



United States Department of Agriculture

Dietary Patterns before and during Pregnancy and Gestational Age at Birth: A Systematic Review

The Pregnancy and Birth to 24 Months Project

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Nutrition Evidence Systematic Review
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This systematic review was conducted for the Pregnancy and Birth to 24 Months Project (P/B-24 Project) by the Nutrition Evidence Systematic Review (NESR) team at the Center for Nutrition Policy and Promotion, Food and Nutrition Service, USDA. All systematic reviews from the P/B-24 Project are available on the NESR website: <https://nesr.usda.gov>.

Conclusion statements drawn as part of this systematic review describe the state of science related to the specific question examined. Conclusion statements do not draw implications, and should not be interpreted as dietary guidance.

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This systematic review has also been published in the *American Journal of Clinical Nutrition*:

Raghavan R, Dreibelbis C, Kingshipp BL, Wong YP, Abrams B, Gernand AD, et al. Dietary patterns before and during pregnancy and birth outcomes: a systematic review. *Am J Clin Nutr.* 2019;109(7):729S–56S. doi: 10.1093/ajcn/nqy353.

Related citations are published in the *American Journal of Clinical Nutrition*:

- **P/B-24 Project overview:** Stoody EE, Spahn JM, Casavale KO. The Pregnancy and Birth to 24 Months Project: a series of systematic reviews on diet and health. *Am J Clin Nutr.* 2019;109(7):685S–97S. doi: 10.1093/ajcn/nqy372.
- **P/B-24 systematic review methodology:** Obbagy JE, Spahn JM, Wong YP, Psota TL, Spill MK, Dreibelbis C, et al. Systematic review methodology used in the Pregnancy and Birth to 24 Months Project. *Am J Clin Nutr.* 2019;109(7):698S–704S. doi: 10.1093/ajcn/nqy226
- **Related systematic reviews from the P/B-24 Project:** Raghavan R, Dreibelbis C, Kingshipp BL,

Wong YP, Abrams B, Gernand AD, et al. Dietary patterns before and during pregnancy and maternal outcomes: a systematic review. *Am J Clin Nutr.* 2019;109(7):705S–28S. doi: 10.1093/ajcn/nqy216

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INTRODUCTION

This document describes a systematic review conducted to answer the following question: What is the relationship between dietary patterns before and during pregnancy and gestational age at birth? This systematic review was conducted as part of the Pregnancy and Birth to 24 Months (P/B-24) Project by USDA's Nutrition Evidence Systematic Review (NESR).

The purpose of the P/B-24 Project was to conduct a series of systematic reviews on diet and health for women who are pregnant and for infants and toddlers from birth to 24 months of age. This project was a joint initiative led by USDA and HHS, and USDA's NESR carried out all of the systematic reviews. A Federal Expert Group (FEG), a broadly representative group of Federal researchers and program leaders, also provided input throughout the P/B-24 Project. More information about the P/B-24 Project has been publishedⁱⁱ and is available on the NESR website: <https://nesr.usda.gov/project-specific-overview-pb-24-0>.

NESR, formerly known as the Nutrition Evidence Library (NEL), specializes in conducting food- and nutrition-related systematic reviews using a rigorous, protocol-driven methodology. To conduct each P/B-24 systematic review, NESR's staff worked with a Technical Expert Collaborative (TEC), which is a group of 7–8 leading subject matter experts.

NESR's systematic review methodology involves developing and prioritizing systematic review questions, searching for and selecting studies, extracting and assessing the risk of bias of data from each included study, synthesizing the evidence, developing a conclusion statement, grading the evidence underlying the conclusion statement, and recommending future research. A detailed description of the methodology used in conducting systematic reviews for the P/B-24 Project has been publishedⁱⁱⁱ and is available on the NESR website: <https://nesr.usda.gov/pb-24-project-methodology-0>. In addition, starting on page 53, this document includes details about the methodology as it was applied to the systematic review described herein. An [analytic framework](#) that illustrates the overall scope of the question, including the population, the interventions and/or exposures, comparators, and outcomes of interest, is found on page 53. In addition, the [literature search plan](#) that was used to identify studies included in this systematic review is found on page 54.

ⁱⁱ Stoody EE, Spahn JM, Casavale KO. The Pregnancy and Birth to 24 Months Project: a series of systematic reviews on diet and health. *Am J Clin Nutr*. 2019;109(7):685S–97S. doi: 10.1093/ajcn/nqy372.

ⁱⁱⁱ Obbagy JE, Spahn JM, Wong YP, Psota TL, Spill MK, Dreibelbis C, et al. Systematic review methodology used in the Pregnancy and Birth to 24 Months Project. *Am J Clin Nutr*. 2019;109(7):698S–704S. doi: 10.1093/ajcn/nqy226.

List of abbreviations

Abbreviation	Full name
FEG	Federal Expert Group
HHS	Department of Health and Human Services
NEL	Nutrition Evidence Library
NESR	Nutrition Evidence Systematic Review
P/B-24	Pregnancy and Birth to 24 Months Project
TEC	Technical Expert Collaborative
USDA	United States Department of Agriculture

WHAT IS THE RELATIONSHIP BETWEEN DIETARY PATTERNS BEFORE AND DURING PREGNANCY AND GESTATIONAL AGE AT BIRTH?

PLAIN LANGUAGE SUMMARY

What is the question?

- The question is: What is the relationship between dietary patterns before and during pregnancy and gestational age at birth?

What is the answer to the question?

- Limited but consistent evidence suggests that certain dietary patterns during pregnancy are associated with a lower risk of preterm birth and spontaneous preterm birth. These protective dietary patterns are:
 - higher in vegetables; fruits; whole grains; nuts, legumes and seeds; and seafood (preterm birth, only), and
 - lower in red and processed meats and fried foods.
 Most of the research was conducted in healthy, Caucasian women with access to health care.
- Evidence is insufficient to estimate the association between dietary patterns before pregnancy and gestational age at birth as well as the risk of preterm birth.

Why was this question asked?

- This important public health question was identified and prioritized as part of the U.S. Department of Agriculture and Department of Health and Human Services Pregnancy and Birth to 24 Months Project.

How was this question answered?

- A team of Nutrition Evidence Systematic Review staff conducted a systematic review in collaboration with a group of experts called a Technical Expert Collaborative.

What was the population of interest?

- Women who are pregnant or able to become pregnant, ages 15-44 years.

What evidence was found?

- This review includes 11 studies published between 2005 and 2016.
- These studies assessed the relationship between dietary patterns before and during pregnancy and gestational age at birth, including premature/preterm birth and gestational age at delivery.
- Eight studies considered dietary patterns during pregnancy and preterm birth. Five of these studies found a statistically significant association. A sixth study found an association between dietary patterns during pregnancy and early preterm birth, but not preterm birth.
- Additionally, five studies considered dietary patterns during pregnancy and *spontaneous* preterm birth. Four of these studies found a statistically significant association. The fifth study showed different associations for women depending

on whether or not it was their first pregnancy.

- There is not enough evidence to estimate the association between dietary patterns during pregnancy and gestational age at birth when measured in days.
- The body of evidence is limited in several ways. For example, minority women and those of lower SES are underrepresented in this body of evidence.

How up-to-date is this review?

- This review includes literature from 01/1980 to 01/2017.

TECHNICAL ABSTRACT

Background

- Systematic reviews were conducted as part of the U.S. Department of Agriculture and Department of Health and Human Services Pregnancy and Birth to 24 Months Project.
- The goal of this systematic review was to examine the relationship between dietary patterns before and during pregnancy and gestational age at birth.

Conclusion Statements and Grades

Limited but consistent evidence suggests that certain dietary patterns during pregnancy are associated with a lower risk of preterm birth and spontaneous preterm birth. These protective dietary patterns are:

- higher in vegetables; fruits; whole grains; nuts, legumes and seeds; and seafood (preterm birth, only), and
- lower in red and processed meats and fried foods.

Most of the research was conducted in healthy, Caucasian women with access to health care.

Grade: Limited

Evidence is insufficient to estimate the association between dietary patterns before pregnancy and gestational age at birth as well as the risk of preterm birth.

Grade: Grade not assignable

Methods

- The systematic review was conducted by a team of Nutrition Evidence Systematic Review staff in collaboration with a Technical Expert Collaborative.
- Literature searches were conducted using PubMed, Embase, Cochrane, and other databases to identify studies that evaluated the relationship between dietary patterns before and during pregnancy and gestational age at birth. A manual search was conducted to identify articles that may not have been included in the electronic databases searched. Articles were screened by two authors independently for inclusion based on pre-determined criteria.
- Data from each included article were extracted, risk of bias was assessed, and both were checked for accuracy. The body of evidence was qualitatively synthesized, a conclusion statement was developed, and the strength of the evidence (grade) was assessed using pre-established criteria for internal validity/risk of bias, adequacy, consistency, impact, and generalizability.

Summary of Evidence

- This systematic review includes 10 prospective cohort studies and 1 randomized controlled trial (RCT) published between 2005 and 2016.
- The studies used multiple approaches to assess dietary patterns:
 - Four studies used indices/scores to assess dietary patterns.
 - Four studies used factor or principal component analysis (PCA).
 - One study used both indices/scores and PCA.
 - One RCT assigned subjects to one of two experimental diets.
 - One study did not use a formal method to arrive at a dietary pattern.

- Despite this variability, 5 of the 8 studies that assessed the relationship between dietary patterns during pregnancy and preterm birth found a statistically significant association. A sixth study found an association between dietary patterns during pregnancy and early preterm birth, but not preterm birth.
 - Highest adherence to a protective dietary pattern during pregnancy was associated with a preterm birth risk reduction of 9% to 90%.
 - Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in preterm birth risk of 53% to 55%.
- Additionally, 4 of the 5 studies that assessed the relationship between dietary patterns during pregnancy and spontaneous preterm birth found a statistically significant association. The fifth study showed an effect measure modification by parity.
 - Highest adherence to a protective dietary pattern during pregnancy was associated with a spontaneous preterm birth risk reduction of 15% to 45%.
 - Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in spontaneous preterm birth risk of 18% to 92%.
- There is insufficient evidence to estimate the association between dietary patterns during pregnancy and gestational age at birth when measured in days.
- Generalizability of the included studies is limited to healthy Caucasian women who have access to health care. Minority women and those of lower SES are underrepresented in this body of evidence.
- The ability to draw strong conclusions was limited by the following issues:
 - The data were primarily observational in nature, limiting the ability to determine causal effect of the dietary patterns
 - There was heterogeneity in terms of when dietary data were assessed
 - There was a lack of uniformity in outcome assessment, and some studies used less robust methods than others
 - Key confounding factors were not consistently controlled across studies
 - Only two studies were conducted in the U.S, one of which was primarily conducted in adolescent girls
 - Minority and lower SES populations were underrepresented
 - There was a lack of diversity based on BMI, parity, age at conception and smoking status

FULL REVIEW

Systematic review question

What is the relationship between dietary patterns before and during pregnancy and gestational age at birth?

Conclusion statement

Limited but consistent evidence suggests that certain dietary patterns during pregnancy are associated with a lower risk of preterm birth and spontaneous preterm birth. These protective dietary patterns are:

- higher in vegetables; fruits; whole grains; nuts, legumes and seeds; and seafood (preterm birth, only), and
- lower in red and processed meats and fried foods.

Most of the research was conducted in healthy, Caucasian women with access to health care.

Grade

Limited: This grade is assigned to the statement relevant to dietary patterns during pregnancy.

Conclusion statement

Evidence is insufficient to estimate the association between dietary patterns before pregnancy and gestational age at birth as well as the risk of preterm birth.

Grade

Not assignable: This grade is assigned to the statement relevant to dietary patterns before pregnancy.

