |

Table S3. Basic clinical characteristics of children in the main cohort^a.

| Clinical Characteristics | Observed Data (<i>n</i> = 369,578) | | | | Matched Data (<i>n</i> = 145,966) ^b | | |
|--|---------------------------------------|-----------------------|---|--|---|----------------------|---|
| | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Difference % ^d | | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Difference % ^d |
| | Users | Non-users | | | Users | Non-users | |
| | (<i>n</i> = 203,073) | (<i>n</i> = 166,505) | | | (<i>n</i> = 72,983) | (<i>n</i> = 72,983) | |
| Hospital utilization | | | | | | | |
| No. hospitalized | 50,256 (24.7) | 12,045 (7.2) | 48.6 | | 9402 (12.9) | 8790 (12.0) | 1.1 |
| No. visiting ER | 16,360 (8.1) | 6399 (3.8) | 17.4 | | 3906 (5.4) | 3883 (5.3) | 0.0 |
| Certain conditions (ICD-10 code) originating in the perinatal period | | | | | | | |
| Fetus and newborn af- fected by maternal fac- tors and by complica- tions of pregnancy, la- bor and delivery | 4799 (2.4) | 2396 (1.4) | 6.8 | | 1500 (2.1) | 1492 (2.0) | 0.1 |
| Disorders related to length of gestation and fetal growth | 875 (0.4) | 494 (0.3) | 2.3 | | 272 (0.4) ^l | 245 (0.3) | 0.6 |
| Birth trauma | 1912 (0.9) | 1316 (0.8) | 1.6 | | 664 (0.9) | 664 (0.9) | 0.0 |

| | | | | | | | |
|---|----------------|----------------|------|--|---------------|---------------|-----|
| Respiratory and cardiovascular disorders specific to the perinatal period | 10,677 (5.3) | 4936 (3.0) | 11.8 | | 3180 (4.4) | 3108 (4.3) | 0.5 |
| Respiratory and cardiovascular disorders specific to the perinatal period | 33,680 (16.6) | 18,593 (11.2) | 15.8 | | 10,209 (14.0) | 10,164 (13.9) | 0.2 |
| Hemorrhagic and hematological disorders of fetus and newborn | 67,110 (33.0) | 50,367 (30.2) | 6.1 | | 23,356 (32.0) | 23,292 (31.9) | 0.2 |
| Transitory endocrine and metabolic disorders specific to fetus and newborn | 6028 (3.0) | 3580 (2.2) | 5.4 | | 1947 (2.7) | 1876 (2.6) | 0.6 |
| Digestive system disorders of fetus and newborn | 6473 (3.2) | 4151 (2.5) | 4.2 | | 2153 (3.0) | 2182 (3.0) | 0.2 |
| Conditions involving the integument and temperature regulation of fetus and newborn | 8174 (4.0) | 5944 (3.6) | 3.4 | | 2716 (3.7) | 2689 (3.7) | 0.2 |
| Other disorders originating in the perinatal period | 12,174 (6.0) | 9496 (5.7) | 1.3 | | 4438 (6.1) | 4405 (6.0) | 0.2 |
| Congenital malformations, deformations and chromosomal abnormalities | 21,216 (10.4) | 14,131 (8.5) | 6.8 | | 6956 (9.5) | 7013 (9.6) | 0.3 |
| Prevalent diseases (ICD-10 codes) diagnosed before 6 months of age | | | | | | | |
| Singleton, born in hospital | 202,893 (99.9) | 163,244 (98.0) | 18.6 | | 72,815 (99.8) | 72,805 (99.8) | 0.1 |
| Viral intestinal infection, unspecified | 8904 (4.4) | 5202 (3.1) | 6.6 | | 2957 (4.1) | 3003 (4.1) | 0.3 |
| Other and unspecified gastroenteritis and colitis of infectious origin | 17,544 (8.6) | 8203 (4.9) | 14.8 | | 5134 (7.0) | 5122 (7.0) | 0.1 |
| Gastroenteritis and colitis of unspecified origin | 18,590 (9.2) | 9019 (5.4) | 14.5 | | 5574 (7.6) | 5584 (7.7) | 0.1 |
| Candidal stomatitis | 5026 (2.5) | 2481 (1.5) | 7.3 | | 1320 (1.8) | 1373 (1.9) | 0.5 |
| Mucopurulent conjunctivitis | 4950 (2.4) | 1790 (1.1) | 10.5 | | 1235 (1.7) | 1218 (1.7) | 0.2 |
| Other acute conjunctivitis | 6154 (3.0) | 2657 (1.6) | 9.4 | | 1695 (2.3) | 1691 (2.3) | 0.0 |
| Acute conjunctivitis | 11,520 (5.7) | 5234 (3.1) | 12.2 | | 3351 (4.6) | 3375 (4.6) | 0.2 |
| Conjunctivitis, unspecified | 11,828 (5.8) | 5842 (3.5) | 11.0 | | 3566 (4.9) | 3620 (5.0) | 0.4 |
| Acute suppurative otitis media | 21,733 (10.7) | 430 (0.3) | 47.1 | | 468 (0.6) | 412 (0.6) | 0.3 |
| Acute nasopharyngitis | 80,109 (39.4) | 46,375 (27.9) | 24.7 | | 25,304 (34.7) | 22,595 (31.0) | 0.9 |

