



Question: What is the relationship between dietary patterns and risk of congenital anomalies (neural tube defects, congenital heart defects, cleft lip/palate)?

Table 1. Summary of studies examining the relationship between dietary patterns and risk of congenital anomalies

Author, Year Study Design; Location (Cohort) Risk of Bias*	Sample Size (Cases, Controls) (Gender; Age)	Dietary Patterns** Dietary Assessment Timing	Results	Summary of Findings
Neural Tube Defects				
Carmichael, 2012 Case-Control; US (National Birth Defects Prevention Study) Risk of Bias: 2/26	N=936 cases, 6,147 controls (Child's gender=NR; Age=NR)	Mediterranean Diet Score (MDS) Diet Quality Index (DQI) Dietary patterns were assessed between 6 weeks and 24 months postpartum, and the recall period was the year before conception.	MDS score: • <i>Anencephaly</i> : Inverse association (Q1 vs. Q4), OR=0.64 (95% CI=0.45- 0.92) • <i>Spina Bifida</i> : NS DQI score: • <i>Anencephaly</i> : Inverse association (Q1 vs. Q4), OR=0.49 (95% CI=0.31- 0.75) • <i>Spina Bifida</i> : NS	Higher Mediterranean Diet Scores and Diet Quality Index scores were both associated with lower risk of having a child with anencephaly. Neither index was associated with risk of spina bifida.
Sotres-Alvarez, 2013 Case-Control; US (National Birth Defects Prevention Study) Risk of Bias: 2/26	N=1,047 cases, 6,123 controls (Child's gender=NR; Mother's age =<25y: 34%; 25- 35y: 52%; >35y: 14%)	"Prudent diet" "Mexican" "Low-calorie Western diet" Dietary patterns were assessed between 6 weeks and 24 months postpartum, and the recall period was the year before conception.	Western vs. Prudent: <i>No folic acid supplement used:</i> Positive association, OR=1.45 (95% CI=1.10-1.90) <i>Folic acid supplement used:</i> NS Low-Calorie Western vs. Prudent: <i>No folic acid supplement used:</i> Positive association, OR=1.38 (95% CI=1.05-1.83) <i>Folic acid supplement used:</i> NS Mexican vs. Prudent: <i>No folic acid supplement used:</i> Positive association, OR =1.58 (95% CI=1.15-2.19) <i>Folic acid supplement used:</i> NS	There was no difference in risk of neural tube defects between the dietary patterns among participants using folic acid supplements. Among non-users of folic acid supplements, "Calorie Western," "Western," and "Mexican" patterns were associated with higher risk for neural tube defects compared to "Prudent" dietary pattern.
Vujkovic, 2009 Case-Control; Netherlands Risk of Bias: 9/26	N=50 cases, 81 controls (Child's gender=43.5% female; Mother's age=31 y (SD=3.7))	"Mediterranean dietary pattern" identified via: • Principal components analysis (PCA) • Reduced rank regression (RRR)	PCA Mediterranean pattern (Q1 vs. Q4): Lower scores were inversely associated with spina bifida risk, OR=2.3 (95% CI=0.9-5.6) RRR Mediterranean pattern (Q1 vs. Q4): Lower scores were inversely associated with	The PCA derived pattern was not significantly associated with spina bifida, while the high adherence to the RRR derived pattern was associated with lower risk of have a child with spina bifida.



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		Dietary patterns were assessed ~14 months postpartum, and the recall period was the 3 months prior.	spina bifida risk, OR=3.5 (95% CI=1.5-8.2)	
Congenital Heart Defects				
Obermann-Borst, 2011 Case-Control; Netherlands (The HAVEN study) Risk of Bias: 7/26	N=179 cases, 231 controls (Child's gender=NR; Mother's age=~33y)	<ul style="list-style-type: none"> • "One-carbon-poor" • "One-carbon-rich" (identified using RRR) Dietary patterns were assessed ~16 months postpartum, and the recall period was the month before.	"One-carbon-poor" diet (high vs. low adherence): NS "One-carbon-rich" diet (high vs. low adherence): Inverse association, OR=0.32 (95% CI=0.18 -0.59)	The one-carbon-rich dietary pattern, characterized by the high intake of fish and seafood, is associated with a lower risk of congenital heart defects in offspring.
Sotres-Alvarez, 2013 Case-Control; US (National Birth Defects Prevention Study) Risk of Bias: 2/26	N=6,641 cases, 6,123 controls (Child's gender=NR; Mother's age=<25 y: 34%; 25-35y: 52%; >35y: 14%)	"Prudent diet" "Mexican" "Low-calorie Western diet" (identified using latent class analysis) Dietary patterns were assessed between 6 weeks and 24 months postpartum, and the recall period was the year before conception.	Western vs. Prudent: <i>Septal:</i> Positive association, OR=1.18 (95% CI=1.03-1.35) <i>Conotruncal:</i> Positive association, OR=1.22 (95% CI=1.03-1.46) Low-Calorie Western vs. Prudent: <i>Septal:</i> Positive association, OR=1.16 (95% CI=1.01-1.32) <i>Conotruncal:</i> NS Mexican vs. Prudent: <i>Septal:</i> NS <i>Conotruncal:</i> NS	Compared to the "Prudent" pattern, the "Western;" pattern was associated with higher risk of septal and Conotruncal congenital heart defects, the "Low-Calorie Western" pattern was only associated with higher risk for septal heart defects, and the "Mexican" pattern was not associated with risk for congenital heart defects.
Cleft Lip/Palate				
Carmichael, 2012 Case-Control; US (National Birth Defects Prevention Study) Risk of Bias: 2/26	N=2,475 cases (1,622 cleft lip, 853 cleft palate), 6,147 controls (Child's gender=NR; Age=NR)	Mediterranean Diet Score (MDS) Diet Quality Index (DQI) Dietary patterns were assessed between 6 weeks and 24 months postpartum, and the recall period was the year before conception.	MDS score: <i>Cleft Lip:</i> Inverse association (Q1 vs. Q4), OR=0.76 (95% CI=0.6-0.90) <i>Cleft Palate:</i> NS DQI score: <i>Cleft Lip:</i> Inverse association (Q1 vs. Q4), OR=0.66 (95% CI=0.54-0.81) <i>Cleft Palate:</i> Inverse association (Q1 vs. Q4),	Higher Mediterranean Diet Scores and Diet Quality Index scores were both associated with lower risk of having a child with cleft palate. Only the Diet Quality Index scores were associated with lower risk of having a child with cleft palate, while Mediterranean Diet Score was not associated.



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Vujkovic, 2007 Case-Control; Netherlands Risk of Bias: 5/26	N=203 cases, 178 controls (Child's gender=NR; Mother's age=~32y)	"Western" "Prudent": Identified using principal components analysis Dietary patterns were assessed ~14 months postpartum, and the recall period was the 3 months prior.	OR=0.74 (95% CI=0.56-0.96) Western: Higher scores were positively associated with cleft lip/palate risk (T1 vs. T3), OR=1.7 (95% CI=1.0-3.0) Prudent: NS	Higher adherence to the "Western" dietary pattern is associated with higher risk of cleft lip and/or palate. There was no significant association with adherence to the "Prudent" pattern.

*Risk of Bias as determined using the Nutrition Evidence Library Bias Assessment Tool

**Additional details regarding the dietary patterns, as reported by the authors, are found in the "Description of Evidence" section of the Evidence Portfolio