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Supplemental Material

Prenatal Exposure to Nitrate from Drinking Water and Markers of Fetal Growth Restriction: A Population-Based Study of Nearly One Million Danish-Born Children

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Table S1. Characteristics of the study population by low birthweight, 1991-2011.

Characteristic	Normal weight (≥ 2,500 g)	Low birthweight (< 2,500 g)
Total population[a], *n (%)*	842,320 (100)	10,028 (100)
Pregnancy average NO_3^- (mg/L), *mean ± SD*	4.7 ± 7.6	4.9 ± 7.7
Gestational age (weeks), *mean ± SD*	40 ± 1	38 ± 1
Maternal age (years), *mean ± SD*	30 ± 5	29 ± 5
Maternal income[b] (DKK), *mean ± SD*	229,100 ± 114,200	211,700 ± 108,800
Paternal age (years), *mean ± SD*	32 ± 5	32 ± 6
Paternal income[b] (DKK), *mean ± SD*	331,000 ± 211,200	299,000 ± 178,000
Missing, *n (%)*	429 (0)	6 (0)
Maternal height (cm)[c], *mean ± SD*	169 ± 16	166 ± 8
Maternal pre-pregnancy weight (kg)[c], *mean ± SD*	70 ± 23	65 ± 15
Sex, *n (%)*		
Female	410,705 (49)	5,856 (58)
Male	431,615 (51)	4,172 (42)
Gravidity, *n (%)*		
1	368,281 (44)	5,691 (57)
2	328,443 (39)	2,777 (28)
≥ 3	145,596 (17)	1,560 (16)
Maternal smoking[d], *n (%)*		
No	657,508 (78)	5,047 (50)
Yes	184,812 (22)	4,981 (50)
Maternal education[e], *n (%)*		
Compulsory	194,700 (23)	3,828 (38)
Secondary	404,032 (48)	4,288 (43)
Post-secondary	243,588 (29)	1,912 (19)
Maternal employment status[e], *n (%)*		
Employed	688,628 (82)	7,419 (74)
Unemployed	52,969 (6)	969 (10)
Not seeking work	100,723 (12)	1,640 (16)
Paternal education[e], *n (%)*		
Compulsory	182,765 (22)	3,290 (33)
Secondary	438,140 (52)	4,959 (49)
Post-secondary	212,136 (25)	1,588 (16)
Missing	9,279 (1)	191 (2)
Paternal employment status[e], *n (%)*		
Employed	760,694 (90)	8,512 (85)
Unemployed	33,551 (4)	664 (7)
Not seeking work	45,325 (5)	816 (8)
Missing	2,750 (0)	36 (0)
Urbanicity of maternal address at birth, *n (%)*		
Rural areas[f]	272,270 (32)	3,390 (34)
Provincial town[g]	241,417 (29)	3,083 (31)
Provincial city[h]	106,839 (13)	1,124 (11)
Suburb of capital	102,658 (12)	1,142 (11)
Capital	119,136 (14)	1,289 (13)
Region of maternal address at birth, *n (%)*		
North Jutland	88,919 (11)	1,114 (11)
Middle Jutland	208,230 (25)	2,245 (22)
Southern Jutland	175,993 (21)	2,238 (22)
Capital area	253,167 (30)	2,840 (28)

Zealand	116,011 (14)	1,591 (16)
Year of birth, *n (%)*		
1991 - 1995	207,774 (25)	2,980 (30)
1996 - 2000	205,373 (24)	2,522 (25)
2001 - 2005	197,992 (24)	2,141 (21)
2006 - 2012	231,181 (27)	2,385 (24)
Season of birth, *n (%)*		
January - March	203,904 (24)	2,573 (26)
April - June	211,581 (25)	2,382 (24)
July - September	227,136 (27)	2,639 (26)
October - December	199,699 (24)	2,434 (24)
Water supply, *n (%)*		
Public[i]	838,345 (99)	9,971 (99)
Private[j]	2,989 (0.4)	42 (0.4)
Unknown[k]	986 (0.1)	15 (0.1)
Caesarean delivery[l], *n (%)*		
No	494,210 (83)	4,294 (66)
Yes	97,663 (17)	2,187 (34)