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|--|---------------|---------------|------|--|---------------|---------------|-----|
| Influenza due to other identified influenza virus with pneumonia | 4927 (2.4) | 590 (0.4) | 17.8 | | 536 (0.7) | 506 (0.7) | 0.4 |
| Acute sinusitis, unspecified | 16,024 (7.9) | 2419 (1.5) | 30.8 | | 2174 (3.0) | 2130 (2.9) | 0.3 |
| Acute pharyngitis, unspecified | 36,219 (17.8) | 15,692 (9.4) | 24.6 | | 10,337 (14.2) | 10,439 (14.3) | 0.4 |
| Acute tonsillitis, unspecified | 17,803 (8.8) | 14,436 (8.7) | 0.5 | | 6504 (8.9) | 6545 (9.0) | 0.2 |
| Acute laryngopharyngitis | 9648 (4.8) | 3193 (1.9) | 15.8 | | 2322 (3.2) | 2335 (3.2) | 0.1 |
| Other acute upper respiratory infections of multiple sites | 8741 (4.3) | 3646 (2.2) | 11.9 | | 2347 (3.2) | 2375 (3.3) | 0.2 |
| Acute upper respiratory infection, unspecified | 67,628 (33.3) | 35,140 (21.1) | 27.7 | | 20,610 (28.2) | 21,043 (28.8) | 1.3 |
| Pneumonia, unspecified | 12,012 (5.9) | 399 (0.2) | 33.3 | | 424 (0.6) | 380 (0.5) | 0.4 |
| Acute bronchitis | 77,144 (38.0) | 14,992 (9.0) | 72.7 | | 13,859 (19.0) | 13,539 (18.6) | 1.1 |
| Acute bronchiolitis | 58,490 (28.8) | 8549 (5.1) | 66.3 | | 8356 (11.4) | 7895 (10.8) | 1.8 |
| Unspecified acute lower respiratory infection | 4818 (2.4) | 813 (0.5) | 15.8 | | 718 (1.0) | 721 (1.0) | 0.0 |
| Allergic rhinitis | 9333 (4.6) | 3218 (1.9) | 15.0 | | 2192 (3.0) | 2283 (3.1) | 0.7 |
| Other and unspecified asthma | 11,597 (5.7) | 1051 (0.6) | 29.3 | | 1020 (1.4) | 970 (1.3) | 0.4 |
| Gastro-esophageal reflux disease without esophagitis | 5853 (2.9) | 3882 (2.3) | 3.4 | | 2028 (2.8) | 2090 (2.9) | 0.5 |
| Functional dyspepsia | 5213 (2.6) | 3963 (2.4) | 1.3 | | 1967 (2.7) | 2012 (2.8) | 0.4 |
| Noninfective gastroenteritis and colitis, unspecified | 13,931 (6.9) | 8224 (4.9) | 8.1 | | 4620 (6.3) | 4697 (6.4) | 0.4 |
| Constipation | 10,322 (5.1) | 7752 (4.7) | 2.1 | | 3684 (5.0) | 3782 (5.2) | 0.6 |
| Functional diarrhea | 4380 (2.2) | 3693 (1.6) | 3.9 | | 1473 (2.0) | 1498 (2.1) | 0.3 |
| Functional intestinal disorder, unspecified | 7322 (3.6) | 5054 (3.0) | 3.2 | | 2558 (3.5) | 2620 (3.6) | 0.5 |
| Impetigo [any organism] [any site] | 4655 (2.3) | 2352 (1.4) | 6.5 | | 1461 (2.0) | 1438 (2.0) | 0.2 |
| Other atopic dermatitis | 13,350 (6.6) | 11,162 (6.7) | 0.5 | | 5122 (7.0) | 5070 (6.9) | 0.3 |
| Atopic dermatitis | 37,833 (18.6) | 31,269 (18.8) | 0.3 | | 14,229 (19.5) | 14,242 (19.5) | 0.0 |
| Seborrheic infantile dermatitis | 5186 (2.6) | 4736 (2.8) | 1.9 | | 2035 (2.8) | 2046 (2.8) | 0.1 |
| Seborrheic dermatitis | 4684 (2.3) | 3,934 (2.4) | 0.4 | | 2035 (2.8) | 2046 (2.8) | 0.2 |
| Diaper dermatitis | 17,806 (8.8) | 14,436 (8.7) | 0.5 | | 6504 (8.9) | 6545 (9.0) | 0.2 |
| Allergic contact dermatitis | 12,138 (6.0) | 9821 (5.9) | 0.3 | | 4556 (6.2) | 4539 (6.2) | 0.1 |
| Irritant contact dermatitis, unspecified cause | 4916 (2.4) | 4183 (2.5) | 0.7 | | 1892 (2.6) | 1866 (2.6) | 0.2 |

