Online Supplementary Materials

Maternal Vitamin D Concentrations During Pregnancy, Fetal Growth Patterns and Risks of Adverse Birth Outcomes.

Running title: Maternal 25(OH)D and fetal outcomes

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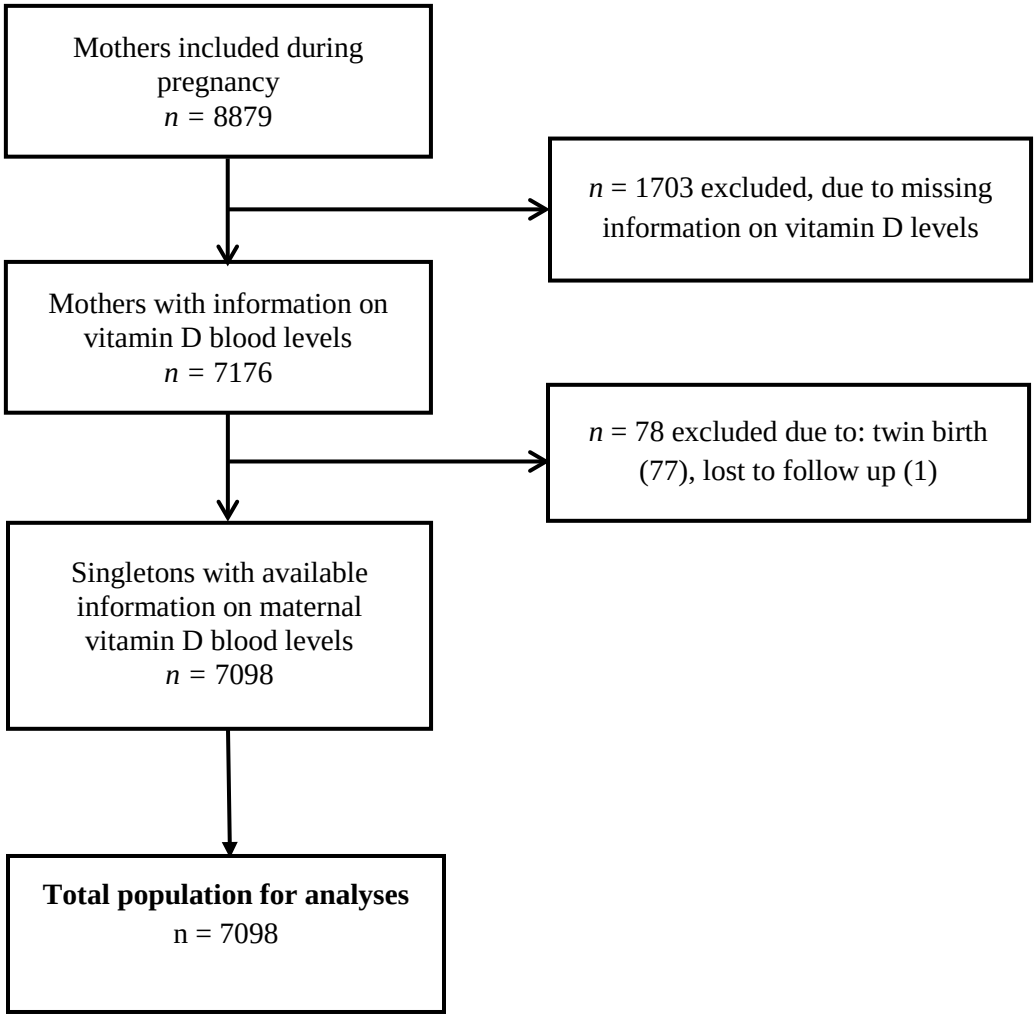
Supplementary Figure 1. Flowchart of the study participants



Supplementary Table 1. Subject characteristics observed and imputed[1]