Note: All X^2 tests for difference between strata were significant at $p \leq 0.001$ except for the water supply ($p = 0.36$) and continuous nitrate ($p = 0.007$).

a. The study population: full-term singleton live births in Denmark with a birthweight measurement born January 1, 1991 to December 31, 2011 to Danish-born parents who have at least eight address-linked NO_3^- measurements and with non-missing covariates in the base model

b. As reported two years prior to birth and standardized to 2009 values

c. Maternal height and weight were assessed two years prior to birth and available from 2003 onward only, which reduces the sample size to 3,038 cases and 294,715 non-cases of LBW

d. For children born in the period before 1997 smoking was recorded at the first visit with the midwife with no specifications as to the timing. For children born from 1997 onward smoking is during pregnancy.

e. As reported two years before birth

f. Municipalities in Denmark where the largest town has < 10,000 inhabitants

g. Municipalities having a town with between 10,000 and 100,000 inhabitants

h. Municipalities having a town with > 100,000 inhabitants

i. Public water throughout pregnancy

j. Private well at some point in pregnancy

k. Public water supply for at least 8 out of the 10 months during pregnancy and unknown water supply for the remaining months

l. Available from 1997 onward only, which reduces the sample size to 6,481 cases and 591,873 non-cases of LBW

Table S2. Difference in the mean birthweight (grams) for NO_3^- concentrations in household drinking water restricted to babies born to mothers who were on public water throughout their pregnancy, and restricted to babies born to mothers whose nitrate levels were never reported above the EU standard of 50 mg/L.

	Base model *n* = 852,348			Only public *n* = 848,316			Never above 50 mg/L *n* = 845,699		
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI	*p*-value
Categorical									
≤ 1	186,182	Ref (0)		185,339	Ref (0)		185,661	Ref (0)	
> 1 – ≤ 2	182,870	-3.6 (-6.8, -0.5)	0.02	182,322	-3.5 (-6.7, -0.3)	0.03	182,333	-3.5 (-6.7, -0.3)	0.03
> 2 – ≤ 5	299,468	-7.4 (-10.8, -4.1)	<0.001	298,381	-7.4 (-10.7, -4.0)	<0.001	298,401	-7.4 (-10.7, -4.0)	<0.001
> 5 – ≤ 25	150,019	-8.1 (-11.6, -4.6)	<0.001	148,999	-7.9 (-11.5, -4.4)	<0.001	149,130	-8.0 (-11.6, -4.5)	<0.001
> 25	33,809	-7.0 (-13.3, -0.7)	0.03	33,275	-7.0 (-13.4, -0.7)	0.03	30,174	-6.6 (-13.2, 0.03)	0.05
trend			<0.001			<0.001			<0.001
Continuous[a]	852,348	-9.7 (-14.6, -4.8)	<0.001	848,316	-9.5 (-14.4, -4.5)	<0.001	845,699	-9.8 (-14.8, -4.8)	<0.001

Note: EU = European Union. CI = Confidence interval. Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.
a. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and β (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

Table S3. Difference in mean body length at birth (millimeters) restricted to babies born to mothers who were on public water throughout their pregnancy, and restricted to babies born to mothers whose nitrate levels were never reported above the EU standard of 50 mg/L.

	Base model *n* = 848,106			Only public *n* = 844,095			Never above 50 mg/L *n* = 841,494		
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value
Categorical									
≤ 1	185,379	Ref (0)		184,539	Ref (0)		184,860	Ref (0)	
> 1 – ≤ 2	182,001	-0.1 (-0.2, 0.1)	0.24	181,456	-0.1 (-0.2, 0.1)	0.26	181,467	-0.1 (-0.2, 0.1)	0.26
> 2 – ≤ 5	297,885	-0.2 (-0.3, -0.02)	0.03	296,803	-0.2 (-0.3, -0.01)	0.04	296,824	-0.2 (-0.3, -0.01)	0.03
> 5 – ≤ 25	149,114	-0.4 (-0.5, -0.2)	<0.001	148,102	-0.4 (-0.5, -0.2)	<0.001	148,234	-0.4 (-0.5, -0.2)	<0.001
> 25	33,727	-0.2 (-0.5, 0.1)	0.27	33,195	-0.2 (-0.5, 0.1)	0.22	30,109	-0.2 (-0.5, 0.1)	0.21
trend			<0.001			<0.001			<0.001
Continuous[a]	848,106	-0.3 (-0.5, -0.1)	0.01	844,095	-0.3 (-0.5, -0.1)	0.01	841,494	-0.3 (-0.5, -0.1)	0.01

Note: EU = European Union. CI = Confidence interval. Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.
a. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and β (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

Table S4. Difference in mean head circumference (millimeters) restricted to babies born to mothers who were on public water throughout their pregnancy, and restricted to babies born to mothers whose nitrate levels were never reported above the EU standard of 50 mg/L.