Summary

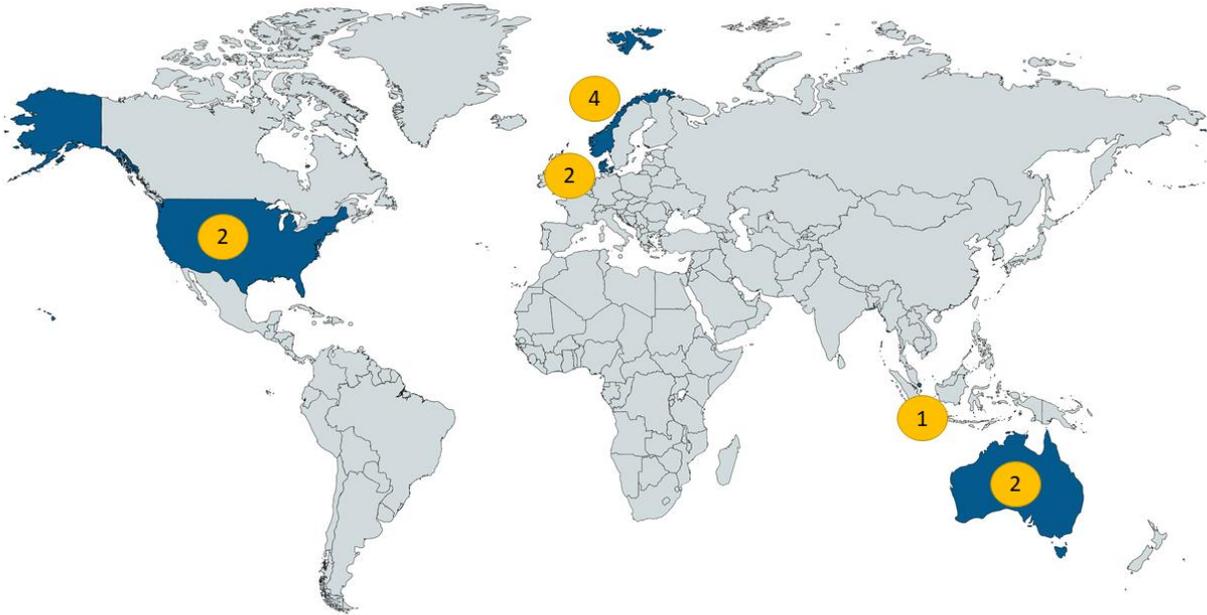
- This systematic review includes 10 prospective cohort studies and 1 randomized controlled trial (RCT) published between 2005 and 2016.
- The studies used multiple approaches to assess dietary patterns:
 - Four studies used indices/scores to assess dietary patterns.
 - Four studies used factor or principal component analysis (PCA).
 - One study used both indices/scores and PCA.
 - One RCT assigned subjects to one of two experimental diets.
 - One study did not use a formal method to arrive at a dietary pattern.
- Despite this variability, 5 of the 8 studies that assessed the relationship between dietary patterns during pregnancy and preterm birth found a statistically significant association. A sixth study found an association between dietary patterns during pregnancy and early preterm birth, but not preterm birth.
 - Highest adherence to a protective dietary pattern during pregnancy was associated with a preterm birth risk reduction of 9% to 90%.
 - Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in preterm birth risk of 53% to 55%.
- Additionally, 4 of the 5 studies that assessed the relationship between dietary patterns during pregnancy and spontaneous preterm birth found a statistically

significant association. The fifth study showed an effect measure modification by parity.

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- Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in spontaneous preterm birth risk of 18% to 92%.
- There is insufficient evidence to estimate the association between dietary patterns during pregnancy and gestational age at birth when measured in days.
- Generalizability of the included studies is limited to healthy Caucasian women who have access to health care. Minority women and those of lower SES are underrepresented in this body of evidence.

Description of the evidence

- The search included articles from very high and high Human Development Index (HDI) countries and the search timeframe spanned between January 1980 and January 2017.
- This evidence review includes 10 cohort studies and 1 RCT that examined the relationship between dietary patterns before and during pregnancy and gestational age at birth (GA) (1-11).
- The RCT is from the Cardiovascular Risk Reduction Diet in Pregnancy (CARRDIP) trial. Among 10 cohort studies, three used data from the Norwegian Mother and Child Cohort (MoBA) (3, 5, 7), and two used data from the Danish National Birth Cohort (6, 9). The remaining studies used data from different cohorts: 1) Gresham et al. used the Australian Longitudinal Study on Women's Health cohort; 2) Chia et al. used the Growing Up in Singapore Towards healthy Outcomes (GUSTO) study; 3) Martin et al. used the Pregnancy, Infection and Nutrition (PIN) study; 4) Xie et al. used the National Longitudinal Study of Adolescent Health (Add Health); and 5) Grieger et al. used an unnamed cohort in Lyell McEwin Hospital, Adelaide, Australia. Only one of these studies was conducted in a cohort that was specifically designed to assess the relationship between maternal diet and preterm birth (8).
- Two of the 11 studies were conducted in the U.S. (8, 10). In addition, two studies were conducted in Australia (1, 4) and one in Singapore (2). The rest were conducted in Europe: four in Norway (3, 5, 7, 11) and two in Denmark (6, 9). See the map below.



Subject characteristics:

- **Sample size** of the studies ranged from 290 subjects (11) to 72,072 subjects (7). The median sample size was 3,143.
- **Age:** Most of the studies included women between 20 and 40 years of age. An exception is the Add Health cohort, which included only adolescent participants (10). While two studies reported that ~12% of the participants were 35 years or older (7, 8), it is unclear how many of these participants were over 40 years.
- **Pregnancy characteristics:** Almost all of the studies included singleton pregnancies, only.
- **Health Characteristics:**
 - Three studies excluded women with a history of greater than 3 abortions (5, 6, 11).
 - Englund-Ogge et al. reported that 4% of women had a history of preterm deliveries.
 - A few studies reported study subject's comorbidities.
 - Hillesund reported a prevalence of 2% for diabetes mellitus and 1% for chronic hypertension.
 - Chia et al. excluded women with type 1 diabetes, Englund-Ogge et al. excluded women with type 2 diabetes and Mikkelsen et al. excluded women with chronic hypertension. Khoury et al. excluded women with high risk pregnancies caused by diabetes mellitus, endocrine disease, chronic hypertension, drug abuse, history of thromboembolic disease or significant gastrointestinal, cardiac, pulmonary, or hematologic disease. Women with complications during previous pregnancy, including neonatal death, still birth, preterm delivery were excluded. Women who experienced ongoing hyperemesis gravidarum or bleeding after gestational week 12 in the current pregnancy were not included.

- **Smoking** during pregnancy varied across studies.
 - Daily or occasional smoking was reported to be in the range of ~3% (2) to 32% (4).
 - Three studies excluded smokers (5, 6, 11)
 - Pre-pregnancy smoking status (7-13 y prior to becoming pregnant) was reported to be 25% in one study (1).
- **Race/ethnicity:** About half of the studies (n=6) did not report participants' race/ethnicity. Grieger et al. and Khoury et al. respectively reported that 89% and 100% of their study subjects were Caucasian. Categorized another way, Xie et al. and Martin et al. reported that 69% and 72% of the study subjects were non-Blacks, respectively. The GUSTO study participants (based in Singapore) were Chinese, Malayan or Indian. The authors present race/ethnicity by dietary pattern and do not specify the overall percentage of each race/ethnicity.
- **Parity:** There is heterogeneity in terms of study participants' parity. For example, in some studies, most of the subjects were nulliparous (90% in the ALSWH (1) and 100% in Add Health Cohort (10)). Other studies (n=5) reported that 50-70% of women were nulliparous (3, 7-9, 11).
- **Pre-pregnancy BMI:** Pre-pregnancy BMI ranged from 23.3 kg/m² (6) to 27.6 kg/m² (4). It should be noted that Khoury et al. and Mikkelsen et al. excluded subjects with a BMI either <19 or >32. While Grieger et al. reported on maternal BMI, it is unclear if it was measured pre-pregnancy. Xie et al. reported that pre-pregnancy BMI in adolescents was 22.2 kg/m². Martin et al. noted that the factor and DASH adherence scores were significantly different by pre-pregnancy BMI within each dietary pattern.
- **Maternal education:** Among studies that reported maternal education, participants with more than a high school education ranged from 33% (1) to 82% (11).
- **Socioeconomic status (SES):** Below is a summary of studies that reported SES. Data are presented as they were reported in each study, with some differences across studies.
 - Martin et al. reported that 41% of the study participants were 185% below federal poverty level, 20% between 185-350% and 39% above 350%.
 - Englund-Ogge et al. noted that 28% of participants reported both partners earning <\$48,406, 41% reported either participant or partner earning >\$48,406 and 28% reported both partners earning >\$48,406.
 - Grieger et al. reported that 82% of their participants were in the lowest 2/5th SES strata.
 - Rasmussen et al. mentioned that about half (51%) of the participants had medium level of proficiency or were unskilled.
 - Xie et al. study participants were adolescents, so they reported parental education status as a proxy for SES, with 79% of parents having at least a high school education.

Interventions/Exposures:

Dietary patterns were assessed using 1) index/score analysis; 2) factor and principal components analysis (PCA); 3) both methods; 4) experimental diet; and 5) another

unspecified method. A description of the studies included by each method used to measure dietary patterns is included below.

- **Index/score analysis (Table 1. Indices and scores used to assess the relationship between dietary patterns before and during pregnancy and gestational age):** Five studies included in this review used one or more of the following indices/scores:
 - Australian Recommended Food Score (1)
 - Mediterranean diet (5, 6)
 - New Nordic Diet score (7)
 - DASH adherence score (8)

Table 1. Indices and scores used to assess the relationship between dietary patterns before and during pregnancy and gestational age

Index/Score (Reference)	Australian Recommended Food Score (min-max score) ¹	Mediterranean Diet Index ^{2,3}	New Nordic Diet Score ^{4,5}	DASH Diet ⁶
Article	Gresham et al., 2016	Haugen et al., 2008; Mikkelsen et al., 2008	Hillesund et al., 2014	Martin et al., 2015
Component	Total score: 0-72	Total score: 0-5	Total score: 0-10	Total score: 8-40
Vegetables	Vegetables (0-22)	Vegetables and fruits (≥5 servings/day)	Root Vegetables ≥Median = 1; <Median = 0	Vegetables (1-5)
			Cabbages ≥Median = 1; <Median = 0	
			Potatoes relative to rice and pasta combined ≥Median = 1; <Median = 0	
Fruit and/or nuts	Fruits (0-14)	<i>Included with vegetables</i>	Nordic fruits ≥Median = 1; <Median = 0	Fruits (1-5)
			Native berries (includes "foods from wild countryside")	<i>Included nuts along with legumes</i>

¹ Collins, C. E., Young, A. F., & Hodge, A. (2008). Diet quality is associated with higher nutrient intake and self-rated health in mid-aged women. *J Am Coll Nutr*, 27(1), 146-157.

² Willett, W. C., Sacks, F., Trichopoulou, A., Drescher, G., Ferro-Luzzi, A., Helsing, E., & Trichopoulos, D. (1995). Mediterranean diet pyramid: a cultural model for healthy eating. *Am J Clin Nutr*, 61(6 Suppl), 1402s-1406s.