	Original	Imputed
	N = 7098	N = 7098
Maternal characteristics		
Age, mean (SD), y	29.7 (5.2)	NI
Body mass index at enrolment, median (95% range) , kg/m^2	23.8 (18.7, 36.3)	23.7 (18.7, 36.3)
Missing, No. (%)	*46 (0.6)*	
Gestational age at enrollment, median (95% range), wk	13.9 (9.9, 22.9)	NI
Nulliparous, No. (%)	3955 (55.7)	3987 (56.2)
Missing, No. (%)	*67 (0.9)*	
Education level, No. (%)		
- No higher education	3756 (52.9)	4204 (59.2)
- Higher education	2786 (39.3)	2894 (40.8)
Missing, No. (%)	*556 (7.8)*	
Ethnicity, No. (%)		
- European	3897 (54.9)	4069 (57.3)
- Cape Verdean	294 (4.1)	311 (4.4)
- Dutch Antillean	242 (3.4)	253 (3.5)
- Moroccan	447 (6.3)	471 (6.6)
- Turkish	630 (8.9)	651 (9.2)
- Surinamese	610 (8.6)	643 (9.1)
- Other	665 (9.4)	700 (9.9)
Missing, No. (%)	*313 (4.4)*	
Presence of anorexia, No. (%)		
- No	5254 (74.0)	6352 (89.5)
- Yes	244 (3.4)	503 (7.1)
- Maybe	114 (1.6)	243 (3.4)
Missing, No. (%)	1486 (20.9)	
Smoking during pregnancy, No. (%)		
- Never	4536 (63.9)	5131 (72.3)
- Until pregnancy was known	551 (7.8)	665 (9.4)
- Continued	1179 (16.6)	1302 (18.3)

Missing, No. (%)	*832 (11.7)*	
Alcohol consumption during pregnancy, No. (%)		
- Never	3001 (42.3)	3493 (49.2)
- Until pregnancy was known	863 (12.2)	974 (13.7)
- Continued	2315 (32.6)	2631 (37.1)
Missing, No. (%)	*919 (12.9)*	
Folic acid supplement use, No. (%)		
- No	1515 (21.4)	2204 (31.0)
- Start in the first 10 weeks	1677 (23.6)	2219 (31.3)
- Start periconceptional	2123 (29.9)	2675 (37.7)
Missing, No. (%)	*1783 (25.1)*	
Vitamin supplement use, No. (%)		
- Yes	4128 (58.2)	5049 (71.1)
- No	1730 (24.4)	2049 (28.9)
Missing, No. (%)	*1240 (17.5)*	
Maternal energy intake (kcal)	2041 (566)	2039 (490)
Missing, No. (%)	*1813 (25.5)*	
Maternal zink intake (mg)	9.6 (1.7)	9.6 (1.6)
Missing, No. (%)	*1813 (25.5)*	
Maternal iron intake (mg)	11.1 (2.1)	11.1 (2.1)
Missing, No. (%)	*1813 (25.5)*	
Maternal calcium intake (mg)	1100 (453)	1087 (418)
Missing, No. (%)	*1813 (25.5)*	
Maternal 25(OH)D concentrations, median (95% range), nmol/L	46.7 (7.0, 119.4)	NI
Season when maternal blood sample was take, No. (%)		
- Spring	2097 (29.5)	NI
- Summer	1622 (22.9)	NI
- Autumn	1702 (24.0)	NI
- Winter	1677 (23.6)	NI
Pregnancy complications, No. (%)		
- Gestational Hypertensive disorders	388 (5.5)	421 (5.9)
- Gestational Diabetes	67 (0.9)	67 (0.9)
Missing, No. (%)	*422 (5.9)*	

Birth characteristics		
Female sex, No. (%)	3529 (49.7)	3.529 (49.7)
Missing, No. (%)	*1 (0.01)*	
Preterm birth (<37 wk of gestation), No. (%)	370 (5.2)	NI
Low birth weight (<2500 g), No. (%)	342 (4.8)	NI
Small-size for gestational age at birth (<5th percentile), No. (%)	355 (5.0)	NI
25(OH)D concentration in cord blood at birth, median (95% range), nmol/L	27.4 (4.7, 81.4)	NI
Season when cord blood sample was taken, No. (%)		
- Spring	1130 (26.5)	NI
- Summer	1164 (27.2)	NI
- Autumn	996 (23.4)	NI
- Winter	977 (22.9)	NI

1 Values are percentages for categorical variables, means (SD) for continuous variables with a normal distribution, or medians (95% range) for continuous variables with a skewed distribution.