	Base model[a] *n* = 588,981			Only public *n* = 586,128			Never above 50 mg/L *n* = 584,807		
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value
Categorical									
≤ 1	140,486	Ref (0)		139,828	Ref (0)		140,085	Ref (0)	
> 1 – ≤ 2	126,561	0.02 (-0.1, 0.2)	0.79	126,186	0.02 (-0.1, 0.2)	0.81	126,198	0.02 (-0.1, 0.2)	0.80
> 2 – ≤ 5	218,398	-0.2 (-0.4, -0.1)	0.001	217,601	-0.2 (-0.4, -0.1)	0.001	217,625	-0.2 (-0.4, -0.1)	0.001
> 5 – ≤ 25	81,085	0.1 (-0.1, 0.2)	0.52	80,451	0.1 (-0.1, 0.2)	0.57	80,588	0.1 (-0.1, 0.2)	0.55
> 25	22,451	0.1 (-0.2, 0.3)	0.62	22,062	0.1 (-0.2, 0.4)	0.62	20,311	0.1 (-0.2, 0.4)	0.46
trend			0.52			0.47			0.55
Continuous[b]	588,981	0.04 (-0.2, 0.3)	0.69	586,128	0.04 (-0.2, 0.3)	0.74	584,807	0.1 (-0.2, 0.3)	0.60

Note: EU = European Union. CI = Confidence interval. Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.

a. Data were available only for births ≥1997

b. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and β (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

Table S5. Adjusted odds ratios (aOR) for the association between term low birthweight and household NO_3^- concentration, restricted to babies born to mothers who were on public water throughout their pregnancy, and restricted to babies born to mothers whose nitrate levels were never reported above the EU standard of 50 mg/L.

	Base model *n* = 852,348			Only public *n* = 848,316			Never above 50 mg/L *n* = 845,699		
NO_3^- (mg/L)	*n*	aOR (95% CI)	*p*-value	*n*	aOR (95% CI)	*p*-value	*n*	aOR (95% CI)	*p*-value
Categorical									
≤ 1	186,182	Ref (1)		185,339	Ref (1)		185,661	Ref (1)	
> 1 – ≤ 2	182,870	0.98 (0.92, 1.05)	0.52	182,322	0.98 (0.91, 1.04)	0.47	182,333	0.98 (0.91, 1.04)	0.47
> 2 – ≤ 5	299,468	1.01 (0.94, 1.08)	0.86	298,381	1.01 (0.94, 1.08)	0.84	298,401	1.01 (0.94, 1.07)	0.87
> 5 – ≤ 25	150,019	1.02 (0.95, 1.09)	0.55	148,999	1.02 (0.95, 1.09)	0.55	149,130	1.02 (0.96, 1.09)	0.51
> 25	33,809	0.99 (0.88, 1.12)	0.91	33,275	0.99 (0.87, 1.11)	0.81	30,174	0.98 (0.86, 1.12)	0.78
trend			0.51			0.52			0.50
Continuous[a]	852,348	1.02 (0.93, 1.11)	0.73	848,316	1.02 (0.93, 1.11)	0.75	845,699	1.02 (0.93, 1.12)	0.74

Notes: EU = European Union. CI = Confidence interval. Models were fitted using logistic regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.
a. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and aOR (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

Table S6. Difference in the mean birthweight (g) and body length at birth (mm) and odds of low birthweight for NO_3^- concentrations in household drinking water to babies born during the full cohort (1991-2011) and restricted to the later, lower exposure years (1997-2011).