³ Khoury, J., Henriksen, T., Christophersen, B., & Tonstad, S. (2005). Effect of a cholesterol-lowering diet on maternal, cord, and neonatal lipids, and pregnancy outcome: a randomized clinical trial. *Am J Obstet Gynecol*, 193(4), 1292-1301. doi:10.1016/j.ajog.2005.05.016

⁴ Hillesund, E. R., Bere, E., Haugen, M., & Overby, N. C. (2014). Development of a New Nordic Diet score and its association with gestational weight gain and fetal growth - a study performed in the Norwegian Mother and Child Cohort Study (MoBa). *Public Health Nutr*, 17(9), 1909-1918. doi:10.1017/s1368980014000421

⁵ Includes meal frequency which is not included as a component in this table

⁶ Fung, T. T., Chiuve, S. E., McCullough, M. L., Rexrode, K. M., Logroscino, G., & Hu, F. B. (2008). Adherence to a DASH-style diet and risk of coronary heart disease and stroke in women. *Arch Intern Med*, 168(7), 713-720. doi:10.1001/archinte.168.7.713

Index/Score (Reference)	Australian Recommended Food Score (min-max score) ¹	Mediterranean Diet Index ^{2,3}	New Nordic Diet Score ^{4,5}	DASH Diet ⁶
Cereals/ Grains and whole grains	Grains (0-14)		Whole grain bread ≥Median = 1; <Median = 0	Whole grains (1-5)
			Oatmeal porridge ≥Median = 1; <Median = 0	
Legumes	<i>Included under fish and other protein foods</i>			Nuts and legumes (1-5)
Meat	<i>Included as part of protein</i>	Meat (≤2 servings/wk)		Red and processed meats (5-1) (reverse scored)
Fish and other protein foods	Fish (0-2)	Fish (≥2 servings/wk)	Foods from wild countryside (wild fish, seafood, game) <i>Also includes native berries, captured as part of fruits</i> ≥Median = 1; <Median = 0	
	Meat (0-5)			
	Nuts/bean/soya (0-6)			
	Eggs (0-1)			
Dairy	Dairy (0-7)		Milk ≥Median = 1; <Median = 0	Low fat dairy (1-5)
Fat	Fat (0-1)	Olive oil or rapeseed oil		
Sodium				Sodium (5-1) (reverse scored)

Index/Score (Reference)	Australian Recommended Food Score (min-max score) ¹	Mediterranean Diet Index ^{2,3}	New Nordic Diet Score ^{4,5}	DASH Diet ⁶
Sweetened beverage intake				Sweetened beverage intake (5-1) (reverse scored)
Water			Water consumption relative to sweetened beverages ≥Median = 1; <Median = 0	
Alcohol	<i>Excluded alcohol</i>			
Caffeine		Coffee (≤2 cups/day)		

- **Factor analysis and principal component analysis (Table 2. Summary of dietary patterns identified using factor or principal component analysis):** Five studies included in this review assessed dietary patterns using factor or PCA (2-4, 8, 9).
- **Experimental diet:** One study included in this review assigned participants to one of two experimental diets (11):
 - Intervention diet:
 - Dietitians encouraged the intake of fatty fish, vegetable oils, especially olive oil and rapeseed oil, nuts, nut butters, margarine based on olive- or rapeseed oil, and avocado to replace meat, butter, cream, and fatty dairy products; the consumption of fresh fruits and vegetables was advised (at least 6 a day); intake of dairy products in the form of skimmed or low-fat products (skimmed milk, fat-reduced cheese, and yogurt) in place of full fat products was encouraged; subjects were advised to choose meat for a main meal twice a week and use legumes, vegetable main dishes, fatty fish, or poultry with the fat trimmed off on the other days; coffee was limited to 2 cups of filtered coffee a day
 - Included significantly more fish and fish products; fatty fish and fish products; rapeseed-based margarine; oils; olive oil; rapeseed oil; nuts, olives, and seeds; vegetables; and fruits when compared to the control diet⁷

⁷ Khoury, J., Henriksen, T., Seljeflot, I., Mørkrid, L., Frøslie, K. F., & Tonstad, S. (2007). Effects of an antiatherogenic diet during pregnancy on markers of maternal and fetal endothelial activation and

- Control diet:
 - Subjects were asked to consume their usual diet based on Norwegian foodstuffs, and not to introduce more oils or low-fat meat and dairy products than usual
 - Included significantly more fatty milk, meat and meat products, fatty minced meat, butter, and hard margarines when compared to the intervention diet⁶
- **Other method:** One study created dietary patterns by grouping foods into categories defined “on the basis of theoretical expectations” by Dube et al.⁸ and later used by Jeffery et al.⁹ and Agurs-Collins et al.¹⁰ (10). The following three categories were created:
 - High-calorie sweet pattern: includes foods such as doughnuts, ice cream, chocolate candy, regular candy, and cookies
 - High-calorie nonsweet pattern: includes steak, fried chicken, fried fish, pizza, hot dogs, sausage, cheese, whole milk, etc.
 - Low-calorie pattern: includes foods such as low-fat and skim milk, grilled chicken, grilled fish, apples, and breakfast cereal

Time point of exposure (Table 3. Time point of exposure assessment):

- Most of the studies collected dietary data during second trimester. The following were the exceptions:
 - Grieger et al. collected data at 13 weeks, but the recall period was 12 months prior to conception.
 - Gresham et al. and Xie et al. did not specify a particular time period when the diet was assessed (which could have ranged from before to during pregnancy).
- Recall periods were heterogeneous across studies.
- Some studies asked women to report on their dietary intake from the start of pregnancy until the time data were collected in second trimester (5, 7).
- In other studies, recall period varied from a few days (2, 10) to a few weeks (6, 9) to a few months (8).

Outcomes:

Studies assessed several outcomes related to gestational age at birth, including premature/preterm birth (sometimes stratified by early/moderate/late and spontaneous/induced) and gestational age at delivery. Table 4. Summary of outcome definitions, summarizes the outcomes and diagnostic criteria grouped by methodology used to create dietary patterns.

inflammation: the CARRDIP study. *BJOG*, 114(3), 279-288. doi:10.1111/j.1471-0528.2006.01187.x

⁸ Dube, L., LeBel, J. L., & Lu, J. (2005). Affect asymmetry and comfort food consumption. *Physiol Behav*, 86(4), 559-567. doi:10.1016/j.physbeh.2005.08.023

⁹ Jeffery, R. W., Linde, J. A., Simon, G. E., Ludman, E. J., Rohde, P., Ichikawa, L. E., & Finch, E. A. (2009). Reported food choices in older women in relation to body mass index and depressive symptoms. *Appetite*, 52(1), 238-240. doi:10.1016/j.appet.2008.08.008

¹⁰ Agurs-Collins, T., & Fuemmeler, B. F. (2011). Dopamine polymorphisms and depressive symptoms predict foods intake. Results from a nationally representative sample. *Appetite*, 57(2), 339-348. doi:10.1016/j.appet.2011.05.325

Table 2. Summary of dietary patterns identified using factor or principal component analysis

Study	Dietary Patterns
Chia, 2016	<p>Vegetable, fruit, and white rice pattern: positive loadings for vegetables, fruits, plain white rice, whole-grain bread, fish, and nuts and seeds and negative loadings for fried potatoes, burgers, carbonated and sweetened drinks, and flavored rice</p> <p>Seafood and noodle pattern: positive loadings for soup, seafood, fish and seafood products, noodles (flavored and in soup), and low-fat red meat and negative loadings for legumes, ethnic bread, white rice, and curry-based gravies</p> <p>Pasta, cheese, and processed meat pattern: positive loadings for pasta-, tomato-, and cream-based gravies, cheese, and processed meat</p>
Englund-Ögge, 2014	<p>Prudent pattern: positive factor loadings for raw and cooked vegetables, salad, onion/leek/garlic, fruit and berries, nuts, vegetable oils, water as beverage, whole grain cereals, poultry, and fibre rich bread; negative factor loadings for processed meat products (hot dogs, hamburgers, and so on), white bread, and pizza/tacos</p> <p>Western pattern: positive factor loadings for salty snacks, chocolate and sweets, cakes, French fries, white bread, ketchup, sugar sweetened drinks, processed meat products, and pasta; negative factor loadings for lean fish and fibre rich bread</p> <p>Traditional pattern: positive factor loadings for boiled potatoes, fish products, gravy, lean fish, margarine, rice pudding, low fat milk, and cooked vegetables; negative factor loadings for poultry and pizza/tacos</p>
Grieger, 2014	<p>High-protein/fruit: positive factor loadings for fish, meat, chicken, fruit, whole grains</p> <p>High-fat/sugar/takeaway: positive loadings for takeaway foods, potato chips, refined grains, added sugar</p> <p>Vegetarian-type: characterized by vegetables, whole grains, legumes</p>

Study	Dietary Patterns
Martin, 2015	<p>Factor 1: high positive loadings for fruits, tomatoes, broccoli, spinach, carrots, green salads, sweet potatoes, low-fat milk, yogurt, high-fiber and highly fortified cereals, nonfried chicken and fish, and wheat bread</p> <p>Factor 2: high positive loadings for beans, corn, French fries, hamburgers or cheeseburgers, white potatoes, fried chicken, spaghetti dishes, cheese dishes such as macaroni and cheese, cornbread or hushpuppies, processed meats, biscuits, and ice cream</p> <p>Factor 3: high positive loadings for collard greens, coleslaw or cabbage, red meats, fried chicken and fish, processed meats, cornbread or hushpuppies, eggs or egg biscuits, gravy, whole milk, and vitamin C–rich drinks such as Kool-Aid and Hi-C</p> <p>Factor 4: high positive loadings for of shellfish, pizza, salty snacks, candies, pancakes, tacos or burritos, and cakes and cookies</p>
Rasmussen, 2014	<p>Alcohol pattern: high positive loadings for soya, root, wine, liquor, and beer</p> <p>Vegetable/Prudent pattern: high positive loadings for cabbage, onion, mushroom, corn, salad, tomato, vegetables other, and legumes</p> <p>Western pattern: high positive loadings for potatoes, French fries, bread white, pork, beef veal, meat mixed, meat cold, and dressing sauce</p> <p>Seafood pattern: high positive loadings for fish</p> <p>Nordic pattern: high positive loadings for bread dark, fruit Nordic, and hard cheese</p> <p>Sweets pattern: high positive loadings for bread white, margarine, snack, sugar cakes, sweet spread, candy, dessert dairy, and chocolate</p> <p>Rice/Pasta/Poultry pattern: high positive loadings for rice, pasta, and poultry</p>