Supplementary Table 2. Subject characteristics according to quartiles of 25(OH)D[1]

	Full group	Quartile 1	Quartile 2	Quartile 3	Quartile 4
	N = 7098	N = 1774	N = 1773	N = 1777	N = 1774
Maternal characteristics					
Age, mean (SD), y	29.7 (5.2)	27.7 (5.5)	29.6 (5.4)	30.5 (4.8)	31.3 (4.4)
Body mass index at enrolment, median (95% range), kg/m^2	23.7 (18.7, 36.3)	25.0 (18.5, 38.3)	24.0 (18.5, 36.0)	23.6 (18.8, 35.8)	23.0 (18.7, 33.4)
Gestational age at enrollment, median (95% range), wk	13.9 (9.9, 22.9)	15.2 (10.3, 23.5)	13.9 (9.8, 22.7)	13.4 (9.8, 22.1)	13.2 (9.5, 21.9)
Nulliparous, No. (%)	3987 (56.2)	829 (46.8)	960 (54.1)	1085 (61.1)	1113 (62.7)
Education level, No. (%)					
- No higher education	4204 (59.2)	1499 (84.5)	1110 (62.0)	879 (49.5)	726 (40.9)
- Higher education	2894 (40.8)	275 (15.5)	673 (28.0)	898 (50.5)	1048 (59.1)
Ethnicity, No. (%)					
- European	4069 (57.3)	327 (18.5)	940 (53.0)	1259 (71)	1543 (87)
- Cape Verdean	311 (4.4)	105 (5.9)	126 (7.1)	62 (3.4)	18 (1.1)
- Dutch Antillean	253 (3.5)	106 (5.9)	88 (4.9)	37 (2.1)	22 (1.2)
- Moroccan	471 (6.6)	331 (18.5)	87 (4.9)	40 (2.2)	13 (0.7)
- Turkish	651 (9.2)	379 (21.5)	148 (8.5)	98 (5.6)	26 (1.5)
- Surinamese	643 (9.1)	321 (18.1)	201 (11.3)	92 (5.2)	29 (1.6)
- Other	700 (9.9)	205 (11.6)	183 (10.3)	189 (10.6)	123 (6.9)
Presence of anorexia, No. (%)					
- No	6352 (89.5)	1522 (85.8)	1578 (89.0)	1630 (91.7)	1620 (91.3)
- Yes	503 (7.1)	142 (8.0)	130 (7.3)	111 (6.2)	120 (6.8)
- Maybe	243 (3.4)	110 (6.2)	64 (3.6)	36 (2.1)	34 (1.9)
Smoking during pregnancy, No. (%)					

- Never	5.131 (72.3)	1226 (69.0)	1243 (70.0)	1318 (74.2)	1344 (75.8)
- Until pregnancy was known	665 (9.4)	145 (8.2)	182 (10.3)	171 (9.6)	169 (9.5)
- Continued	1302 (18.3)	403 (22.8)	348 (19.7)	288 (16.2)	261 (14.7)
Alcohol consumption during pregnancy, No. (%)					
- Never	3.493 (49.2)	1.297 (73.1)	899 (50.7)	725 (40.8)	571 (32.2)
- Until pregnancy was known	974 (13.7)	164 (9.2)	254 (14.3)	266 (15.0)	291 (16.4)
- Continued	2.631 (37.1)	313 (17.6)	620 (35.0)	786 (44.2)	912 (51.4)
Folic acid supplement use, No. (%)					
- No	2204 (31.0)	1092 (61.6)	633 (35.7)	310 (17.4)	169 (9.5)
- Start in the first 10 weeks	2219 (31.3)	415 (23.4)	591 (33.3)	622 (35.0)	591 (33.3)
- Start periconceptional	2675 (37.7)	267 (15.0)	549 (31.0)	845 (47.6)	1014 (57.2)
Vitamin supplement use, No. (%)					
- Yes	5049 (71.1)	1578 (89.0)	1353 (76.3)	1131 (63.6)	987 (55.6)
- No	2049 (28.9)	196 (11.0)	420 (23.7)	646 (36.4)	787 (44.4)
Maternal energy intake (kcal)	2039 (490)	1954 (484)	2022 (490)	2081 (499)	2102 (472)
Maternal zink intake (mg)	9.6 (1.6)	9.1 (1.6)	9.5 (1.6)	9.7 (1.7)	9.8 (1.6)
Maternal iron intake (mg)	11.1 (2.1)	10.4 (1.9)	11.0 (2.1)	11.3 (2.1)	11.6 (2.1)
Maternal calcium intake (mg)	1087 (418)	966 (405)	1060 (408)	1144 (426)	1176 (400)
Maternal 25(OH)D concentrations, median (95% range), nmol/L	46.7 (7.0, 119.4)	14.7 (4.7, 23.6)	35.1 (24.6, 46.0)	59.0 (47.1, 73.0)	91.7 (74.5, 136.8)
Season when maternal blood sample was take, No. (%)					
- Spring	2.097 (29.5)	565 (31.8)	570 (32.2)	530 (29.8)	432 (24.4)
- Summer	1622 (22.9)	179 (10.1)	307 (17.3)	418 (23.5)	718 (40.4)
- Autumn	1702 (24.0)	434 (24.5)	428 (24.1)	454 (25.5)	386 (21.8)