| | | | | | | | |
|---|----------------|---------------|-------|--|---------------|---------------|-----|
| Dermatitis | 10,211 (5.0) | 8702 (5.2) | 0.9 | | 3893 (5.3) | 3920 (5.4) | 0.2 |
| Urinary tract infection, site not specified | 9203 (4.5) | 1193 (0.7) | 24.1 | | 1075 (1.5) | 1045 (1.4) | 0.3 |
| Other and unspecified abdominal pain | 3318 (1.6) | 2183 (1.3) | 2.6 | | 1109 (1.5) | 1145 (1.6) | 0.4 |
| Nausea and vomiting | 7569 (3.7) | 5058 (3.0) | 3.8 | | 2604 (3.6) | 2646 (3.6) | 0.3 |
| Fever, unspecified | 15,068 (7.4) | 7366 (4.4) | 12.6 | | 4215 (5.8) | 4180 (5.7) | 0.2 |
| Nonspecific symptoms peculiar to infancy | 3081 (1.5) | 2720 (1.6) | 0.9 | | 1171 (1.6) | 1207 (1.7) | 0.4 |
| Malnutrition | 9 (0.0) | 10 (0.0) | 0.0 | | 4 (0.0) | 6 (0.0) | 0.0 |
| Drug (drug classification code) used before 6 months of age | | | | | | | |
| Sedative- hypnotics | 8642 (4.3) | 4183 (2.5) | 9.6 | | 2537 (3.5) | 2532 (3.5) | 0.0 |
| Antiepileptics | 66 (0.0) | 25 (0.0) | 1.2 | | 15 (0.0) | 16 (0.0) | 0.1 |
| Antipyretics | 123,846 (61.0) | 47,328 (28.4) | 69.1 | | 32,519 (44.6) | 32,669 (44.8) | 0.4 |
| Psycho-nervous system drug | 26,818 (13.2) | 8887 (5.3) | 27.6 | | 6175 (8.5) | 6217 (8.5) | 0.2 |
| Automatic nervous system drugs | 196 (0.1) | 67 (0.0) | 2.1 | | 40 (0.1) | 43 (0.1) | 0.2 |
| Antispasmodics | 9456 (4.7) | 3431 (2.1) | 14.6 | | 2340 (3.2) | 2401 (3.3) | 0.5 |
| Antihistamine | 156,558 (77.1) | 60,913 (36.6) | 89.6 | | 43,719 (59.9) | 44,398 (60.8) | 2.1 |
| Other allergic drug | 3308 (1.6) | 528 (0.3) | 13.3 | | 454 (0.6) | 427 (0.6) | 0.4 |
| Circulatory system drugs | 24,929 (12.3) | 2743 (1.6) | 42.6 | | 2571 (3.5) | 2423 (3.3) | 0.8 |
| Respiratory system drugs | 174,725 (86.0) | 69,910 (42.0) | 103.2 | | 50,853 (69.7) | 51,580 (70.7) | 2.3 |
| Digestive system drugs | 166,479 (82.0) | 69,225 (41.6) | 91.3 | | 47,331 (64.9) | 47,942 (65.7) | 1.9 |
| Hormone drugs | 25,110 (12.4) | 2890 (1.7) | 42.3 | | 2641 (3.6) | 2493 (3.4) | 0.8 |
| Steroid | 24,929 (12.3) | 2743 (1.6) | 42.6 | | 2571 (3.5) | 2423 (3.3) | 0.8 |

Abbreviations, N, Number; ICD, International Classification of Diseases; ER, Emergency room. ^a Unless otherwise specified, baseline characteristics were assessed on the day of birth. ^b Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by the Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^c Values are reported as No. (%) unless otherwise indicated. ^d The difference between the groups divided by the pooled standard deviation; a value greater than 10% is interpreted as a meaningful difference.

Table S4. Basic sociodemographic characteristics of children in the additional cohort^a

| Sociodemo- graphic Charac- teristics | Observed Data (<i>n</i> = 369,733) | | | | Matched Data (<i>n</i> = 118,886) ^b | | |
|--|---------------------------------------|------------------------------------|---|--|---|-----------------------------------|---|
| | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Differ- ence % ^d | | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Differ- ence % ^d |
| | Users (<i>n</i> = 97,653) | Non-users (<i>n</i> = 272,080) | | | Users (<i>n</i> = 59,443) | Non-users (<i>n</i> = 59,443) | |
| Sex | | | | | | | |
| Girl | 43,644 (44.7) | 136,398 (50.1) | 10.8 | | 27,686 (46.6) | 27,424 (46.1) | 0.1 |
| Boy | 54,009 (55.3) | 135,682 (49.9) | | | 31,757 (53.4) | 32,019 (53.9) | |
| Residence at birth ^e | | | | | | | |
| Seoul | 21,494 (22.0) | 69,618 (25.6) | 6.3 | | 13,925 (23.4) | 14,429 (24.3) | 0.9 |
| Metropolitan | 24,258 (24.8) | 62,609 (23.0) | | | 15,043 (25.3) | 13,849 (23.3) | |
| Urban | 39,426 (40.4) | 106,523 (39.2) | | | 23,760 (40.0) | 24,085 (40.5) | |