Table 3. Time point of exposure assessment

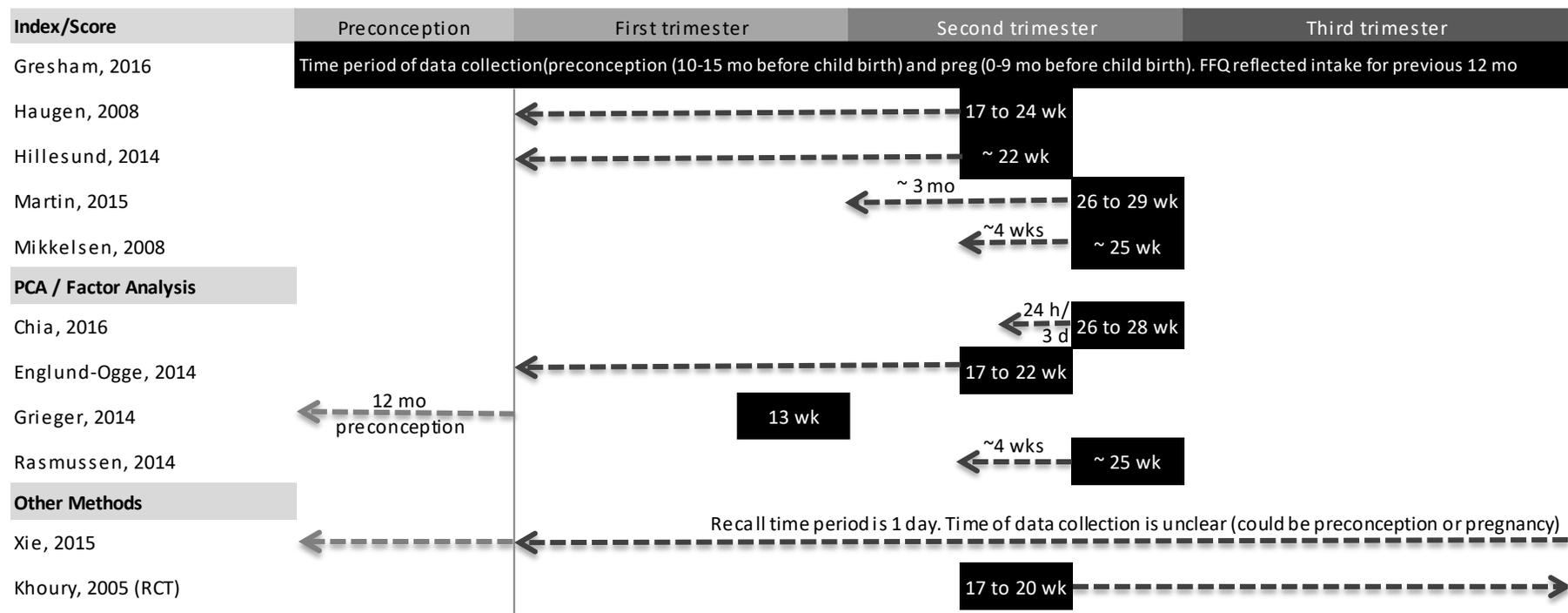


Table 4. Summary of outcome definitions

Study	Outcome	Diagnostic Criteria	Source of Criteria	Method of Assessment	References	Additional Outcomes Measured
Index/Score						
Gresham, 2016	Premature birth	No cutoff specified	NR	Self-reported answer to "Did you experience a premature birth?"	N/A	Gestational hypertension GDM Low birth weight
Haugen, 2008	Preterm birth Late preterm birth Early preterm birth	<u>Preterm birth</u> : >21 and < 37 weeks gestation <u>Late preterm birth</u> : 35-36 weeks gestation <u>Early preterm birth</u> : <35 weeks <u>Note</u> : Elective deliveries were considered a censoring event	NR	Data obtained from the Norwegian Medical Registry	N/A	N/A

Study	Outcome	Diagnostic Criteria	Source of Criteria	Method of Assessment	References	Additional Outcomes Measured
Hillesund, 2014	Preterm delivery Spontaneous preterm delivery (primary outcome)	<u>Preterm delivery</u> : 22 to 37 weeks gestation	NR	Data obtained from the Medical Birth Registry of Norway (Length of gestation estimated from ultrasound examination, supplemented with last menstrual period (LMP), along with information on type of delivery)	N/A	Preeclampsia Early preeclampsia
Martin, 2015	Preterm birth (Spontaneous; Medically indicated)	<u>Preterm birth</u> : <37 weeks gestation <u>Spontaneous preterm birth</u> : preceded by either preterm labor or premature rupture of the membranes resulting in delivery <u>Medically indicated preterm birth</u> : induction of labor or cesarean delivery without labor	NR	Combination of last menstrual period and ultrasound data (when both measures were available and there was agreement within 14 d, LMP was used to assign gestational age; otherwise, ultrasound data were used)	N/A	N/A

Study	Outcome	Diagnostic Criteria	Source of Criteria	Method of Assessment	References	Additional Outcomes Measured
Mikkelsen, 2008	Preterm delivery Early preterm delivery Late preterm delivery	<u>Preterm delivery</u> : >22 to <37 weeks gestation <u>Early preterm delivery</u> : <35 weeks gestation <u>Late preterm delivery</u> : 35-36 weeks gestation <u>Note</u> : Hazard rate of spontaneous delivery was modelled with Cox regression; elective deliveries were considered a censoring event	NR	Assessed ~8-12 weeks gestation using last menstrual period as reported on recruitment form and first interview	N/A	N/A
PCA/Factor Analysis						
Chia, 2016	Preterm birth (Spontaneous; Induced)	<u>Preterm birth</u> : <37 weeks gestation	NR	Dating ultrasound scan	N/A	Birth weight Birth length Body circumferences Body fat percentage

Study	Outcome	Diagnostic Criteria	Source of Criteria	Method of Assessment	References	Additional Outcomes Measured
Englund-Ogge, 2014	Preterm delivery (Spontaneous; Iatrogenic) Late preterm Moderate preterm Early preterm	<u>Preterm delivery</u> : 22 to <37 weeks gestation <u>Late preterm</u> : 34 to <37 weeks gestation <u>Moderately preterm</u> : 32 to <34 weeks gestation <u>Early preterm</u> : 22 to <37 weeks gestation	NR	Based on ultrasound measurements at 17-18wk, or if missing, then calculated from LMP	N/A	N/A
Grieger, 2014	Preterm birth	<u>Preterm birth</u> : <37 weeks gestation	NR	Determined by the date of the LMP and confirmed by ultrasound at 18 wk	N/A	Birth weight Birth length Head circumference
Martin, 2015	See above					
Rasmussen, 2014	Preterm birth (Spontaneous; Induced)	Gestational age <259 days (<37 weeks)	NR	Based on last menstrual period unless cycles were irregular, in which case expected delivery date (based on ultrasound data) was used	N/A	N/A

Evidence synthesis

With 10 prospective cohort studies and 1 RCT, there is a modest body of evidence available to examine the relationship between dietary patterns before and during pregnancy and gestational age. Table 5. Results grouped by methodology used for dietary pattern assessment, provides more information on the findings of each of these studies. There is substantial heterogeneity in the methodology employed to define and assess dietary patterns and how outcomes were reported, which makes it difficult to compare across studies. Also, the time period of dietary assessment was variable. Despite these differences, there is modest evidence of an association between dietary patterns before and during pregnancy and gestational age.

Dietary patterns assessed via index/score

Five studies used indices/scores to assess dietary patterns. Two of these studies found a significant association between adherence to a healthy dietary pattern and reduced risk of preterm birth (7, 8) and an additional study reported risk reduction of early preterm birth, only (6).

- Gresham et al. examined adherence to the Australian Recommended Food Score before and during pregnancy and its association with premature birth. Components included vegetables, fruit, grain, protein (nuts/bean/soya, meat, fish, eggs), dairy, and fat. The exposure was self-reported and captured dietary intake during the previous 12 months. The time point of data collection ranged from before pregnancy to the end of the third trimester of pregnancy. Similar to the exposure, the outcome was also self-reported. The study found no significant difference in the odds of premature birth based on adherence to the ARFS.
- Haugen et al. assessed the relationship between adherence to a Mediterranean diet (characterized by high intake of vegetables, fruits, fish, olive/canola/rapeseed and low intake of red meat and coffee) during pregnancy and risk of preterm birth (>21 to <37 weeks). Adherence to a Mediterranean diet during pregnancy was not associated with the risk of preterm birth. However, fish intake (≥ 2 times/week) was associated with reduced risk of preterm birth and late preterm birth (35-<37 weeks) after adjusting for remaining Mediterranean diet criteria and other covariates.
- Hillesund et al. assessed adherence to the New Nordic Diet, which measured the frequency of eating the following foods: Nordic fruits (apples, pears, plums, strawberries), root vegetables (carrots, rutabaga and various types of onions), cabbages (kale, cauliflower, broccoli and Brussels sprouts), potatoes, whole grain breads, oat meal porridge, foods from the wild countryside (wild fish, seafood, game and wild berries), milk and water (7). Higher adherence to the New Nordic Diet was associated with reduced risk of preterm delivery (between 22 and 37 weeks). While there was no association with spontaneous preterm delivery in the whole sample, there was effect measure modification by parity. Greater adherence to a New Nordic Diet was associated with a lower risk of spontaneous preterm delivery among nulliparous women. However, greater adherence to the same diet was associated with an increased risk of spontaneous preterm deliveries among multiparous women.
- Martin et al. examined the relationship between adherence to the DASH diet during pregnancy and risk of preterm birth. Greater adherence to a DASH diet

was associated with reduced odds of preterm birth including spontaneous preterm birth. Martin et al. also examined the relationship between four different dietary patterns and preterm birth (discussed in the next section).

- Mikkelsen et al. assessed adherence to a Mediterranean diet and risk of preterm birth. The Mediterranean diet was characterized by higher intake of fruits and vegetables, fish, and olive or rapeseed oil and lower intake of meat and coffee. Compared to women with lower adherence to a Mediterranean diet, women with higher adherence were at reduced risk of early preterm deliveries. However, the odds of preterm delivery and the mean difference in gestational age did not vary significantly based on adherence to a Mediterranean diet.

Dietary patterns assessed via factor or principal component analysis

Five studies used diet-driven methods (i.e., principal component analysis or exploratory factor analysis) to develop a variety of dietary patterns and assessed preterm delivery in that context. A summary of findings across studies is presented below.

- Chia et al. showed that greater adherence to a ‘vegetable, fruit and white rice’ dietary pattern (characterized by higher intakes of vegetables, fruits, plain white rice, whole-grain bread, fish, and nuts and seeds and lower intakes of fried potatoes, burgers, carbonated and sweetened drinks, and flavored rice) was associated with a lower risk of preterm birth and spontaneous preterm birth. Chia et al. also assessed other dietary patterns (‘seafood and noodle’ and ‘pasta, cheese and processed meat’), which were not associated with preterm and spontaneous preterm birth. There was no association between any of the dietary patterns and induced preterm birth.
- Englund-Ogge et al. generated three different dietary patterns (listed below) and assessed their association with six health outcomes: 1) preterm; 2) spontaneous preterm; 3) iatrogenic preterm; 4) late preterm; 5) moderately preterm; and 6) early preterm.
 - A prudent pattern was characterized by high positive factor loadings for raw and cooked vegetables, salad, onion/leek/garlic, fruit and berries, nuts, vegetables oils, water as beverage, whole grain cereals, poultry, and fibre rich bread; and negative factor loadings for processed meat products (hot dogs, hamburgers, and so on), white bread, and pizza/tacos
 - A Western pattern was characterized by positive factor loadings for salty snacks, chocolate and sweets, cakes, French fries, white bread, ketchup, sugar sweetened drinks, processed meat products, and pasta; and negative factor loadings for lean fish and fibre rich bread
 - A traditional pattern was characterized by positive factor loadings for boiled potatoes, fish products, gravy, lean fish, margarine, rice pudding, low fat milk, and cooked vegetables; and negative factor scores for poultry and pizza/tacos

Greater adherence to a prudent dietary pattern was associated with a lower risk of preterm, spontaneous preterm and late preterm birth, but there was no association with other outcomes. Similarly, greater adherence to a traditional dietary pattern was associated with a reduction in the risk of preterm, iatrogenic preterm and late preterm birth, but no association was observed with other outcomes. The Western dietary pattern was not associated with any outcomes.

- Grieger et al. collected data that reflected dietary patterns before pregnancy. Three dietary patterns were generated: 1) high protein/fruit, characterized by a diet rich in fish, meat, chicken, fruit and whole grains; 2) high fat, sugar/takeaway, characterized by takeaway foods, potato chips, refined grains, added sugar; and 3) vegetarian type, characterized by a diet rich in vegetables, whole grains, legumes. Greater adherence to a high protein/fruit pattern was negatively associated with preterm birth; greater adherence to a high fat, sugar/takeaway diet was positively associated with the risk of preterm birth. There was no association with the vegetarian type diet and preterm risk.
- Martin et al. generated four dietary patterns:
 - Factor 1: Higher amounts of fruits, tomatoes, broccoli, spinach, carrots, green salads, sweet potatoes, low-fat milk, yogurt, high fiber and highly fortified cereals, nonfried chicken and fish, and wheat bread
 - Factor 2: Higher amounts of beans, corn, French fries, hamburgers or cheeseburgers, white potatoes, fried chicken, spaghetti dishes, cheese dishes such as macaroni and cheese, cornbread or hushpuppies, processed meats, biscuits, and ice cream
 - Factor 3: Higher amounts of collard greens, coleslaw or cabbage, red meats, fried chicken and fish, processed meats, cornbread or hushpuppies, eggs or egg biscuits, gravy, whole milk, and vitamin C-rich drinks such as Kool-Aid and Hi-C
 - Factor 4: Higher amounts of shellfish, pizza, salty snacks, candies, pancakes, tacos or burritos, and cakes and cookies

Greater adherence to factor 2 and factor 3 dietary patterns was associated with an increased risk of preterm birth and spontaneous preterm birth. Factors 1 and 4 were not associated with these outcomes.