- Winter	1677 (23.6)	596 (33.6)	468 (26.4)	375 (21.2)	238 (13.4)
Pregnancy complications, No. (%)					
- Gestational Hypertensive disorders	421 (5.9)	91 (5.1)	103 (5.8)	122 (6.9)	105 (5.9)
- Gestational Diabetes	67 (0.9)	22 (1.2)	22 (1.2)	11 (0.6)	12 (0.7)
Birth characteristics					
Female sex, No. (%)	3529 (49.7)	882 (49.7)	884 (49.9)	898 (50.5)	865 (48.8)
Preterm birth (<37 wk of gestation), No. (%)	370 (5.2)	114 (6.4)	103 (5.8)	88 (5.0)	65 (3.7)
Low birth weight (<2500 g), No. (%)	342 (4.8)	109 (6.1)	91 (5.1)	78 (4.4)	64 (3.6)
Small-size for gestational age at birth (<5th percentile), No. (%)	355 (5.0)	115 (6.5)	102 (5.8)	83 (4.7)	55 (3.1)
25(OH)D concentration in cord blood at birth, median (95% range), nmol/L	27.4 (4.7, 81.4)	11.2 (3.0, 52.8)	23.0 (6.0, 70.3)	32.7 (9.0, 81.0)	45.0 (14.3, 93.4)
Season when cord blood sample was taken, No. (%)	4264	1003	1066	1119	1076
- Spring	1130 (26.5)	329 (32.8)	306 (28.7)	296 (26.4)	199 (18.5)
- Summer	1164 (27.2)	376 (37.5)	327 (30.7)	271 (24.2)	187 (17.4)
- Autumn	996 (23.4)	152 (15.2)	234 (22.0)	286 (25.6)	324 (30.1)
- Winter	977 (22.9)	146 (14.5)	199 (18.6)	266 (23.8)	366 (34.0)

[1]Values are percentages for categorical variables, means (SD) for continuous variables with a normal distribution, or medians (95% range) for continuous variables with a skewed distribution.

Supplementary Table 3. Associations of maternal second trimester 25(OH)D concentrations with fetal growth patterns from multiple regression models (N = 7098)[1]

	Head circumference SDS (95% Confidence Interval)		
	2nd trimester N = 6967	**3rd trimester N = 6800**	**Birth N = 3681**
25(OH)D concentrations			
Quartile 1 (N = 1774)	-0.01 (-0.10, 0.08) N = 1734	-0.07 (-0.15, 0.02) N = 1633	**-0.14 (-0.28, -0.01)[2]** N = 919
Quartile 2 (N = 1773)	-0.05 (-0.12, 0.03) N = 1736	-0.03 (-0.10, 0.05) N = 1692	-0.07 (-0.19, 0.04) N = 940
Quartile 3 (N = 1777)	0.01 (-0.06, 0.08) N = 1750	0 (-0.07, 0.07) N = 1722	-0.03 (-0.13, 0.07) N = 983
Quartile 4 (N = 1774)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.02, 0.04)*	*0.02 (-0.01, 0.05)*	***0.05 (0.01, 0.10)[2]***
	Length SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 6988**	**3rd trimester N = 6851**	**Birth N = 4533**
Quartile 1 (N = 1774)	-0.01 (-0.10, 0.08) N = 1741	0.01 (-0.08, 0.10) N = 1674	**-0.20 (-0.33, -0.07)[2,3]** N = 1038
Quartile 2 (N = 1773)	-0.01 (-0.08, 0.07) N = 1745	0.04 (-0.04, 0.11) N = 1705	-0.09 (-0.19, 0.02) N = 1119
Quartile 3 (N = 1777)	0.01 (-0.06, 0.08) N = 1751	0.05 (-0.02, 0.12) N = 1732	-0.09 (-0.18, 0.01) N = 1164
Quartile 4 (N = 1774)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.02, 0.04)*	*-0.01 (-0.04, 0.02)*	***0.06 (0.02, 0.11)[2,3]***
	Weight SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 6952**	**3rd trimester N = 6828**	**Birth N = 7043**
Quartile 1 (N = 1774)	-0.07 (-0.15, 0.02) N = 1737	-0.04 (-0.13, 0.05) N = 1666	**-0.17 (-0.26, -0.09)[2,3]** N = 1751
Quartile 2 (N = 1773)	-0.02 (-0.09, 0.06) N = 1731	0.02 (-0.06, 0.09) N = 1701	**-0.07 (-0.14, -0.01)[2]** N = 1759
Quartile 3 (N = 1777)	-0.01 (-0.07, 0.06) N = 1742	0.07 (-0.01, 0.13) N = 1728	-0.02 (-0.09, 0.05) N = 1766
Quartile 4 (N = 1774)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.02 (-0.01, 0.06)*	*0.01 (-0.02, 0.04)*	***0.06 (0.03, 0.09)[2,3]***