| | | | | | | | |
|--|---------------|----------------|-----|--|---------------|---------------|-----|
| Rural | 11,740 (12.0) | 30,779 (11.3) | | | 6715 (11.3) | 7080 (11.9) | |
| Birth year | | | | | | | |
| 2008 | 49,127 (50.3) | 128,986 (47.4) | | | 29,645 (49.9) | 29,714 (50.0) | 0.2 |
| 2009 | 48,526 (49.7) | 143,094 (52.6) | | | 29,798 (50.1) | 29,729 (50.0) | |
| Birth weight, kg (SD) ^f | 3.24 (0.32) | 3.23 (0.32) | 3.6 | | 3.24 (0.32) | 3.24 (0.32) | 0.2 |
| Type of feeding ^g | | | | | | | |
| Only breast-feeding | 42,810 (43.8) | 125,386 (47.4) | 1.6 | | 26,737 (45.0) | 27,310 (45.9) | 1.1 |
| Only formula milk | 26,070 (36.9) | 91,624 (33.7) | | | 21,367 (35.9) | 20,715 (34.8) | |
| Mixed | 17,890 (18.3) | 52,963 (19.5) | | | 11,086 (18.6) | 11,177 (18.8) | |
| Special milk | 469 (0.5) | 942 (0.3) | | | 253 (0.4) | 241 (0.4) | |
| Additional complementary feeding before 3 months of age ^h | | | | | | | |
| Yes | 43,081 (44.1) | 114,529 (42.1) | 4.1 | | 26,099 (43.9) | 26,073 (43.9) | 0.1 |
| No | 53,879 (55.2) | 155,740 (57.2) | | | 33,344 (56.1) | 33,370 (56.1) | |
| Economic status ⁱ | | | | | | | |
| 1 (Lowest) | 7758 (7.9) | 20,347 (7.5) | 5.6 | | 4742 (8.0) | 4814 (8.1) | 0.2 |
| 2 | 15,023 (15.4) | 38,882 (14.3) | | | 9357 (15.7) | 9251 (15.6) | |
| 3 (Middle) | 26,762 (27.4) | 72,175 (26.5) | | | 16,746 (28.2) | 16,821 (28.3) | |
| 4 | 30,163 (30.9) | 87,585 (32.2) | | | 19,339 (32.5) | 19,374 (32.6) | |
| 5 (Highest) | 14,385 (14.7) | 43,878 (16.1) | | | 9259 (15.6) | 9183 (15.4) | |

Abbreviations, N, Number; SD, standard deviation. ^a Unless otherwise specified, baseline characteristics were assessed on the day of birth. ^b Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by the Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^c Results are reported as N (%) unless otherwise indicated. ^d Differences greater than 10% were interpreted as meaningful differences. All standardized differences of cohort values were < 0.05. ^e Metropolitan areas were defined as six metropolitan cities (Busan, Incheon, Gwangju, Daegu, Daejeon, and Ulsan), urban areas as cities, and rural areas as non-city areas. Missing data of observed data; user group = 753, non-user group = 2,551 ^f Obtained by the 1st National health screening program of infants and children at 4 to 6 months of age. ^g Obtained by the 1st National health screening program of infants and children at 4 to 6 months of age. Missing data of observed data; user group = 414, non-user group = 1,165, ^h Obtained by the 1st National health screening program of infants and children at 4 to 6 months of age. Missing data of observed data; user group = 693, non-user group = 1,811, ⁱ Economic status was estimated by the amount of insurance co-payment and classified by quintiles. Missing data of observed data; user group = 3,562, non-user group = 9,213.