- Rasmussen et al. identified seven different dietary patterns:
 - Alcohol pattern with high intakes of soya, root, wine, liquor, and beer
 - Vegetable/Prudent pattern characterized by high intakes of cabbage, onion, mushroom, corn, salad, tomato, vegetables other, and legumes
 - Western pattern characterized by high intakes of potatoes, French fries, bread white, pork, beef veal, meat mixed, meat cold, and dressing sauce
 - Seafood pattern characterized by high intakes of fish
 - Nordic pattern characterized by high intakes of bread dark, fruit Nordic, and hard cheese
 - Sweets pattern characterized by high intakes of bread white, margarine, snack, sugar cakes, sweet spread, candy, dessert dairy, and chocolate
 - Rice/Pasta/Poultry pattern characterized by high intakes of rice, pasta, and poultry

Greater adherence to a Western dietary pattern was positively associated with the risk of spontaneous and induced preterm birth. A non-linear relationship was observed between seafood dietary pattern and induced preterm birth, with a protective effect being observed or women in the quintile 4 intake category, only (no associations were found for quintile 5). In this study, other dietary patterns were not associated with the preterm outcomes.

Dietary patterns assessed in the RCT

Khoury et al. randomly assigned participants to an intervention diet characterized by higher amounts of fruits and vegetables, fatty fish, vegetable oils, nuts and low-fat

dairy. Participants were asked to restrict meat and replace it with avocado, as well as to limit coffee consumption to 2 cups/day. Subjects who were assigned to the control group were asked to consume their usual diet based on Norwegian foodstuffs and to not introduce more oils or low-fat meat and dairy products than usual (11). The study reported a significant difference in the mean gestational age between the intervention and control groups. Further, the odds of preterm delivery were also lower in those who were assigned to the intervention diet.

Dietary patterns assessed through other methods

Xie et al. generated the following dietary patterns: 1) High-calorie sweet pattern characterized by foods such as doughnuts, ice cream, chocolate candy, regular candy, and cookies; 2) High-calorie nonsweet pattern characterized by steak, fried chicken, fried fish, pizza, hot dogs, sausage, cheese, whole milk, etc.; and 3) Low-calorie pattern characterized by foods such as low-fat and skim milk, grilled chicken, grilled fish, apples, and breakfast cereal. The questionnaire was not validated and the outcome was self-reported. In this adolescent-only cohort, there was no significant difference in preterm birth based on adherence to different dietary patterns.

Table 5. Results grouped by methodology used for dietary pattern assessment

Key for color-coding:
<i>Dietary pattern categorized as beneficial when...</i> Greater adherence improves gestational age outcomes Lower adherence is detrimental for gestational age outcomes
<i>Dietary pattern categorized as detrimental when...</i> Greater adherence is detrimental for gestational age outcomes Lower adherence improves gestational age outcomes

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
Index/Score				
Before pregnancy/ Before and During Pregnancy				

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
Gresham, 2016 Australia N = 1,897	Australian Recommended Food Score (ARFS) Based on consistency with Dietary Guidelines for Australian Adults and core foods within Australian Guide to Healthy Eating	Premature (OR) Q1=REF		Q2: 0.7 (95% CI: 0.3, 1.4) Q3: 1.1 (95% CI: 0.6, 2.0) Q4: 0.8 (95% CI: 0.4, 1.6) Q5: 0.5 (95% CI: 0.2, 1.1)
Pregnancy				
Haugen, 2008 Norway N = 26,563	Mediterranean Diet (MD) index To comply with a Mediterranean diet, all 5 criteria had to be met; compared 5 criteria with 0 criteria and 1-4 criteria <u>MD Criteria:</u> ≥5 servings of veg or fruit/day, ≥2 servings of fruits, olive/canola/rapeseed oil for cooking and dressing, ≤2 servings of red meat/week, and ≤2 cups of coffee per day	Preterm (OR) 0 criteria= REF		All MD criteria: 0.73 (95% CI: 0.32, 1.68)
		Early preterm (OR) 0 criteria= REF		All MD criteria: 0.93 (95% CI: 0.16, 5.37)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Late preterm (OR) 0 criteria= REF		All MD criteria: 0.66 (95% CI: 0.25, 1.69)
		Gestational age (HR) 0 criteria= REF		All MD criteria: 0.75 (95% CI: 0.34, 1.65)
		Preterm (OR) 1-4 criteria= REF		All MD criteria: 1.06 (95% CI: 0.71, 1.58)
		Early preterm (OR) 1-4 criteria= REF		All MD criteria: 0.80 (95% CI: 0.40, 1.62)
		Late preterm (OR) 1-4 criteria= REF		All MD criteria: 1.24 (95% CI: 0.77, 2.00)
		Gestational age (HR) 1-4 criteria= REF		All MD criteria: 1.06 (95% CI: 0.72, 1.57)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
Hillesund, 2014 Norway N = 72,072	New Nordic Diet score Constructed to measure adherence with the fundamental guidelines of the NND <u>Positively scored components:</u> (i) eating ≥ 24 main meals/week; (ii) eating Nordic fruits ≥ 5 times/week; (iii) eating root vegetables ≥ 5 times/week; (iv) eating cabbage ≥ 2 times/week; (v) eating potatoes \geq one-third of total occasions of eating potatoes, rice or pasta; (vi) choosing whole grain bread more often than refined bread; (vii) eating oatmeal \geq monthly; (viii) eating fish/game/berries about 2 times/week; (ix) drinking milk more often than juice; and (x) drinking ≥ 6 times as much water as sugar-sweetened beverages	Preterm (OR) Low=REF	High: 0.90 (95% CI: 0.81, 0.98)	Medium: NR
		Spontaneous preterm (OR) Low=REF		Medium: 1.06 (95% CI: 0.94, 1.19) High: 0.91 (95% CI: 0.80, 1.03)
			Nulliparous High: 0.77 (95% CI: 0.66, 0.89)	Medium: 0.95 (95% CI: 0.85, 1.12)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
			Multiparous Medium: 1.28 (95% CI: 1.03, 1.58) High: 1.25 (95% CI: 1.00, 1.53)	
Martin, 2015¹⁵ USA N = 3,143	DASH adherence score <u>Positively-scored components:</u> fruits, vegetables, nuts and legumes, low-fat dairy, and whole grains <u>Negatively-scored components:</u> sodium, red and processed meats, and sweetened beverages	Preterm (OR) Q1=REF	Q4: 0.59 (95% CI: 0.40, 0.85)	Q2: 0.85 (95% CI: 0.63, 1.16) Q3: 0.96 (95% CI: 0.72, 1.29)
		Spontaneous preterm (OR) Q1=REF	Q4: 0.58 (95% CI: 0.36, 0.95)	Q2: NR Q3: NR
		Medically indicated preterm: results NR (see figure 1)		NR

¹⁵ Martin, 2015 is listed twice in the table: once under Index/Score and once under Principal Component Analysis/Factor Analysis

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
Mikkelsen, 2008 Denmark N = 35,530	Mediterranean Diet (MD) MD group and two control groups: - MD group met all of the below criteria - Control group (CG) 1 met 1-4 criteria - CG 2 met none of the criteria <u>MD Criteria:</u> consumption of fish twice a week or more (lunch or dinner), intake of olive or rape seed oil, high consumption of fruits and vegetables (≥5/day), meat (other than poultry and fish) at most twice a week, and at most 2 cups of coffee/day	Preterm (OR)		All MD criteria: 0.61 (95% CI: 0.35, 1.05)
		0 criteria= REF		
		Early preterm (OR)	All MD criteria: 0.28 (95% CI: 0.11, 0.76)	
		0 criteria= REF		
		Late preterm (OR)		All MD criteria: 0.82 (95% CI: 0.43, 1.57)
		0 criteria= REF		
		Gestational age (HR)		All MD criteria: 1.01 (95% CI: 0.89, 1.15)
		0 criteria= REF		
		Preterm (OR)		All MD criteria: 0.92 (95% CI: 0.69, 1.24)
		1-4 criteria= REF		

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Early preterm (OR) 1-4 criteria= REF		All MD criteria: 0.58 (95% CI: 0.32, 1.06)
		Late preterm (OR) 1-4 criteria= REF		All MD criteria: 1.11 (95% CI: 0.80, 1.55)
		Gestational age (HR) 1-4 criteria= REF		All MD criteria: 0.97 (95% CI: 0.91, 1.04)
PCA/Factor Analysis				
Before pregnancy				
Grieger, 2014 Australia N = 309	High-protein/fruit Fish, meat, chicken, fruit, whole grains	Preterm (OR for 1 SD increase in DP score)	0.31 (95% CI: 0.13, 0.72)	
	High-fat/sugar/takeaway Takeaway foods, potato chips, refined grains, added sugar	Preterm (OR for 1 SD increase in DP score)	1.54 (95% CI: 1.10, 2.15)	