[1]Values are linear regression coefficients (95% confidence interval) and reflect the differences in fetal growth compared to the reference group. Continuous analyses reflect the differences in head circumference, femur length, estimated fetal weight during second and third trimester of pregnancy and head circumference, length and weight at birth per 1 SDS increase in maternal 25(OH)D. Multivariable model is adjusted for maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, vitamin supplements, folic acid, iron, calcium, zinc and energy intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity and season when blood samples were drawn, and the presence of anorexia). [2] *P value* < 0.05. Abbreviations: SDS standard deviation scores.[3]Also significant after applying Bonferroni correction (*P value* <0.025).

Supplementary Table 4. Associations of maternal second trimester 25(OH)D concentrations in clinical cut-off groups with fetal growth patterns (N = 7098)[1]

	Head circumference SDS (95% Confidence Interval)		
	2nd trimester N = 6967	**3rd trimester N = 6800**	**Birth N = 3681**
25(OH)D concentrations			
< 25.0 nmol/L (N = 1828)	-0.02 (-0.11, 0.07)	-0.07 (-0.16, 0.02)	**-0.13 (-0.27, 0)**
25.0 to 49.9 nmol/L (N = 1893)	-0.03 (-0.11, 0.04)	-0.02 (-0.09, 0.05)	-0.08 (-0.19, 0.03)
50.0 to 74.9 nmol/L (N = 1604)	0.01 (-0.06, 0.08)	-0.01 (-0.08, 0.06)	-0.04 (-0.14, 0.07)
≥ 75.0 nmol/L (N = 1693)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.02, 0.04)*	*0.02 (-0.01, 0.05)*	***0.05 (0.01, 0.10)***[2,3]
	Length SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 6988**	**3rd trimester N = 6851**	**Birth N = 4533**
< 25.0 nmol/L (N = 1828)	-0.01 (-0.09, 0.08)	0.02 (-0.07, 0.11)	**-0.18 (-0.30, -0.05)**[2,3]
25.0 to 49.9 nmol/L (N = 1893)	-0.01 (-0.09, 0.06)	0.04 (-0.04, 0.11)	-0.08 (-0.19, 0.02)
50.0 to 74.9 nmol/L (N = 1604)	0 (-0.07, 0.07)	0.06 (-0.01, 0.12)	-0.08 (-0.18, 0.02)
≥ 75.0 nmol/L (N = 1693)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.02, 0.04)*	*-0.01 (-0.04, 0.02)*	***0.06 (0.02, 0.11)***[2,3]
	Weight SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 6952**	**3rd trimester N = 6828**	**Birth N = 7043**
< 25.0 nmol/L (N = 1828)	-0.07 (-0.16, 0.01)	-0.06 (-0.15, 0.03)	**-0.16 (-0.25, -0.08)**[2,3]
25.0 to 49.9 nmol/L (N = 1893)	-0.03 (-0.10, 0.05)	0.02 (-0.06, 0.09)	**-0.07 (-0.14, 0)**
50.0 to 74.9 nmol/L (N = 1604)	-0.01 (-0.08, 0.06)	0.05 (-0.02, 0.12)	-0.05 (-0.11, 0.02)
≥ 75.0 nmol/L (N = 1693)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.02 (-0.01, 0.06)*	*0.01 (-0.02, 0.04)*	***0.06 (0.03, 0.09)***[2,3]