	Birthweight (g) base model			Birthweight (g) restricted model		
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value
Categorical						
≤ 1	186,182	Ref (0)		142,697	Ref (0)	
> 1 – ≤ 2	182,870	-3.6 (-6.8, -0.5)	0.02	128,846	-2.8 (-6.6, 0.9)	0.14
> 2 – ≤ 5	299,468	-7.4 (-10.8, -4.1)	<0.001	221,761	-9.3 (-13.3, -5.3)	<0.001
> 5 – ≤ 25	150,019	-8.1 (-11.6, -4.6)	<0.001	82.449	-7.5 (-11.9, -3.1)	0.001
> 25	33,809	-7.0 (-13.3, -0.7)	0.03	22,616	-6.5 (-14.4, 1.4)	0.11
trend			<0.001			<0.001
Continuous[a,b]	852,348	-9.7 (-14.6, -4.8)	<0.001	598,369	-9.6 (-15.8, -3.4)	0.002

	Body length (mm) base model			Body length (mm) restricted model		
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	*n*	Δ (95% CI)	*p*-value
Categorical						
≤ 1	185,379	Ref (0)		142,156	Ref (0)	
> 1 – ≤ 2	182,001	-0.1 (-0.2, 0.1)	0.24	128,301	-0.2 (-0.4, -0.02)	0.03
> 2 – ≤ 5	297,885	-0.2 (-0.3, -0.02)	0.03	220,776	-0.4 (-0.6, -0.2)	<0.001
> 5 – ≤ 25	149,114	-0.4 (-0.5, -0.2)	<0.001	82,033	-0.4 (-0.6, -0.2)	<0.001
> 25	33,727	-0.2 (-0.5, 0.1)	0.27	22,583	-0.2 (-0.5, 0.2)	0.41
trend			<0.001			<0.001
Continuous[a,b]	848,106	-0.3 (-0.5, -0.1)	0.01	595,849	-0.4 (-0.6, -0.1)	0.02

	Low birthweight base model			Low birthweight restricted model		
NO_3^- (mg/L)	*n*	aOR (95% CI)	*p*-value	*n*	aOR (95% CI)	*p*-value
Categorical						
≤ 1	186,182	Ref (1)		142,697	Ref (1)	
> 1 – ≤ 2	182,870	0.98 (0.92, 1.05)	0.52	128,846	1.00 (0.93, 1.09)	0.94
> 2 – ≤ 5	299,468	1.01 (0.94, 1.08)	0.86	221,761	1.07 (0.98, 1.16)	0.12
> 5 – ≤ 25	150,019	1.02 (0.95, 1.09)	0.55	82.449	1.03 (0.94, 1.12)	0.55
> 25	33,809	0.99 (0.88, 1.12)	0.91	22,616	0.99 (0.84, 1.15)	0.85
trend			0.51			0.4
Continuous[b,c]	852,348	1.02 (0.93, 1.11)	0.73	598,369	1.02 (0.90, 1.15)	0.77

Note: CI = Confidence interval. Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.

a. Total *n* is the same as the continuous model *n*

b. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and β (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

c. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and aOR (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

Table S7. Difference in the mean birthweight (g), birth length (mm), head circumference (mm), and odds ratios (OR) for low birthweight using categorical and continuous variables for NO_3^- concentrations in household drinking water, restricting to those with a recorded value for maternal pre-pregnancy height and weight.

		Birthweight (g) restricted base model[a,b]		Birthweight (g) restricted base model[a,b] + height and weight	
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	Δ (95% CI)	*p*-value
Categorical					
≤ 1	71,885	Ref (0)		Ref (0)	
> 1 – ≤ 2	70,245	-1.5 (-6.7, 3.7)	0.57	0.9 (-4.2, 6.0)	0.73
> 2 – ≤ 5	114,043	-5.6 (-11.3, 0.03)	0.05	-3.7 (-9.2, 1.8)	0.19
> 5 – ≤ 25	31,091	-3.1 (-10.1, 3.8)	0.38	-2.3 (-9.0, 4.4)	0.50
> 25	10,489	1.7 (-9.9, 13.3)	0.77	1.6 (-9.6, 12.9)	0.78
trend			0.25		0.35
Continuous[c]	297,753	-3.4 (-12.7, 6.0)	0.48	-2.7 (-11.8, 6.4)	0.56