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
	Vegetarian-type Vegetables, whole grains, legumes	Preterm (OR for 1 SD increase in DP score)		1.08 (95% CI: 0.74, 1.57)
Pregnancy				
Chia, 2016 Singapore N = 923	Vegetable, fruit, and white rice pattern <u>Higher</u> intakes of vegetables, fruits, plain white rice, whole-grain bread, fish, and nuts and seeds, and <u>Lower</u> intakes of fried potatoes, burgers, carbonated and sweetened drinks, and flavored rice	Preterm (OR) Low=REF	Higher: 0.67 (95% CI: 0.50, 0.91)	
		Spontaneous preterm (OR) Low=REF	Higher: 0.55 (95% CI: 0.37, 0.82)	
		Induced preterm (OR) Low=REF		Higher: 1.18 (95% CI: 0.69, 2.03)
	Seafood and noodle pattern <u>Higher</u> intakes of soup, seafood, fish and seafood products, noodles (flavored and in soup), and low-fat red meat, and <u>Lower</u> intakes of legumes, ethnic bread, white rice, and curry-based gravies	Preterm (OR) Low=REF		Higher: 1.27 (95% CI: 0.93, 1.74)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Spontaneous preterm (OR) Low=REF		Higher: 1.20 (95% CI: 0.78, 1.83)
		Induced preterm (OR) Low=REF		Higher: 1.21 (95% CI: 0.67, 2.20)
	Pasta, cheese, and processed meat pattern High intakes of pasta-, tomato-, and cream-based gravies, cheese, and processed meat	Preterm (OR) Low=REF		Higher: 0.79 (95% CI: 0.55, 1.12)
		Spontaneous preterm (OR) Low=REF		Higher: 0.71 (95% CI: 0.42, 1.19)
		Induced preterm (OR) Low=REF		Higher: 0.50 (95% CI: 0.18, 1.42)
Englund-Ögge, 2014 Norway N = 66,000	Prudent pattern <u>Positive</u> for raw and cooked vegetables, salad, onion/leek/garlic, fruit and berries, nuts, vegetable oils, water as beverage, whole grain cereals, poultry, and fibre rich bread <u>Negative</u> for processed meat products (hot dogs, hamburgers, and so on), white bread, and pizza/tacos	Preterm (HR) T1=REF	T3: 0.88 (95% CI: 0.80, 0.97)	T2: 0.94 (95% CI: 0.86, 1.02)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Spontaneous preterm (HR) T1=REF	T3: 0.85 (95% CI: 0.75, 0.96)	T2: 0.90 (95% CI: 0.81, 1.01)
		Iatrogenic preterm (HR) Low=REF		T2: 1.00 (95% CI: 0.88, 1.15) T3: 0.93 (95% CI: 0.80, 1.08)
		Late preterm (HR) T1=REF	T2: 0.91 (95% CI: 0.82, 0.99) T3: 0.86 (95% CI: 0.78, 0.96)	
		Moderately preterm (HR) T1=REF		T2: 0.94 (95% CI: 0.75, 1.17) T3: 0.91 (95% CI: 0.71, 1.17)
		Early preterm (HR) T1=REF		T2: 1.10 (95% CI: 0.88, 1.38) T3: 0.92 (95% CI: 0.71, 1.19)
	Western pattern <u>Positive</u> for salty snacks, chocolate and sweets, cakes, French fries, white bread, ketchup, sugar sweetened drinks, processed meat products, and pasta <u>Negative</u> for lean fish and fibre rich bread	Preterm (HR) T1=REF		T2: 1.04 (95% CI: 0.95, 1.13) T3: 1.02 (95% CI: 0.92, 1.13)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Spontaneous preterm (HR) T1=REF		T2: 1.10 (95% CI: 0.98, 1.23) T3: 1.04 (95% CI: 0.91, 1.19)
		Iatrogenic preterm (HR) T1=REF		T2: 1.00 (95% CI: 0.87, 1.15) T3: 1.05 (95% CI: 0.90, 1.23)
		Late preterm (HR) T1=REF		T2: 1.06 (95% CI: 0.96, 1.17) T3: 1.06 (95% CI: 0.94, 1.19)
		Moderately preterm (HR) T1=REF		T2: 0.81 (95% CI: 0.64, 1.02) T3: 0.79 (95% CI: 0.60, 1.04)
		Early preterm (HR) T1=REF		T2: 1.21 (95% CI: 0.95, 1.53) T3: 1.09 (95% CI: 0.82, 1.44)
	Traditional pattern <u>Positive</u> for boiled potatoes, fish products, gravy, lean fish, margarine, rice pudding, low fat milk, and cooked vegetables <u>Negative</u> for poultry and pizza/tacos	Preterm (HR) T1=REF	T3: 0.91 (95% CI: 0.83, 0.99)	T2: 0.98 (95% CI: 0.90, 1.06)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Spontaneous preterm (HR) T1=REF		T2: 0.96 (95% CI: 0.86, 1.07) T3: 0.96 (95% CI: 0.86, 1.09)
		Iatrogenic preterm (HR) T1=REF	T3: 0.85 (95% CI: 0.74, 0.99)	T2: 1.01 (95% CI: 0.89, 1.15)
		Late preterm (HR) T1=REF	T3: 0.89 (95% CI: 0.80, 0.99)	T2: 0.98 (95% CI: 0.89, 1.08)
		Moderately preterm (HR) T1=REF		T2: 1.02 (95% CI: 0.81, 1.28) T3: 1.02 (95% CI: 0.79, 1.32)
		Early preterm (HR) T1=REF		T2: 0.93 (95% CI: 0.74, 1.16) T3: 0.90 (95% CI: 0.69, 1.15)
Martin, 2015¹⁶ USA N = 3,143	Factor 1 Fruits, tomatoes, broccoli, spinach, carrots, green salads, sweet potatoes, low-fat milk, yogurt, highfiber and highly fortified cereals, nonfried chicken and fish, and wheat bread	Preterm (OR) Q1=REF		Q2: 1.20 (95% CI: 0.88, 1.64) Q3: 1.07 (95% CI: 0.77, 1.49) Q4: 0.87 (95% CI: 0.60, 1.27)

¹⁶ Martin, 2015 is listed twice in the table: once under Index/Score and once under Principal Component Analysis/Factor Analysis

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Spontaneous preterm (OR) Q1=REF		Q2: NR Q3: NR Q4: NR
		Medically indicated preterm: results NR (see figure 1)		NR
	Factor 2 Beans, corn, French fries, hamburgers or cheeseburgers, white potatoes, fried chicken, spaghetti dishes, cheese dishes such as macaroni and cheese, cornbread or hushpuppies, processed meats, biscuits, and ice cream	Preterm (OR) Q1=REF	Q4: 1.53 (95% CI: 1.02, 2.30)	Q2: 1.01 (95% CI: 0.72, 1.42) Q3: 1.37 (95% CI: 0.96, 1.96)
		Spontaneous preterm (OR) Q1=REF	Q4: 1.92 (95% CI: 1.08, 3.41)	Q2: NR Q3: NR
		Medically indicated preterm: results NR (see figure 1)		NR

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
	Factor 3 Collard greens, coleslaw or cabbage, red meats, fried chicken and fish, processed meats, cornbread or hushpuppies, eggs or egg biscuits, gravy, whole milk, and vitamin C-rich drinks such as Kool-Aid and Hi-C	Preterm (OR) Q1=REF	Q4: 1.55 (95% CI: 1.07, 2.24)	Q2: 1.25 (95% CI: 0.89, 1.74) Q3: 1.32 (95% CI: 0.94, 1.86)
		Spontaneous preterm (OR) Q1=REF	Q4: 1.78 (95% CI: 1.07, 2.96)	Q2: NR Q3: NR
		Medically indicated preterm: results NR (see figure 1)		NR
	Factor 4 Shellfish, pizza, salty snacks, candies, pancakes, tacos or burritos, and cakes and cookies	Preterm (OR) Q1=REF		Q2: 0.94 (95% CI: 0.68, 1.31) Q3: 1.18 (95% CI: 0.85, 1.64) Q4: 1.13 (95% CI: 0.79, 1.63)
		Spontaneous preterm: results NR (see figure 1)		NR

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Medically indicated preterm: results NR (see figure 1)		NR
Rasmussen, 2014 Denmark N = 59,949	Alcohol pattern Soya, root, wine, liquor, and beer	Spontaneous preterm (OR)		NR
		Induced preterm (OR)		NR
	Vegetable/Prudent pattern Cabbage, onion, mushroom, corn, salad, tomato, vegetables other, and legumes	Spontaneous preterm (OR)		NR
		Induced preterm (OR)		NR
	Western pattern Potatoes, French fries, bread white, pork, beef veal, meat mixed, meat cold, and dressing sauce	Spontaneous preterm (OR) Q1=REF		Q2: NR Q3: NR Q4: NR Q5: 1.18 (95% CI: 0.99, 1.39)

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Induced preterm (OR) Q1=REF	Q5 (unadjusted): 1.70 (95% CI: 1.37, 2.11) (Association was "relatively unaffected" after adjustment)	Q2: NR Q3: NR Q4: NR
	Seafood pattern Fish	Spontaneous preterm (OR)		NR
		Induced preterm (OR) Q1=REF	Q4: 0.62 (95% CI: 0.50, 0.79)	Q2: NR Q3: NR Q5: 0.90 (95% CI: 0.72, 1.11)
	Nordic pattern Bread dark, fruit Nordic, and hard cheese	Spontaneous preterm (OR)		NR
		Induced preterm (OR)		NR
	Sweets pattern Bread white, margarine, snack, sugar cakes, sweet spread, candy, dessert dairy, and chocolate	Spontaneous preterm (OR)		NR
		Induced preterm (OR)		NR
	Rice/Pasta/Poultry pattern Rice, pasta, and poultry	Spontaneous preterm (OR)		NR

Author, Year Country, N	Exposure	Outcome	Significant finding	NS finding
		Induced preterm (OR)		NR
Other Method				
Before pregnancy/ Before or During Pregnancy				
Xie, 2015 USA N = 572	High-calorie sweet pattern Foods such as doughnuts, ice cream, chocolate candy, regular candy, and cookies	Gestational age (β for 1-unit increase in the scale)		0.03 (SE=0.10)
	High-calorie nonsweet pattern Steak, fried chicken, fried fish, pizza, hot dogs, sausage, cheese, whole milk, etc.	Gestational age (β for 1-unit increase in the scale)		-0.06 (SE=0.04)
	Low-calorie pattern Foods such as low-fat and skim milk, grilled chicken, grilled fish, apples, and breakfast cereal	Gestational age (β for 1-unit increase in the scale)		0.11 (SE=0.08)

Assessment of the body of evidence

This body of evidence was deemed to be limited in strength. The individual grading elements are discussed below.

Internal validity (determined with NEL Bias Assessment Tool):

- Study design: The data were primarily observational in nature, limiting the ability to determine causal effect of the dietary patterns.
- Exposure:
 - Food frequency questionnaires (FFQ) were the primary measurement tool. The type of FFQ used varied between studies; furthermore, the data were self-reported, thus possibly affecting the validity of the data collected.
 - Two studies used 24-hour dietary recalls to collect exposure data (2, 10), one of which was not validated (10). While Chia et al. reported significant associations, Xie et al. did not.
- Timing: Heterogeneity in the duration of recall (e.g. 24 hours vs. 12 months) and the timing of exposure assessment (as noted below) would affect the validity.
 - Grieger et al. assessed dietary patterns before pregnancy.
 - Gresham et al. and Xie et al. measured diet during a wide window spanning from before pregnancy to the end of pregnancy, but did not delineate the findings based on timing (before pregnancy vs. during pregnancy).
 - The rest of the studies assessed diet during pregnancy.
- Outcome: There was a lack of uniformity in outcome assessment, and some studies used less robust methods than others.
 - Two studies used Last Menstrual Period (LMP) to assess outcomes (6, 9).
 - Two studies used ultrasound dating (2, 11).
 - Five studies used a combination of LMP and ultrasound dating (3-5, 7, 8).
 - Two studies used self-reported outcome data (1, 10).
 - Studies measured and reported the outcome (gestational age at birth) in one or more of the following ways-
 - Preterm birth (1-8, 10, 11)
 - Spontaneous preterm birth (2, 3, 7-9)
 - Induced preterm birth (3, 9)
 - Early preterm birth (3, 6)
 - Late preterm birth (3)
 - Gestational age (6, 10, 11)

It is unclear if the study findings differed based on how the outcome was measured and reported.

- Confounders: Key confounding factors such as parity, educational attainment, smoking status, race/ethnicity, maternal age, family poverty income ratio, pre-pregnancy BMI, mean total energy intake, hypertensive disorders of pregnancy, gestational diabetes mellitus and intrauterine growth restriction were not consistently controlled across studies.

Adequacy:

- The number of studies in this body of evidence was modest. This evidence base included 11 studies corresponding to one RCT and seven unique cohorts.

- There was overlap in the use of some datasets. For example, three studies used MoBA (3, 5, 7) and two used DNBC (6, 9). However, there was no overlap in authorship.
- The sample size varied between 290 subjects in the RCT (11) and 72,072 in a prospective cohort study (7). Notably, the RCT may not have been powered to address this outcome.