Table S5. Basic clinical characteristics of children in the additional cohort^a.

| Clinical Characteristics | Observed Data (<i>n</i> = 369,733) | | | | Matched Data (<i>n</i> = 118,886) ^b | | |
|--|---------------------------------------|-----------------------|---|--|---|----------------------|---|
| | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Difference % ^d | | Antibiotic, <i>n</i> (%) ^c | | Standard- ized Difference % ^d |
| | Users | Non-users | | | Users | Non-users | |
| | (<i>n</i> = 97,653) | (<i>n</i> = 272,080) | | | (<i>n</i> = 59,443) | (<i>n</i> = 59,443) | |
| Hospital utilization | | | | | | | |
| No. hospitalized | 31,335 (32.1) | 19,017 (7.0) | 63.6 | | 12,761 (21.5) | 11,796 (19.8) | 1.4 |
| No. visiting ER | 5360 (5.5) | 5748 (2.1) | 17.6 | | 2377 (4.0) | 2398 (4.0) | 0.4 |
| Certain conditions (ICD-10 code) originating in the perinatal period, N (%) ^c | | | | | | | |
| Fetus and newborn affected by maternal factors and by complications of | 3466 (3.5) | 3732 (1.4) | 14.1 | | 1834 (3.1) | 1831 (3.1) | 0.0 |

| | | | | | | | |
|---|---------------|----------------|------|--|---------------|---------------|------|
| pregnancy, labor and delivery | | | | | | | |
| Disorders related to length of gestation and fetal growth | 536 (0.5) | 833 (0.3) | 3.8 | | 265 (0.4) | 257 (0.4) | 0.2 |
| Birth trauma | 1050 (1.1) | 2182 (0.8) | 2.8 | | 621 (1.0) | 641 (1.1) | 0.35 |
| Respiratory and cardiovascular disorders specific to the perinatal period | 7712 (7.9) | 7909 (2.9) | 22.5 | | 3865 (6.5) | 3912 (6.6) | 0.4 |
| Respiratory and cardiovascular disorders specific to the perinatal period | 21,022 (21.5) | 31,268 (11.5) | 27.4 | | 11,032 (18.6) | 11,335 (19.1) | 1.4 |
| Hemorrhagic and hematological disorders of fetus and newborn | 34,694 (35.5) | 82,835 (30.4) | 10.9 | | 20,529 (34.5) | 21,316 (35.9) | 2.8 |
| Transitory endocrine and metabolic disorders specific to fetus and newborn | 3991 (4.1) | 5629 (2.1) | 11.8 | | 2092 (3.5) | 2073 (3.5) | 0.2 |
| Digestive system disorders of fetus and newborn | 3840 (3.9) | 6789 (2.5) | 8.1 | | 2110 (3.5) | 2159 (3.6) | 0.5 |
| Conditions involving the integument and temperature regulation of fetus and newborn | 4353 (4.5) | 9470 (3.5) | 5.0 | | 2505 (4.2) | 2497 (4.2) | 0.1 |
| Other disorders originating in the perinatal period | 6434 (6.6) | 15,247 (5.6) | 4.1 | | 3837 (6.5) | 3953 (6.7) | 0.8 |
| Congenital malformations, deformations and chromosomal abnormalities | 11,609 (11.9) | 23,857 (8.8) | 10.3 | | 6555 (11.0) | 6699 (11.3) | 0.8 |
| Prevalent diseases (ICD-10 codes) diagnosed before 3 months of age | | | | | | | |
| Singleton, born in hospital | 64,656 (66.2) | 189,067 (69.5) | 6.8 | | 40,048 (67.4) | 40,124 (67.5) | 0.3 |
| Viral intestinal infection, unspecified | 1812 (1.9) | 3069 (1.1) | 6.0 | | 1014 (1.7) | 1030 (1.7) | 0.2 |
| Other and unspecified gastroenteritis and colitis of infectious origin | 4115 (4.2) | 5817 (2.1) | 11.8 | | 2116 (3.6) | 2179 (3.7) | 0.6 |
| Gastroenteritis and colitis of unspecified origin | 4612 (4.7) | 6634 (2.4) | 12.3 | | 2410 (4.1) | 2486 (4.2) | 0.7 |
| Sepsis, unspecified | 2728 (2.8) | 278 (0.1) | 22.7 | | 332 (0.6) | 267 (0.4) | 0.9 |
| Candidal stomatitis | 1486 (1.5) | 2688 (1.0) | 4.9 | | 834 (1.4) | 840 (1.4) | 0.1 |
| Mucopurulent conjunctivitis | 2223 (2.3) | 2083 (0.8) | 12.4 | | 1195 (2.0) | 1279 (2.2) | 1.2 |