		Birth length (mm) restricted base model[b,d]		Birth length (mm) restricted base model[b,d] + height and weight	
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	Δ (95% CI)	*p*-value
Categorical					
≤ 1	71,598	Ref (0)		Ref (0)	
> 1 – ≤ 2	69,932	0.02 (-0.2, 0.3)	0.89	0.1 (-0.2, 0.3)	0.49
> 2 – ≤ 5	113,501	-0.3 (-0.6, -0.1)	0.01	-0.3 (-0.6, -0.03)	0.03
> 5 – ≤ 25	30,918	-0.4 (-0.7, -0.1)	0.03	-0.3 (-0.7, -0.03)	0.03
> 25	10,476	-0.2 (-0.7, 0.3)	0.43	-0.3 (-0.8, 0.3)	0.33
trend			0.01		0.01
Continuous[c]	296,425	-0.5 (-0.9, -0.02)	0.04	-0.5 (-0.9, -0.03)	0.03

		Head circumference (mm) restricted base model[b,e,f]		Head circumference (mm) restricted base model[b,e,f] + height and weight	
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	Δ (95% CI)	*p*-value
Categorical					
≤ 1	70,889	Ref (0)		Ref (0)	
> 1 – ≤ 2	69,226	0.2 (0.02, 0.4)	0.03	0.3 (0.1, 0.4)	0.003
> 2 – ≤ 5	112,684	-0.2 (-0.4, -0.01)	0.04	-0.2 (-0.4, 0.03)	0.11
> 5 – ≤ 25	30,650	0.1 (-0.1, 0.4)	0.26	0.2 (-0.1, 0.4)	0.22
> 25	10,433	0.2 (-0.2, 0.6)	0.31	0.2 (-0.2, 0.6)	0.31
trend			0.81		0.91
Continuous[c]	293,882	-0.04 (-0.4, 0.3)	0.81	-0.03 (-0.3, 0.3)	0.86

		Low birthweight restricted base model[a,b]		Low birthweight restricted base model[a,b] + height and weight	
NO_3^- (mg/L)	*n*	aOR (95% CI)	*p*-value	aOR (95% CI)	*p*-value
Categorical					
≤ 1	71,885	Ref (1)		Ref (1)	
> 1 – ≤ 2	70,245	1.00 (0.90, 1.13)	0.95	1.00 (0.89, 1.12)	0.98
> 2 – ≤ 5	114,043	1.00 (0.89, 1.13)	0.96	1.01 (0.89, 1.13)	0.93
> 5 – ≤ 25	31,091	1.06 (0.92, 1.23)	0.39	1.06 (0.92, 1.22)	0.46
> 25	10,489	0.85 (0.67, 1.09)	0.21	0.86 (0.67, 1.10)	0.22
trend			0.99		0.98
Continuous[c]	297,753	0.96 (0.80, 1.16)	0.69	0.96 (0.79, 1.16)	0.66

Note: CI = Confidence interval. Models were fitted using logistic regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.

a. *n* = 297,753

b. Restricting the base model to those with pre-pregnancy height and weight measurements for comparable estimates between models

c. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and aOR (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L

d. *n* = 296,425

e. *n* = 293,882

f. Data were available only for births ≥1997

Table S8. Difference in the mean birthweight (g), birth length (mm), and head circumference (mm) using categorical and continuous variables for NO_3^- concentrations in household drinking water, adding one additional potential confounder to the base model.