Consistency:

- Six of the nine studies found an association between dietary patterns and risk of preterm birth (2-4, 7, 8, 11). It should be noted that Grieger et al. measured dietary patterns before pregnancy while the other studies measured diet during pregnancy. In addition, Mikkelsen et al. observed that dietary patterns were associated with early preterm birth, specifically (not overall preterm birth).
- When gestational age was presented as a continuous outcome (6, 10, 11), only one of the three studies reported a significant finding (11).
- Four of the five studies reported an association between dietary patterns (healthy or unhealthy) and spontaneous preterm birth (2, 3, 8, 9). Only Hillesund et al. did not report a statistically significant association with this outcome. However, Hillesund et al. noted an effect measure modification by parity. Greater adherence to a “healthy” dietary pattern in nulliparous women was associated with a reduced risk of spontaneous preterm birth; on the other hand, greater adherence to the same dietary pattern in multiparous women was associated with an increased risk.
- The following methodological characteristics could explain some of these inconsistencies:
 - Age range of the participants (adolescent vs. adult women)
 - Method of exposure assessment (24-hour recall vs. FFQ)
 - Timing (before pregnancy vs. during pregnancy) and length of time reflected by dietary data (24 hours vs. 12 months)
 - Method of outcome assessment (self-report vs. ultrasound and/or LMP)
 - Measuring the outcome as continuous (gestational age) vs. dichotomous (preterm birth, spontaneous preterm birth, induced preterm birth, early and late preterm birth)
 - Variability in confounders that were adjusted in the analysis

Impact:

- Most of the studies in the body of evidence directly examined the relationship between different dietary patterns or different levels of adherence to a dietary pattern and risk of preterm birth. Notably, only one cohort was designed to understand the etiology of preterm birth (8). Another exception is the RCT, which assessed preterm birth as the secondary outcome. The primary study was focused on understanding the relationship between a cholesterol-lowering diet during pregnancy and cholesterol levels in maternal, cord, neonatal cholesterol (11).
- Modest risk reductions were observed across studies that found a significant relationship between adhering to a dietary pattern and risk of preterm and spontaneous preterm birth.
 - Preterm birth:

- Highest adherence to a protective dietary pattern during pregnancy was associated with a preterm birth risk reduction of 9% to 90%.
- Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in preterm birth risk of 53% to 55%.
- One study reported that highest adherence to a protective dietary pattern before pregnancy was associated with a 69% preterm birth risk reduction.
- Spontaneous preterm birth:
 - Highest adherence to a protective dietary pattern during pregnancy was associated with a spontaneous preterm birth risk reduction of 15% to 45%.
 - Highest adherence to a detrimental dietary pattern during pregnancy was associated with an increase in spontaneous preterm birth risk of 18% to 92%.
- Even though the study findings are merely associations, there is nevertheless a strong scientific premise^{17,18} for this association based on experiments in animals, observations in women about LC-PUFA intake and experimental studies in women with LC-PUFA supplements that produce differences in gestational age comparable to those observed in this body of evidence.

Generalizability:

- Only two studies in this body of evidence were conducted in the U.S (8, 10), and one of them was primarily conducted in adolescent girls.
- Minority and lower SES populations were underrepresented in the body of evidence. There was also a lack of diversity based on BMI, parity, age at conception and smoking status.
- It is unknown if the findings would be applicable in more diverse samples before and during pregnancy.

Other limitations/considerations:

A wide range of methods (sometimes using the same nomenclature) was used to define and assess dietary patterns, which made it difficult to compare and contrast results across studies. Journal editors and peer-reviewers may be less willing to publish studies that replicate others' findings, which could have resulted in an evidence base with a wide array of dietary patterns. It is important for the editors and peer-reviewers to understand the need for publishing studies that replicate dietary patterns, in addition to publishing studies that assess unique dietary patterns¹⁹.

¹⁷ Imhoff-Kunsch, B., Briggs, V., Goldenberg, T., & Ramakrishnan, U. (2012). Effect of n-3 long-chain polyunsaturated fatty acid intake during pregnancy on maternal, infant, and child health outcomes: a systematic review. *Paediatr Perinat Epidemiol*, 26 Suppl 1, 91-107. doi:10.1111/j.1365-3016.2012.01292.x

¹⁸ De Giuseppe, R., Roggi, C., & Cena, H. (2014). n-3 LC-PUFA supplementation: effects on infant and maternal outcomes. *Eur J Nutr*, 53(5), 1147-1154. doi:10.1007/s00394-014-0660-9

¹⁹ U.S. Department of Health and Human Services and U.S. Department of Agriculture. (2015). *2015 – 2020 Dietary Guidelines for Americans. 8th Edition*. Retrieved from <https://health.gov/dietaryguidelines/2015/guidelines/>.

Research recommendations

To assess the relationship between dietary patterns before and during pregnancy and risk of preterm birth more adequately, additional research is needed that should:

- Include diverse populations from the U.S. and elsewhere with varying racial/ethnic and socioeconomic backgrounds.
- Foster collaborative efforts across different regions and populations so that dietary patterns can be more consistently scored, compared and reproduced across studies.
- Develop and validate novel epidemiological tools that can accurately capture the complexity of dietary habits.
- Promote harmonization of research methods across various cohorts and randomized trials, similar to the National Cancer Institute's Dietary Patterns Methods Project²⁰.
- Adjust for key confounding factors in observational studies, including parity, educational attainment, smoking status, race/ethnicity, maternal age, family poverty income ratio, pre-pregnancy BMI, mean total energy intake, hypertensive disorders of pregnancy, gestational diabetes mellitus and intrauterine growth restriction.
- Improve comparability across studies by increasing the uniformity of 1) the timing of dietary assessment, and 2) the outcomes measured.
- Include well-designed and sufficiently powered RCTs.
- Include women before and during pregnancy and contrast the findings to understand whether dietary patterns during certain time periods are more critical than others for preterm deliveries.
- Report study findings as both continuous (gestational age) and dichotomous (preterm birth) outcomes.
- Include women with multiple gestation and measure gestational age as a continuous outcome.
- Assess effect measure modification by parity, pre-pregnancy BMI, smoking status, and income in multiethnic subgroups within the U.S.

²⁰ Liese, A. D., Krebs-Smith, S. M., Subar, A. F., George, S. M., Harmon, B. E., Neuhauser, M. L., . . . Reedy, J. (2015). The Dietary Patterns Methods Project: synthesis of findings across cohorts and relevance to dietary guidance. *J Nutr*, 145(3), 393-402. doi:10.3945/jn.114.205336

Included articles

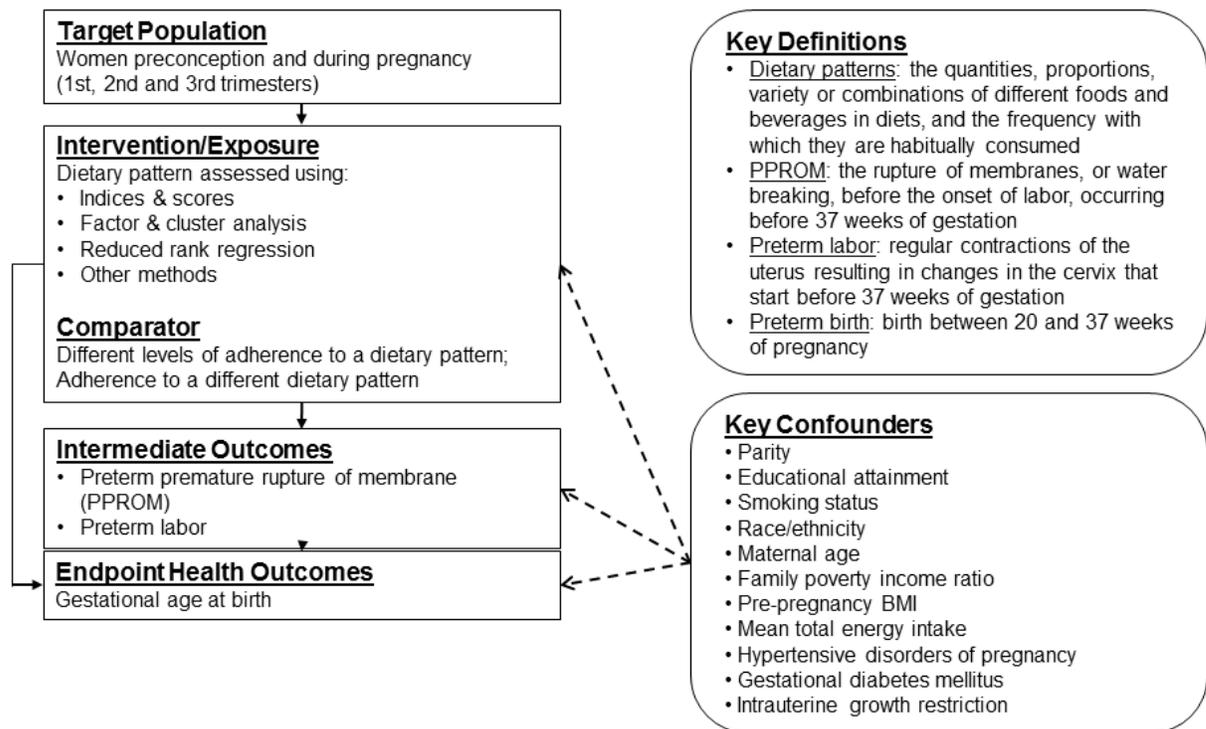
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ANALYTIC FRAMEWORK

The analytic framework (Figure 1) illustrates the overall scope of the systematic review, including the population, the interventions and/or exposures, comparators, and outcomes of interest. It also includes definitions of key terms and identifies key confounders considered in the systematic review. This is the analytic framework for the systematic review conducted to examine the relationship between dietary patterns before and after pregnancy and gestational age at birth.

Figure 1: Analytic framework

Analytic Framework: What is the relationship between dietary patterns before and during pregnancy and gestational age at birth?



SEARCH PLAN AND RESULTS

Inclusion and exclusion criteria

The inclusion and exclusion criteria are a set of characteristics to determine which studies will be included or excluded in the systematic review. This table provides the inclusion and exclusion criteria for the systematic review question(s): What is the relationship between dietary patterns before and during pregnancy and gestational age at birth?

Table 6. Inclusion and exclusion criteria

Category	Inclusion Criteria	Exclusion Criteria
Study Design	<ul style="list-style-type: none"> • Randomized controlled trials • Prospective cohort studies • Retrospective cohort studies • Nested case-control studies 	<ul style="list-style-type: none"> • Non-randomized controlled trials • Cross-sectional studies • Case-control studies • Uncontrolled studies • Pre/post studies with a control • Pre/post studies without a control • Narrative reviews • Systematic reviews • Meta-analyses
Exposure/ Intervention	<ul style="list-style-type: none"> • Studies that provide a description of the dietary pattern(s) (i.e., foods and beverages) consumed by subjects and that methodologically use: <ul style="list-style-type: none"> ○ Indices & scores ○ Cluster or factor analysis ○ Reduced rank regression ○ Other methods 	<ul style="list-style-type: none"> • Studies that <u>do not</u> provide a description of the dietary pattern(s) (i.e., foods and beverages) consumed by subjects²¹
Comparator	<ul style="list-style-type: none"> • Different levels of adherence to a dietary pattern • Adherence to a different dietary pattern 	

²¹ For example, a study would be excluded from the systematic review if the dietary pattern were labeled “vegetarian” but lacked a description of what foods/beverages were consumed as part of that dietary pattern.