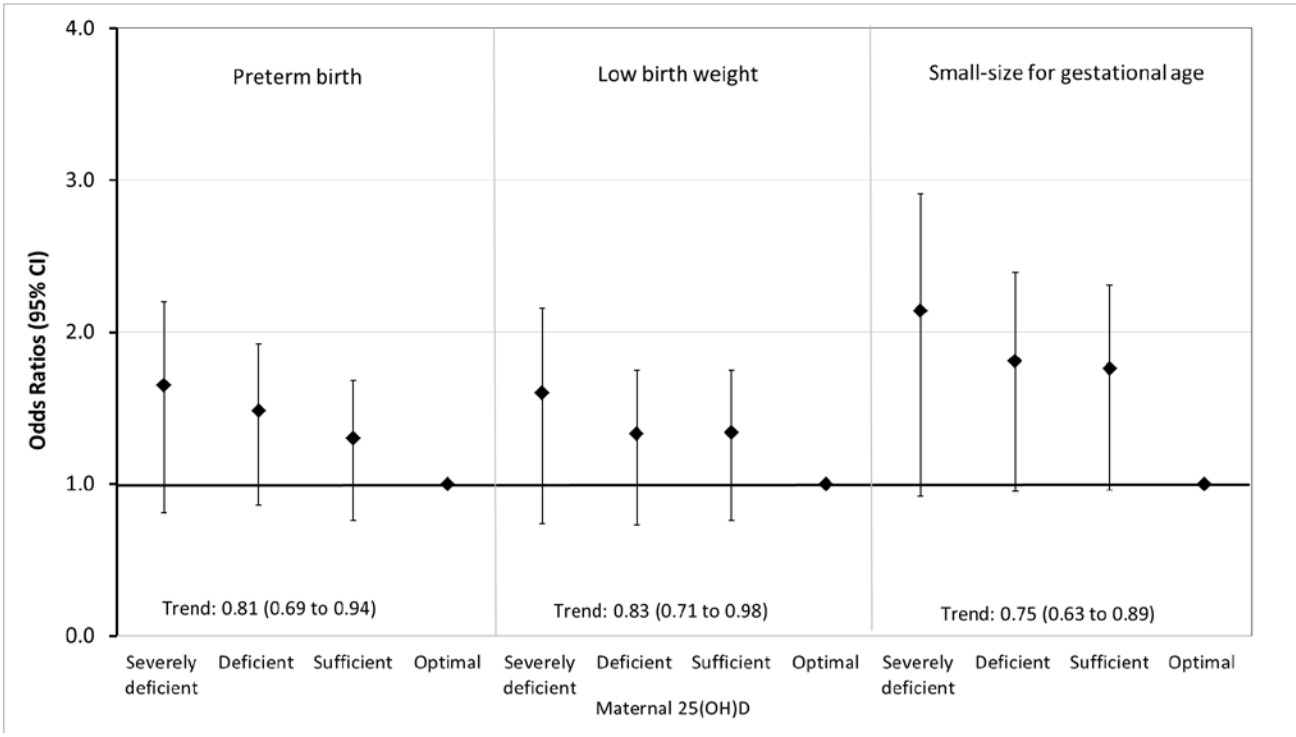
[1]Values are linear regression coefficients (95% confidence interval) and reflect the differences in fetal growth compared to the reference group. Continuous analyses reflect the differences in head circumference, femur length, estimated fetal weight during second and third trimester of pregnancy and head circumference, length and weight at birth per 1 SDS increase in maternal 25(OH)D. Multivariable model is adjusted for maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, folic acid and vitamin supplements, energy, iron, calcium and zinc dietary intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity and the presence of anorexia and season when blood samples were drawn). [2] *P value* < 0.05. Abbreviations: SDS standard deviation scores. [3]Also significant after applying Bonferroni correction (*P value* <0.025).