		Categorical NO_3^- estimation (mg/L)						Continuous
		≤ 1	> 1 – ≤ 2	> 2 – ≤ 5	> 5 – ≤ 25	> 25		at 25 mg/L NO_3^-
	n			Δ (95% CI)			*p* for trend	Δ (95% CI)
Birthweight (g) base model[a]	852,348	Ref (0)	-3.6 (-6.8, -0.5)	-7.4 (-10.8, -4.1)	-8.1 (-11.6, -4.6)	-7.0 (-13.3, -0.7)	<0.001	-9.7 (-14.6, -4.8)
+ gestational age	852,348	Ref (0)	-3.8 (-6.7, -0.9)	-8.4 (-11.5, -5.4)	-8.8 (-12.1, -5.6)	-5.4 (-11.2, 0.5)	<0.001	-9.8 (-14.3, -5.3)
+ Cesarean section	598,354	Ref (0)	-2.8 (-6.6, 0.9)	-9.3 (-13.3, -5.3)	-7.5 (-11.9, -3.0)	-6.6 (-14.4, 1.3)	<0.001	-9.6 (-15.8, -3.5)
+ season of birth	852,348	Ref (0)	-3.7 (-6.8, -0.5)	-7.4 (-10.7, -4.1)	-8.1 (-11.6, -4.5)	-7.0 (-13.3, -0.6)	<0.001	-9.6 (-14.5, -4.7)
+ paternal age	852,348	Ref (0)	-3.6 (-6.8, -0.4)	-7.4 (-10.7, -4.1)	-8.1 (-11.6, -4.6)	-7.0 (-13.3, -0.7)	<0.001	-9.7 (-14.6, -4.8)
+ paternal income	851,913	Ref (0)	-3.5 (-6.7, -0.4)	-7.3 (-10.6, -3.9)	-8.0 (-11.5, -4.5)	-7.0 (-13.3, -0.6)	<0.001	-9.6 (-14.5, -4.7)
+ paternal education	842,878	Ref (0)	-3.7 (-6.9, -0.6)	-7.2 (-10.6, -3.9)	-7.8 (-11.3, -4.3)	-7.1 (-13.5, -0.8)	<0.001	-9.4 (-14.3, -4.5)
+ paternal employment status	849,562	Ref (0)	-3.3 (-6.5, -0.2)	-7.2 (-10.5, -3.8)	-7.9 (-11.4, -4.4)	-7.1 (-13.4, -0.8)	<0.001	-9.7 (-14.6, -4.8)

		Categorical NO_3^- estimation (mg/L)						Continuous
		≤ 1	> 1 – ≤ 2	> 2 – ≤ 5	> 5 – ≤ 25	> 25		at 25 mg/L NO_3^-
	n			Δ (95% CI)			*p* for trend	Δ (95% CI)
Body length (mm) base model[a]	848,106	Ref (0)	-0.1 (-0.2, 0.01)	-0.2 (-0.3, -0.02)	-0.4 (-0.5, -0.2)	-0.2 (-0.5, 0.1)	<0.001	-0.3 (-0.5, -0.1)
+ gestational age	848,106	Ref (0)	-0.1 (-0.3, 0.02)	-0.2 (-0.4, -0.1)	-0.4 (-0.6, -0.3)	-0.1 (-0.4, 0.2)	<0.001	-0.3 (-0.5, -0.1)
+ Cesarean section	595,834	Ref (0)	-0.2 (-0.4, -0.02)	-0.4 (-0.6, -0.2)	-0.4 (-0.6, -0.2)	-0.2 (-0.5, 0.2)	<0.001	-0.4 (-0.6, -0.1)
+ season of birth	848,106	Ref (0)	-0.1 (-0.2, 0.06)	-0.2 (-0.3, -0.02)	-0.4 (-0.5, -0.2)	-0.2 (-0.4, 0.1)	<0.001	-0.3 (-0.5, -0.1)
+ paternal age	848,106	Ref (0)	-0.1 (-0.2, 0.1)	-0.2 (-0.3, -0.01)	-0.4 (-0.5, -0.2)	-0.2 (-0.4, 0.1)	<0.001	-0.3 (-0.5, -0.1)
+ paternal income	847,673	Ref (0)	-0.1 (-0.2, 0.1)	-0.2 (-0.3, -0.01)	-0.3 (-0.5, -0.2)	-0.2 (-0.4, 0.1)	<0.001	-0.3 (-0.5, -0.1)
+ paternal education	838,683	Ref (0)	-0.1 (-0.2, 0.06)	-0.2 (-0.3, -0.01)	-0.3 (-0.5, -0.2)	-0.2 (-0.5, 0.1)	<0.001	-0.3 (-0.5, -0.1)
+ paternal employment status	845,336	Ref (0)	-0.1 (-0.2, 0.1)	-0.2 (-0.3, 0.0)	-0.3 (-0.5, -0.2)	-0.2 (-0.4, 0.1)	<0.001	-0.3 (-0.5, -0.1)