| | | | | | | | |
|--|---------------|---------------|------|--|---------------|---------------|------|
| Other acute conjunctivitis | 1934 (2.0) | 2661 (1.0) | 8.1 | | 1082 (1.8) | 1162 (2.0) | 1.1 |
| Acute conjunctivitis | 4584 (4.7) | 5876 (2.2) | 13.8 | | 2679 (4.5) | 2920 (4.9) | 2.3 |
| Conjunctivitis, unspecified | 4919 (5.0) | 6924 (2.5) | 13.0 | | 2828 (4.8) | 3153 (5.3) | 2.9 |
| Acute suppurative otitis media | 5124 (5.2) | 359 (0.1) | 31.9 | | 483 (0.8) | 335 (0.6) | 1.6. |
| Acute nasopharyngitis | 23,711 (24.3) | 41,787 (15.4) | 22.4 | | 12,961 (21.8) | 13,468 (22.7) | 2.2 |
| Acute sinusitis, unspecified | 3465 (3.5) | 1618 (0.6) | 20.7 | | 1214 (2.0) | 1152 (1.9) | 0.7 |
| Acute tonsillitis, unspecified | 4223 (4.3) | 2636 (1.0) | 20.9 | | 1711 (2.9) | 1671 (2.8) | 0.4 |
| Acute laryngopharyngitis | 1968 (2.0) | 1932 (0.7) | 11.3 | | 960 (1.6) | 981 (1.7) | 0.3 |
| Other acute upper respiratory infections of multiple sites | 2095 (2.1) | 2574 (0.9) | 9.6 | | 1064 (1.8) | 1076 (1.8) | 0.2 |
| Acute upper respiratory infection, unspecified | 18,620 (19.1) | 27,484 (10.1) | 25.7 | | 9907 (16.7) | 10,328 (17.4) | 2.0 |
| Pneumonia, unspecified | 4583 (4.7) | 399 (0.1) | 29.8 | | 475 (0.8) | 369 (0.6) | 1.2 |
| Acute bronchitis | 8008 (8.2) | 9921 (3.6) | 19.4 | | 4082 (6.9) | 4307 (7.2) | 1.6 |
| Acute bronchiolitis | 14,428 (14.8) | 4461 (1.6) | 49.0 | | 4239 (7.1) | 3845 (6.5) | 2.5 |
| Allergic rhinitis | 1788 (1.8) | 2054 (0.8) | 9.6 | | 861 (1.4) | 912 (1.5) | 0.8 |
| Gastro-esophageal reflux disease without esophagitis | 2156 (2.2) | 4719 (1.7) | 3.4 | | 1311 (2.2) | 1338 (2.3) | 0.3 |
| Functional dyspepsia | 1649 (1.7) | 4058 (1.5) | 1.8 | | 1035 (1.7) | 1064 (1.8) | 0.4 |
| Noninfective gastroenteritis and colitis, unspecified | 3323 (3.4) | 6215 (2.3) | 6.6 | | 1932 (3.3) | 2038 (3.4) | 1.1 |
| Constipation | 2851 (2.9) | 7597 (2.8) | 0.8 | | 1785 (3.0) | 1878 (3.2) | 0.9 |
| Functional intestinal disorder, unspecified | 2097 (2.1) | 4918 (1.8) | 2.6 | | 1280 (2.2) | 1318 (2.2) | 0.5 |
| Impetigo [any organism] [any site] | 1528 (1.6) | 2293 (0.8) | 6.5 | | 868 (1.5) | 923 (1.6) | 0.9 |
| Other atopic dermatitis | 3406 (3.5) | 9143 (3.4) | 0.8 | | 2156 (3.6) | 2199 (3.7) | 0.4 |
| Atopic dermatitis | 10,096 (10.3) | 26,901 (9.9) | 1.7 | | 6317 (10.6) | 6500 (10.9) | 1.0 |
| Seborrheic infantile dermatitis | 1789 (1.8) | 5201 (1.9) | 0.7 | | 1110 (1.9) | 1128 (1.9) | 0.2 |
| Seborrheic dermatitis | 1357 (1.4) | 3815 (1.4) | 0.1 | | 837 (1.4) | 885 (1.5) | 0.7 |
| Diaper dermatitis | 6024 (6.2) | 15,755 (5.8) | 1.7 | | 3722 (6.3) | 3749 (6.3) | 0.2 |
| Allergic contact dermatitis | 2659 (2.7) | 6832 (2.5) | 1.5 | | 1642 (2.8) | 1595 (2.7) | 0.5 |
| Irritant contact dermatitis, unspecified cause | 1087 (1.1) | 2838 (1.0) | 0.7 | | 638 (1.1) | 642 (1.1) | 0.1 |
| Dermatitis | 2680 (2.7) | 7326 (2.7) | 0.3 | | 1661 (2.8) | 1653 (2.8) | 0.1 |