Supplementary Table 5. Associations of maternal second trimester 25(OH)D concentrations with fetal growth outcomes among Europeans only (N = 4069) [1]

	Head circumference SDS (95% Confidence Interval)		
	2nd trimester N = 4014	**3rd trimester N = 3929**	**Birth N = 2298**
25(OH)D concentrations			
Quartile 1 (N = 328)	-0.06 (-0.20, 0.08)	-0.01 (-0.14, 0.13)	-0.16 (-0.38, 0.06)
Quartile 2 (N = 940)	-0.01 (-0.10, 0.08)	0.01 (-0.08, 0.09)	-0.04 (-0.17, 0.09)
Quartile 3 (N = 1260)	0.02 (-0.06, 0.10)	-0.02 (-0.09, 0.06)	-0.01 (-0.12, 0.01)
Quartile 4 (N = 1543)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.03, 0.05)*	*0.01 (-0.03, 0.05)*	*0.04 (-0.01, 0.10)*
	Length SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 4017**	**3rd trimester N = 3963**	**Birth N = 2742**
Quartile 1 (N = 328)	-0.08 (-0.22, 0.05)	-0.01 (-0.15, 0.14)	-0.17 (-0.37, 0.03)
Quartile 2 (N = 940)	0.03 (-0.06, 0.11)	0.06 (-0.02, 0.15)	-0.08 (-0.21, 0.04)
Quartile 3 (N = 1260)	0.03 (-0.05, 0.10)	0.05 (-0.03, 0.13)	-0.09 (-0.19, 0.02)
Quartile 4 (N = 1543)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.03, 0.04)*	*-0.02 (-0.06, 0.02)*	***0.06 (0.01, 0.11)*** [2]
	Weight SDS (95% Confidence Interval)		
25(OH)D concentrations	**2nd trimester N = 3995**	**3rd trimester N = 3949**	**Birth N = 4047**
Quartile 1 (N = 328)	**-0.14 (-0.28, -0.01)***	-0.08 (-0.22, 0.06)	**-0.17 (-0.32, -0.03)** [2,3]
Quartile 2 (N = 940)	0.04 (-0.05, 0.13)	0.05 (-0.04, 0.14)	-0.06 (-0.14, 0.03)
Quartile 3 (N = 1260)	0.02 (-0.06, 0.10)	0.06 (-0.01, 0.14)	-0.04 (-0.11, 0.04)
Quartile 4 (N = 1543)	*Reference*	*Reference*	*Reference*
Continuously (per SD)	*0.01 (-0.03, 0.05)*	*0 (-0.04, 0.04)*	***0.05 (0.01, 0.10)*** [2,3]

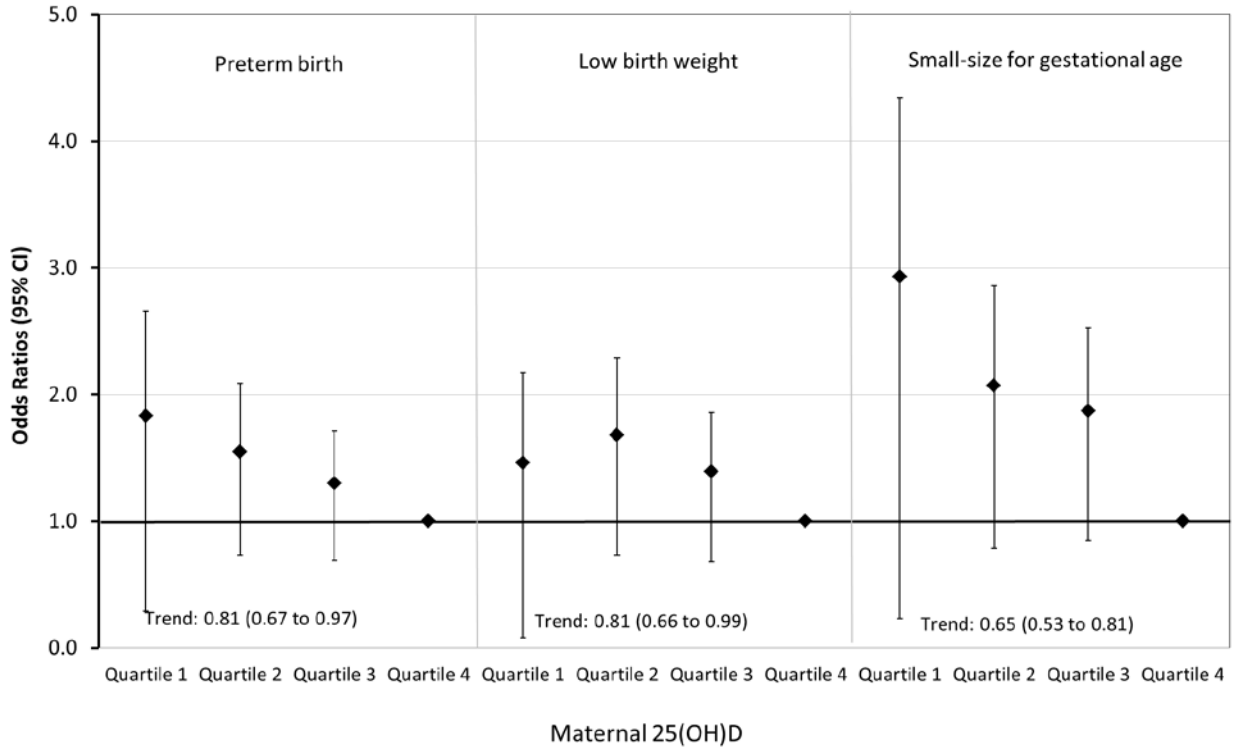
[1]Values are linear regression coefficients (95% confidence interval) and reflect the differences in fetal growth measures compared to the reference group. Continuous analyses reflect the differences in head circumference, femur length, estimated fetal weight during second and third trimester of pregnancy and head circumference, length and weight at birth per 1 SDS increase in maternal 25(OH)D. Multivariable model is adjusted for maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, folic acid and vitamin supplements, energy, iron, calcium and zinc dietary intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity and the presence of anorexia and season when blood samples were drawn. [2]*P value* < 0.05. [3]Also significant after applying Bonferroni correction (*P value* <0.025). Abbreviations: SDS standard deviation scores.