		Categorical NO_3^- estimation (mg/L)						Continuous
		≤ 1	> 1 – ≤ 2	> 2 – ≤ 5	> 5 – ≤ 25	> 25		at 25 mg/L NO_3^-
	n			Δ (95% CI)			*p* for trend	Δ (95% CI)
Head circumference (mm) base model[a]	588,981	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.3)	0.52	0.04 (-0.2, 0.3)
+ gestational age	588,981	Ref (0)	0.01 (-0.1, 0.1)	-0.3 (-0.4, -0.1)	0.02 (-0.1, 0.2)	0.1 (-0.1, 0.4)	0.42	0.1 (-0.2, 0.3)
+ Cesarean section	588,981	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.03 (-0.1, 0.2)	0.1 (-0.2, 0.4)	0.47	0.04 (-0.2, 0.3)
+ season of birth	588,981	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.3)	0.52	0.04 (-0.2, 0.3)
+ paternal age	588,981	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.3)	0.53	0.1 (-0.2, 0.3)
+ paternal income	588,628	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.4)	0.56	0.1 (-0.2, 0.3)
+ paternal education	583,104	Ref (0)	0.02 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.3)	0.65	0.1 (-0.2, 0.3)
+ paternal employment status	586,987	Ref (0)	0.03 (-0.1, 0.2)	-0.2 (-0.4, -0.1)	0.1 (-0.1, 0.2)	0.1 (-0.2, 0.4)	0.60	0.1 (-0.2, 0.3)

Note: Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and β (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L.

a. Base model: Controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity

Table S9. Adjusted odds ratios for the association between term low birthweight and household NO_3^- concentrations, adding one additional potential confounder to the base model.

		Categorical NO_3^- estimation (mg/L)						Continuous at 25 mg/L NO_3^-
		≤ 1	> 1 – ≤ 2	> 2 – ≤ 5	> 5 – ≤ 25	> 25		
	n	OR (95% CI)					*p* for trend	Δ (95% CI)
Low birthweight base model[a]	852,348	Ref (1)	0.98 (0.92, 1.05)	1.01 (0.94, 1.08)	1.02 (0.95, 1.09)	0.99 (0.88, 1.12)	0.51	1.02 (0.93, 1.11)
+ gestational age	852,348	Ref (1)	0.99 (0.92, 1.06)	1.02 (0.95, 1.09)	1.02 (0.95, 1.09)	0.99 (0.87, 1.12)	0.56	1.01 (0.92, 1.11)
+ Cesarean section	598,354	Ref (1)	1.00 (0.93, 1.09)	1.07 (0.99, 1.16)	1.02 (0.94, 1.12)	1.00 (0.85, 1.16)	0.41	1.02 (0.90, 1.15)
+ season of birth	852,348	Ref (1)	0.98 (0.92, 1.05)	1.01 (0.94, 1.08)	1.02 (0.95, 1.09)	0.99 (0.88, 1.12)	0.52	1.02 (0.93, 1.11)
+ paternal age	852,348	Ref (1)	0.98 (0.92, 1.05)	1.01 (0.94, 1.08)	1.02 (0.95, 1.09)	0.99 (0.88, 1.12)	0.51	1.02 (0.93, 1.11)
+ paternal income	851,913	Ref (1)	0.98 (0.92, 1.04)	1.00 (0.94, 1.07)	1.02 (0.95, 1.09)	0.99 (0.88, 1.12)	0.56	1.01 (0.93, 1.11)
+ paternal education	842,878	Ref (1)	0.99 (0.92, 1.05)	1.00 (0.94, 1.07)	1.02 (0.95, 1.09)	1.00 (0.89, 1.13)	0.54	1.02 (0.93, 1.11)
+ paternal employment status	849,562	Ref (1)	0.98 (0.92, 1.04)	1.00 (0.94, 1.07)	1.02 (0.95, 1.09)	0.99 (0.88, 1.12)	0.57	1.01 (0.93, 1.11)

Note: Models were fitted using linear regression with generalized estimating equations in order to control for the non-independence of births from the same mother. The continuous NO_3^- exposure variable was log transformed, ln(x+1) and OR (95% CI) shown for exposures x = 25.0 mg/L NO_3^- compared to 0 mg/L.

a. Base model: Controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity

Table S10. Difference in the mean birthweight (g), birth length (mm), head circumference (mm), and low birthweight for NO_3^- concentrations in household drinking water in two different exposure categorical schemes (five and four categories).