| | | | | | | | |
|---|---------------|---------------|------|--|---------------|---------------|-----|
| Pyogenic granuloma | 1693 (1.7) | 3211 (1.2) | 4.6 | | 1027 (1.7) | 1095 (1.8) | 1.0 |
| Urinary tract infection, site not specified | 2778 (2.8) | 693 (0.3) | 21.1 | | 603 (1.0) | 555 (0.9) | 0.7 |
| Cardiac murmur | 976 (1.0) | 2222 (0.8) | 2.1 | | 557 (0.9) | 574 (1.0) | 0.3 |
| Nausea and vomiting | 2595 (2.7) | 5606 (2.1) | 3.9 | | 1541 (2.6) | 1611 (2.7) | 0.8 |
| Fever, unspecified | 4837 (5.0) | 6350 (2.3) | 14.1 | | 2150 (3.6) | 2093 (3.5) | 0.5 |
| Nonspecific symptoms peculiar to infancy | 1097 (1.1) | 3090 (1.1) | 0.0 | | 708 (1.2) | 712 (1.2) | 0.1 |
| Malnutrition | 4 (0.0) | 4 (0.0) | 0.3 | | 2 (0.0) | 2 (0.0) | 0.0 |
| Drug (drug classification code) used before 6 months of age | | | | | | | |
| Sedative- hypnotics | 3776 (3.9) | 6190 (2.3) | 9.1 | | 2128 (3.6) | 2285 (3.8) | 1.5 |
| Antiepileptics | 18 (0.0) | 7 (0.0) | 1.5 | | 7 (0.0) | 5 (0.0) | 0.3 |
| Antipyretics | 25,600 (26.2) | 30,021 (11.0) | 39.7 | | 12,247 (20.6) | 12,537 (21.1) | 1.3 |
| Psycho-nervous system drug | 5139 (5.3) | 3632 (1.3) | 22.1 | | 2046 (3.4) | 2126 (3.6) | 0.8 |
| Automatic nervous system drugs | 31 (0.0) | 34 (0.0) | 9.2 | | 15 (0.0) | 16 (0.0) | 0.4 |
| Antispasmodics | 1725 (1.8) | 2007 (0.7) | 9.2 | | 884 (1.5) | 911 (1.5) | 2.9 |
| Antihistamine | 43,608 (44.7) | 34,826 (12.8) | 75.0 | | 20,207 (34.0) | 20,928 (35.2) | 0.1 |
| Other allergic drug | 411 (0.5) | 213 (0.1) | 7.4 | | 136 (0.2) | 133 (0.2) | 0.1 |
| Circulatory system drugs | 599 (0.6) | 277 (0.1) | 8.6 | | 167 (0.3) | 163 (0.3) | 3.1 |
| Respiratory system drugs | 54,902 (56.2) | 40,861 (15.0) | 95.1 | | 25,424 (42.8) | 26,224 (44.1) | 3.0 |
| Digestive system drugs | 54,622 (55.9) | 57,403 (21.1) | 76.5 | | 26,303 (44.2) | 27,111 (45.6) | 1.0 |
| Hormone drugs | 3869 (4.0) | 1193 (0.4) | 24.1 | | 929 (1.6) | 841 (1.4) | 1.0 |
| steroid | 3775 (3.9) | 954 (0.4) | 24.6 | | 871 (1.5) | 788 (1.3) | 0.3 |

Abbreviations, N, Number; ICD, International Classification of Diseases; ER, Emergency room. ^a Unless otherwise specified, all baseline characteristics were assessed within the first 3 months of age of participants. ^b Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by the Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^c Results are reported as N (%) unless otherwise indicated. ^d Differences greater than 10% were interpreted as meaningful differences. All standardized differences of cohort values were < 0.05.

Table S6. Risk of linear and ponderal growth in preschool-age for early antibiotics exposure in the additional cohort^a

| | All Data (<i>n</i> = 369,733) | | | | Matched Data (<i>n</i> = 118,886) ^b | | |
|-------------------------------------|----------------------------------|---|---|--|---|--|------------------------------|
| | Antibiotic, N (%) | | aOR ^f (95% CI) | | Antibiotic, <i>n</i> (%) | | aOR ^f (95% CI) |
| | Users (<i>n</i> = 97,653) | Non-users ^c (<i>n</i> = 272,080) | | | Users (<i>n</i> = 59,443) | Non-users ^c (<i>n</i> = 59,443) | |
| Main outcome - linear growth | | | | | | | |
| Stunting ^d | 843 (0.86) | 2140 (0.79) | 1.144 (1.050 to 1.246) | | 500 (0.84) | 474 (0.79) | 1.052 (0.918 to 1.205) |
| Short stature ^e | 2182 (2.23) | 5727 (2.10) | 1.058 (1.030 to 1.086) | | 1339 (2.25) | 1311 (2.21) | 1.073 (0.990 to 1.164) |
| aβ (95% CI) ^g | -0.020 (-0.026 to -0.014) | | | | -0.024 (-0.033 to -0.015) | | |
| Secondary outcome - ponderal growth | | | | | | | |

| | | | | | | |
|---------------------------------|-------------------------------|-------------------|---|-------------------------------|-------------------|---|
| Obesity ^h | 9884 (10.12) | 25,153 (9.24) | 1.133 (1.104 to 1.163) | 5901 (9.93) | 5639 (9.49) | 1.063 (1.021 to 1.107) |
| Overweight ⁱ | 26,002 (26.63) | 68,244 (25.08) | 1.102 (1.084 to 1.120) | 15,513 (26.10) | 15,338 (25.80) | 1.029 (1.003 to 1.056) |
| a β (95% CI) ^g | 0.052 (0.044 to 0.059) | | | 0.016 (0.005 to 0.028) | | |