Supplementary Figure 2. Associations of maternal second trimester 25(OH)D concentrations, in cut-off groups with the risks of adverse birth outcomes (N= 7098)[1]



[1]Values are logistic regression coefficients (95% confidence interval) and reflect the risk of adverse birth outcomes compared to the reference group. Continuous analyses reflect the risks of being preterm, having a low birth weight or being small-size for gestational age at birth per 1 SDS increase in maternal 25(OH)D. Multivariable model is adjusted for maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, folic acid and vitamin supplements, energy, iron, calcium and zinc dietary intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity and the presence of anorexia and season when blood samples were drawn).

Supplementary Figure 3. Associations of maternal second trimester 25(OH) concentrations with the risks of adverse birth outcomes among Europeans only (N = 4069) [1]



[1]Values are logistic regression coefficients (95% confidence interval) and reflect the risks of adverse birth outcomes compared to the reference group. Continuous analyses reflect the risk of being preterm, having a low birth weight or being small-size for gestational age at birth per 1 SDS increase in maternal 25(OH)D. Multivariable model is adjusted for maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, folic acid and vitamin supplements, energy, iron, calcium and zinc dietary intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity, the presence of anorexia and season when blood samples were drawn).

Supplementary Table 6. Associations of adverse birth outcomes with cord blood 25(OH)D concentrations among Europeans only (N = 2550)[1]

Birth characteristics	N	Cord blood 25(OH)D nmol/L
Gestational age	**2553**	
<37.0 weeks	73	0.03 (-0.25, 0.32)
37.0-41.9 weeks	2302	Reference
≥42 weeks	178	-0.17 (-0.34, 0.01)
Trend		*-0.03 (-0.06, 0.01)*
Birth weight	**2552**	
<2000 grams	9	-0.60 (-1.46, 0.26)
2000 - 2499 g	45	0.22 (-0.12, 0.57)
2500 - 2999 g	318	-0.10 (-0.26, 0.05)
3000 - 3499 g	864	Reference
3500 - 3999 g	893	-0.02 (-0.13, 0.09)
4000 - 4499 g	354	-0.04 (-0.18, 0.10)
≥4500 grams	69	-0.09 (-0.38, 0.19)
Trend		*0.03 (-0.02, 0.09)*
Birth weight for gestational age	**2553**	
Small	79	-0.23 (-0.49, 0.04)
Normal	2,313	Reference
Large	161	-0.04 (-0.23, 0.15)
Trend		*0.03 (-0.02, 0.07)*

[1]Values are linear regression coefficients (95% confidence interval) and reflect the change in standard deviation (SDS) of cord blood 25(OH)D for each birth weight or gestational age group, compared to the reference group. Trend estimates represent the effect estimates for the continuous associations per SDS change in birth characteristic. Multivariable model is adjusted for fetal sex, maternal characteristics (age, body mass index at intake, alcohol consumption, smoking during pregnancy, folic acid and vitamin supplements, energy, iron, calcium and zinc dietary intake during pregnancy, education, ethnicity, gestational hypertensive disorders, gestational diabetes, parity and the presence of anorexia).