Supplementary information

Box S1. Model parametrisation [1, 2]

Let $n_{jk}(t)$, the number of bronchiolitis admissions in IMD group *j* and year *k* observed at time *t* (measured in weeks), follow a Poisson distribution with rate $\lambda_{jk}(t) = E(n_{jk}(t))/N_{jk}(t)$ where $N_{jk}(t)$ denote the person-time at risk in IMD group *j* and year k at time t. We modelled this rate, after log-transformation, as a function of year and time of admission as follows:

$$log\big(\lambda_{jk}(t)\big) = \beta_0 + \beta_1(sin(2\pi t/\mathrm{T})) + \beta_2(cos(2\pi t/\mathrm{T})) + \sum_{j=1}^{5} \alpha_j\, I_{\mathrm{IMD}=j} + \sum_{j=1}^{5} \delta_{1j}\, sin(2\pi t/\mathrm{T}) I_{\mathrm{IMD}=j}$$
$$+ \sum_{j=1}^{5} \delta_{2j}\, cos(2\pi t/\mathrm{T}) I_{\mathrm{IMD}=j} + \sum_{k=1}^{3} \theta_k\, I_{\mathrm{age}=k} + \sum_{k=1}^{3} \theta_k\, sin(2\pi t/\mathrm{T}) I_{\mathrm{age}=k}$$
$$+ \sum_{k=1}^{3} \theta_k\, cos(2\pi t/\mathrm{T}) I_{\mathrm{age}=k} + \sum_{k=1}^{K} \theta_k\, I_{x=k}$$

Where: T is the length of period within one harmonic cycle (i.e. 1 year = 52.14 weeks); and $I_{X=x}$ is the binary indicator of the covariates X taking value x; K indicates the number of covariates included in the model (e.g. sex and year categories). The parameter β_0 is the intercept, β_1 and β_2 are harmonic function coefficients, δ_{1j} and δ_{2j} are IMD group-specific harmonic function coefficients, and the parameters α_1, δ_{11}, δ_{21} and θ_1 are all constrained to be zero to deal with the collinearity of the binary indicators.

Figure S1. Flow diagram to show study participant and hospital admission selection

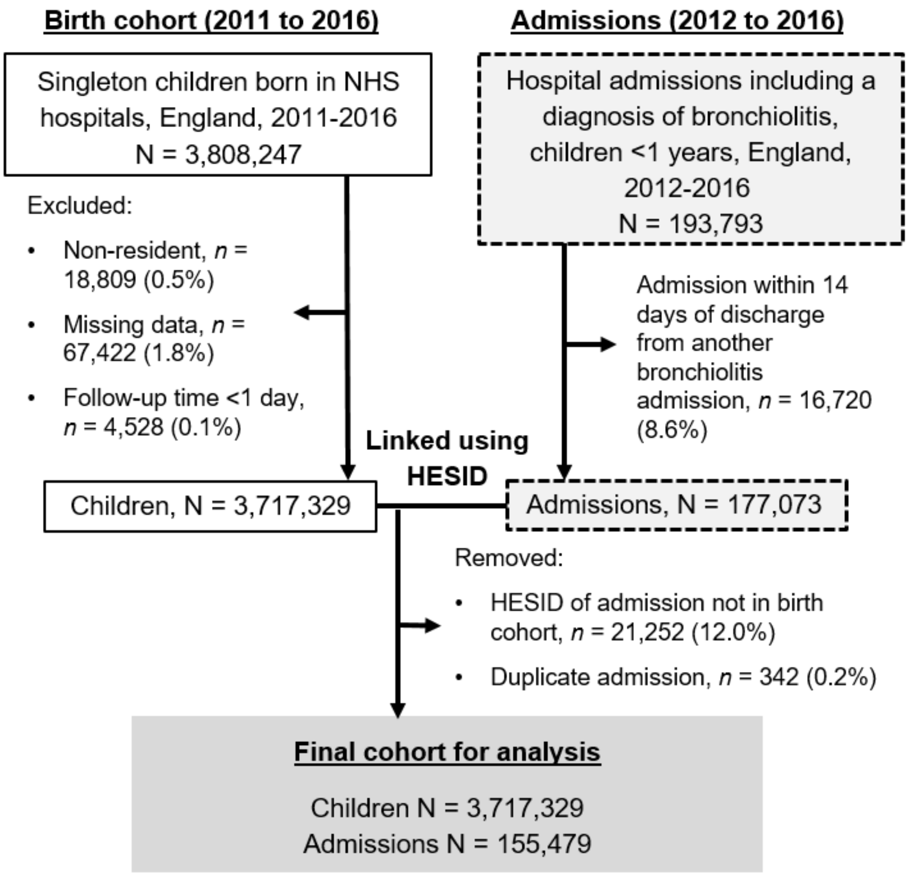

Table S1. Hospital admissions in children <1 year olds, total and due to bronchiolitis, by year and month: England, 2012-2016

		Any condition (N)	Bronchiolitis (N)	Proportion of all (%)
Year	**2012**	262,411	37,136	14.2
	2013	252,053	34,264	13.6
	2014	250,454	35,982	14.4
	2015	255,866	41,408	16.2
	2016	271,865	45,003	16.6
Month	**January**	112,008	24,116	21.5
	February	104,485	13,787	13.2
	March	113,802	11,647	10.2
	April	101,518	8,077	8.0
	May	100,649	6,238	6.3
	June	93,729	4,004	4.3
	July	96,421	3,432	3.6
	August	85,770	1,990	2.3
	September	90,995	5,358	5.9
	October	109,270	14,181	13.0
	November	135,434	41,794	30.9
	December	148,568	59,079	39.8

REFERENCES

1. Lofgren, E.T., et al., *Disproportional effects in populations of concern for pandemic influenza: insights from seasonal epidemics in Wisconsin, 1967–2004.* Influenza and Other Respiratory Viruses, 2010. **4**(4): p. 205-212.
2. Naumova, E.N. and I.B. MacNeill, *Seasonality Assessment for Biosurveillance Systems*, in *Advances in Statistical Methods for the Health Sciences: Applications to Cancer and AIDS Studies, Genome Sequence Analysis, and Survival Analysis*, J.-L. Auget, et al., Editors. 2007, Birkhäuser Boston: Boston, MA. p. 437-450.