Abbreviations, N, Number; aOR, adjusted odds ratio; CI, confidence interval; a β , adjusted β . ^a The main cohort consisted of the antibiotic user group who used antibiotics within the first 6 months of life and non-user group who did not use antibiotics within the first 6 months of life. ^b Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by the Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^c Indicates the reference group ^d Stunting was defined as a height for age z score < -2.0. ^e Short stature was defined as a height for age z score < -1.64. ^f Adjusted odds ratios were assessed using a generalized estimating equation with a binomial distribution logit link function and exchangeable working correlation structure, Adjusting for birthweight, sex, breastfeeding status within 4 to 6 months of age, residence at birth and economic status. ^g The adjusted estimates and 95% CIs of height for age z score and BMI for age z score were as-sessed using a mixed model of GENMOD, adjusting for birthweight, sex, breastfeeding status within 4 to 6 months after birth, residence at birth and economic status. ^h Overweight was defined as a BMI for age z-score ≥ 1.03 . ⁱ Obesity was defined as a BMI for age z score ≥ 1.64 . Bold values indicate $p < 0.05$.

Table S7. Subgroup analysis grouped by the status of breastfeeding during the first 4 to 6 months of life, or in a binary fashion by birthweight.

| category | | Unmatched Data | | Matched Data ^a | |
|-------------|--------------------------------|-------------------------------|--------------------------------|------------------------------|--------------------------------|
| | | β (95% CI) ^f | | | |
| | | Main cohort ^b | Additional cohort ^c | Main cohort ^b | Additional cohort ^c |
| HFA z score | Breastfeeding ^d | -0.041 (-0.048 to -0.034) | -0.027 (-0.038 to -0.016) | -0.026 (-0.037 to -0.014) | -0.019 (-0.036 to -0.003) |
| | Not breastfeeding ^d | -0.041 (-0.048 to -0.034) | -0.022 (-0.032 to -0.012) | -0.020 (-0.031 to -0.009) | -0.023 (-0.038 to -0.007) |
| | Lower half ^e | -0.046 (-0.530to -0.039) | -0.016 (-0.026 to -0.006) | -0.029 (-0.040 to -0.018) | -0.015 (-0.031to 0.000) |
| | Upper half ^e | -0.039 (-0.046 to -0.032) | -0.027 (-0.038 to -0.017) | -0.013 (-0.024 to -0.001) | -0.024 (-0.040 to -0.008) |

Abbreviations, HFA, height for age. ^a Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by the Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^b The main cohort consisted of the antibiotic user group who used antibiotics within the first 6 months of life and the non-user group who did not use antibiotics within the first 6 months of life. ^c The additional cohort consisted of the antibiotic user group who used antibiotics within the first 3 months of life and the non-user group who did not use antibiotics within the first 3 months of life. ^d Data about the status of breastfeeding were obtained by the 1st National health screening program of infants and children at 4 to 6 months of age, which were grouped in a binary fashion to breastfeeding or not. ^e Data about birthweight of participants were obtained by the 1st National health screening program of infants and children at 4 to 6 months of age, which were grouped in a binary fashion to lower half vs upper half (median = 3.24 kg). ^f The estimates and 95% CIs of height for age z score were as-sessed using a mixed model of GENMOD. Bold values indicate $p < 0.05$.

Table S8. Post-hoc analysis for effect on linear growth by routes of antibiotic administration.

| category | Route ^d | All Data | | Matched Data ^a | |
|-------------|--------------------|-------------------------------|--------------------------------|---------------------------------|---------------------------------|
| | | β (95% CI) ^e | | | |
| | | Main cohort ^b | Additional cohort ^c | Main cohort ^b | Additional cohort ^c |
| HFA z score | Paren-teral | −0.028 (−0.036 to -0.019) | 0.006 (−0.007 to 0.020) | −0.0126 (−0.0356 to 0.0104) | 0.0104 (−0.0109 to 0.0317) |
| | Per oral | −0.040 (−0.045 to -0.035) | −0.028 (−0.036 to −0.020) | −0.0178 (−0.0283 to −0.0072) | −0.0246 (−0.0363 to −0.0128) |

Abbreviations, HFA, height for age. ^a Propensity score matching (1:1) was performed to reduce bias for the selection of the comparison group. Matching was performed by Mahalanobis algorithm with a caliper of 0.01 using multivariable logistic regression with 79 previously chosen covariates as defined in Table S2. ^b The main cohort consisted of the antibiotic user group who have been exposed the antibiotics within the first 6 months of age and non-user group without antibiotic exposure within the first 6 months of age. ^c The additional cohort consisted of the antibiotic user group who have been exposed the antibiotics within the first 3 months of age and non-user group without antibiotic exposure within the first 3 months of age. ^d The routes of antibiotic administration were divided into parenteral use (intravenous or intramuscular) and per oral by description of drug prescription. ^e The estimates and 95% CIs of height for age z score were assessed using a mixed model of GENMOD. Bold values indicate $p < 0.05$.