Birthweight base model[a]				Birthweight collapsed model[a]			
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value
Categorical				Categorical			
≤ 1	186,182	Ref (0)		-	-	-	-
> 1 – ≤ 2	182,870	-3.6 (-6.8, -0.5)	0.02	≤ 2	369,052	Ref (0)	
> 2 – ≤ 5	299,468	-7.4 (-10.8, -4.1)	<0.001	> 2 – ≤ 5	299,468	-5.2 (-7.9, -2.5)	<0.001
> 5 – ≤ 25	150,019	-8.1 (-11.6, -4.6)	<0.001	> 5 – ≤ 25	150,019	-6.3 (-9.4, -3.2)	<0.001
> 25	33,809	-7.0 (-13.3, -0.7)	0.03	> 25	33,809	-5.2 (-11.3, 0.9)	0.1
trend			<0.001	trend			<0.001

Birth length base model[b]				Birth length collapsed model[b]			
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value
Categorical				Categorical			
≤ 1	185,379	Ref (0)		-	-	-	-
> 1 – ≤ 2	182,001	-0.1 (-0.2, 0.1)	0.24	≤ 2	367,380	Ref (0)	
> 2 – ≤ 5	297,885	-0.2 (-0.3, -0.02)	0.03	> 2 – ≤ 5	297,885	-0.1 (-0.2, 0.01)	0.07
> 5 – ≤ 25	149,114	-0.4 (-0.5, -0.2)	<0.001	> 5 – ≤ 25	149,114	-0.3 (-0.5, -0.2)	<0.001
> 25	33,727	-0.2 (-0.5, 0.1)	0.27	> 25	33,727	-0.1 (-0.4, 0.2)	0.41
trend			<0.001	trend			<0.001

Head circumference base model[c,d]				Head circumference collapsed model[c,d]			
NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value	NO_3^- (mg/L)	*n*	Δ (95% CI)	*p*-value
Categorical				Categorical			
≤ 1	140,486	Ref (0)		-	-	-	-
> 1 – ≤ 2	126,561	0.02 (-0.1, 0.2)	0.79	≤ 2	267,047	Ref (0)	
> 2 – ≤ 5	218,398	-0.2 (-0.4, -0.1)	0.001	> 2 – ≤ 5	218,398	-0.3 (-0.4, -0.1)	<0.001
> 5 – ≤ 25	81,085	0.1 (-0.1, 0.2)	0.52	> 5 – ≤ 25	81,085	0.04 (-0.1, 0.2)	0.56
> 25	22,451	0.1 (-0.2, 0.3)	0.62	> 25	22,451	0.1 (-0.2, 0.3)	0.65
trend			0.52	trend			0.65

Low birthweight base model[a]				Low birthweight collapsed model[a]			
NO_3^- (mg/L)	*n*	aOR (95% CI)	*p*-value	NO_3^- (mg/L)	*n*	aOR (95% CI)	*p*-value
Categorical				Categorical			
≤ 1	186,182	Ref (1)		-	-	-	-
> 1 – ≤ 2	182,870	0.98 (0.92, 1.05)	0.52	≤ 2	369,052	Ref (1)	
> 2 – ≤ 5	299,468	1.01 (0.94, 1.08)	0.86	> 2 – ≤ 5	299,468	1.02 (0.97, 1.07)	0.5
> 5 – ≤ 25	150,019	1.02 (0.95, 1.09)	0.55	> 5 – ≤ 25	150,019	1.03 (0.97, 1.09)	0.31
> 25	33,809	0.99 (0.88, 1.12)	0.91	> 25	33,809	1.00 (0.89, 1.13)	0.95
trend			0.51	trend			0.40

Note: CI = Confidence interval. Models were fitted using linear and logistic regression with generalized estimating equations in order to control for the non-independence of births from the same mother and were controlled for maternal age, calendar year, sex, gravidity, maternal smoking, maternal education, maternal income, maternal employment status, region, and urbanicity.

a. n = 852,348

b. n = 848,106

c. n = 588,981

d. Data were available only for births ≥1997