Category	Inclusion Criteria	Exclusion Criteria
Date Range	<ul style="list-style-type: none"> Studies published in the following date range: 1980-present (search date) 	
Language	<ul style="list-style-type: none"> Studies published in English 	<ul style="list-style-type: none"> Studies published in languages other than English
Study Setting	<ul style="list-style-type: none"> Studies conducted in Very High and High Human Development Countries* <p><i>*Determined using the most recent Human Development Index</i></p>	<ul style="list-style-type: none"> Studies conducted in Medium and Low Human Development Countries* <p><i>*Determined using the most recent Human Development Index</i></p>
Study Duration	<ul style="list-style-type: none"> Studies regardless of length 	
Temporality	<ul style="list-style-type: none"> Studies when the exposure was assessed prior to the outcome 	<ul style="list-style-type: none"> Studies when the outcome was assessed prior to the exposure
Publication Status	<ul style="list-style-type: none"> Studies published in peer-reviewed journals 	<ul style="list-style-type: none"> Grey literature, including unpublished data, manuscripts, reports, abstracts, conference proceedings
Study Subjects	<ul style="list-style-type: none"> Human subjects Adolescent girls and women capable of becoming pregnant (15-44 years) Pregnant girls and women (15-44 years) – single and multiple pregnancies Neonates 	<ul style="list-style-type: none"> Animal and in vitro models Hospitalized patients, when hospitalization is not related to pregnancy, birth and immediate postpartum Pregnancies conceived ONLY using Assisted Reproductive Technologies
Size of Study Groups	<ul style="list-style-type: none"> Studies regardless of group size 	

Category	Inclusion Criteria	Exclusion Criteria
Health Status of Study Subjects	<ul style="list-style-type: none"> • Studies conducted in generally healthy women of reproductive age, including women in pre/peri-conception and pregnancy • Studies conducted in samples with elevated chronic disease risk or pregnancy related conditions, or that enroll <i>some</i> subjects with a disease or with health outcome of interest such as <ul style="list-style-type: none"> ○ Anemia ○ Gestational diabetes ○ Hypertension ○ Preeclampsia ○ Hyperemesis Gravidarum ○ Previous adverse outcome (e.g., preterm) ○ Obesity 	<ul style="list-style-type: none"> • Studies that <i>exclusively</i> enroll subjects with chronic conditions (e.g. hypertension, diabetes) that are not related to the index pregnancy • Studies that <i>exclusively</i> enroll subjects with a disease or with the health outcome of interest (intermediate or endpoint health outcomes) • Studies done in hospitalized or malnourished subjects, if hospitalization is not related to index pregnancy
Outcomes	<ul style="list-style-type: none"> • Gestational age at birth • Intermediate Outcomes: <ul style="list-style-type: none"> ○ Preterm premature rupture of membrane ○ Preterm labor 	

Search terms and electronic databases used

PubMed, US National Library of Medicine

- Date(s) searched: January 1980 to January 2017
- Search Terms:

pregnancy[mh] OR "Prenatal Exposure Delayed Effects"[mesh] OR "Maternal Exposure"[mesh] OR "pregnant women"[mh] OR pregnan*[tiab] OR prenatal[tiab] OR maternal OR mother* OR postpartum OR newborn*[tiab] OR perinatal OR peri-natal OR pre-conception OR preconception OR peri-conception OR periconception OR "Infant, Newborn"[Mesh] OR neonat*[tiab] OR newly born* OR "Peripartum Period"[Mesh] OR peripartum[tiab] OR peripartum[tiab] OR gestation* OR natal OR puerperium[tiab] OR "Maternal Nutritional Physiological Phenomena"[Mesh]

AND

hypertensi*[tiab] OR "Hypertension"[Mesh:NoExp] OR vomit* OR diabetes*[tiab] OR diabetic*[tiab] OR "Birth Weight"[Mesh] OR "Birth Weight"[tiab] OR "Glucose Intolerance"[Mesh] OR Glucose Intoleran*[tiab] OR glucose toleran* OR "Insulin Resistance"[Mesh] OR Insulin Resistan*[tiab] OR Dysglycemia[tiab] OR fasting blood glucose* OR "Hemoglobin A, Glycosylated"[Mesh] OR "Proteinuria"[Mesh:noexp] OR Albuminuria OR "Blood Pressure"[mh] OR "blood pressure"[tiab]

OR

"Diabetes, Gestational"[Mesh] OR (gestation*[tiab] AND (diabetes*[tiab] OR diabetic*[tiab])) OR "Pre-Eclampsia"[Mesh] OR "Pre-Eclampsia"[tiab] OR preeclampsia[tiab] OR "Hypertension, Pregnancy-Induced"[Mesh] OR Eclampsia OR "Gestational Age"[Mesh] OR "Morning Sickness"[Mesh] OR (Hyperemesis Gravidarum) OR "Gestational Age"[tiab] OR "Obstetric Labor, Premature"[Mesh] OR ((prematu*[tiab] OR preterm [tiab]) AND (baby[tiab] OR infant*[tiab] OR birth OR labor OR membrane* OR babies)) OR "Fetal Growth Retardation"[Mesh] OR IUGR[tiab] OR "Intrauterine growth restriction" OR "Fetal Development"[Mesh:noexp] OR "Fetal Weight"[Mesh] OR "Umbilical Arteries"[Mesh] OR "Uterine Artery"[Mesh]

AND

("diet quality" OR dietary pattern* OR diet pattern* OR eating pattern* OR food pattern* OR eating habit* OR dietary habit* OR food habit* OR dietary profile* OR food profile* OR diet profile* OR eating profile* OR dietary guideline* OR dietary recommendation* OR eating style*) OR

(DASH[ti] OR DASH[tw] OR ("dietary approaches"[ti] AND hypertension[ti]) OR "Diet, Mediterranean"[Mesh] OR Mediterranean[ti] OR vegan* OR vegetarian* OR "Diet, Vegetarian"[Mesh] OR "prudent diet" OR "western diet" OR nordiet OR omni[ti] OR omniheart[tiab] OR (Optimal Macronutrient Intake Trial to Prevent Heart Disease) OR adventist* OR ((Okinawa* OR "Ethnic Groups"[Mesh] OR "plant based" OR Mediterranean[tiab] OR Nordic[tiab] OR "heart healthy"[tiab] OR indo-mediterranean) AND (diet[mh] OR diet[tiab] OR diets[tiab] OR

food[mh])))) OR

("Guideline Adherence"[Mesh] AND (diet OR food OR eating OR eat OR dietary OR feeding OR nutrition OR nutrient*)) OR (adherence AND (nutrient* OR nutrition OR diet OR dietary OR food OR eat OR eating) AND (guideline* OR guidance OR recommendation*)) OR

(dietary score* OR adequacy index* OR kidmed OR Diet Quality Index* OR Food Score* OR Diet Score* OR MedDietScore OR Dietary Pattern Score* OR "healthy eating index") OR

((index*[ti] OR score*[ti] OR indexes OR scoring[ti] OR indices[ti]) AND (dietary[ti] OR nutrient*[ti] OR eating[tiab] OR food[ti] OR food[mh] OR diet[ti] OR diet[mh]) AND (pattern* OR habit* OR profile*)) OR meals[mh] OR meals[tiab] OR meal[tiab] OR mealtime*[tiab]

OR

diet[mh:noexp] OR diet[ti] OR diets[ti] OR food*[tiab] OR "Food"[mh:noexp] OR "Eating"[mh] OR dietary intake*[tiab] OR food intake*[tiab] OR food habits[mh] OR diet habit*[tiab] OR eating habit*[tiab] OR food choice*[tiab] OR dietary choice*[tiab] OR dietary change*[tiab] NOT (editorial[ptyp] OR comment[ptyp] OR news[ptyp] OR letter[ptyp] OR review[ptyp] OR systematic[sb])

Embase, Elsevier:

- Date(s) searched: January 1980 to January 2017
- Search Terms:

'pregnancy'/exp OR 'pregnant woman'/exp OR 'prenatal period'/exp OR 'mother'/exp OR 'prenatal exposure'/exp OR 'prenatal growth'/exp OR 'puerperium'/exp OR 'newborn'/exp OR 'prematurity'/exp OR pregnan*:ti,ab OR maternal:ti,ab OR mother*:ti,ab OR prenatal:ti,ab OR pre-natal:ti,ab OR 'puerperium':ti,ab OR postpartum:ti,ab OR newborn:ti,ab OR neonat*:ti,ab OR "newly born":ti,ab OR periconception:ti,ab OR peri-conception:ti,ab OR pre-conception:ti,ab OR preconception;ti,ab OR gestation* OR peripartum:ti,ab OR peri-partum:ti,ab OR natal:ti,ab OR gestation* OR 'perinatal development'/exp OR 'perinatal care'/de OR perinatal:ti,ab OR peri-natal:ti,ab OR 'puerperium'/de OR 'puerperium':ti,ab OR 'maternal nutrition'/exp

AND

hypertensi* OR hyperemesis:ti,ab OR vomit*:ti,ab OR diabet* OR 'birth weight'/exp OR birthweight:ti,ab OR ((neonatal OR newborn) NEAR/3 weight)

OR

'glucose intolerance'/exp OR (Glucose NEAR/2 Intoleran*) OR (glucose NEAR/2 toleran*) OR 'insulin resistance'/exp OR (Insulin NEAR/1 Resistan*):ti,ab OR Dysglycemia OR "fasting blood glucose" OR 'hemoglobin A1c'/exp OR 'hemoglobin A1c' OR 'proteinuria'/exp OR albuminuria OR "Blood Pressure"/de

OR

'pregnancy diabetes mellitus'/exp OR "diabetes mellitus gravidarum":ti,ab OR

'eclampsia OR preeclampsia'/exp OR eclampsia:ti,ab OR preeclampsia:ti,ab OR pre-eclampsia:ti,ab OR 'maternal hypertension'/exp OR 'gestational age'/exp OR 'small for date infant'/exp OR 'gestational age' OR 'hyperemesis gravidarum'/exp OR 'morning sickness'/exp OR (gestation* NEAR/2 diabet*):ti,ab OR (Obstetric NEAR/3 (Labor OR labour)) OR (labor/exp AND obstetric*) OR 'prematurity'/exp OR ((premat* OR preterm) NEAR/3 (baby OR infant* OR babies OR birth OR childbirth OR labor OR membrane*)) OR 'intrauterine growth retardation'/de OR IUGR:ti,ab OR "Intrauterine growth restriction" OR 'fetus growth'/exp OR 'fetus development'/exp OR 'fetus weight'/exp OR 'umbilical artery'/exp OR 'uterine artery'/exp OR ((fetal OR fetus OR foetal OR foetus OR embryo*) NEAR/3 (weight OR develop* OR growth)):ti,ab

AND

'eating habit'/exp OR 'Mediterranean diet'/exp OR nordiet:ti,ab OR 'nordic diet':ti,ab OR DASH:ti,ab OR 'dietary approaches to stop hypertension':ti,ab OR vegan*:ab,ti OR vegetarian*:ab,ti OR 'vegetarian diet'/exp OR 'vegetarian'/exp OR 'prudent diet':ti,ab OR 'western diet':ti,ab OR 'Western diet'/exp OR meal/de OR omniheart:ti,ab OR omni:ti OR 'plant based diet' OR ((eating OR food OR diet* OR calor*) NEAR/3 (pattern? OR habit? OR profile? OR recommendation? OR guideline? OR style* OR choice* OR intake OR quality)) OR ((ethnic, racial and religious groups'/exp OR Okinawa* OR adventist* OR 'mediterranean') AND (diet/exp OR eating/exp OR 'food intake'/de OR calor* OR diet* OR food OR eating))

OR

Diet/de OR 'dietary intake'/de OR 'food preference'/de OR 'food intake'/de OR 'diet restriction'/exp OR 'eating habit'/exp OR diet*:ti OR kidmed:ab,ti OR 'meddietscore':ab,ti OR 'healthy eating index':ab,ti OR ((index OR score OR scoring OR indices) NEAR/3 (diet* OR eating OR food)) OR "food consumption"

OR

food*:ti,ab OR "Food"/de OR Eating:ti,ab OR (dietary NEAR/1 change*):ti,ab OR Meal*:ti,ab

Cochrane, Central Register of Controlled Trials, John Wiley & Sons:

- Date(s) searched: January 1980 to January 2017
- Search Terms:

[mh pregnancy] OR [mh "Maternal Exposure"] OR [mh "Prenatal Exposure Delayed Effects"] OR [mh "pregnant women"] OR pregnan*:ti,ab OR prenatal OR maternal OR mother* OR postpartum OR newborn*:ti,ab OR perinatal OR perinatal OR pre-conception OR preconception OR peri-conception OR periconception OR [mh "Infant, Newborn"] OR neonat*:ti,ab OR (newly NEAR/1 born*) OR gestation* OR peripartum OR peri-partum OR natal:ti,ab OR puerperium OR gravidarum OR [mh "Peripartum Period"] OR peripartum:ti,ab

OR peri-partum:ti,ab OR natal OR puerperium:ti,ab OR [mh "Maternal Nutritional Physiological Phenomena"]

AND

(hypertensi*:ti,ab OR [mh ^Hypertension] OR vomit*:ti,ab OR diabet*:ti,ab OR [mh "Birth Weight"] OR "Birth Weight":ti,ab OR [mh "Glucose Intolerance"] OR (Glucose NEAR/1 Intoleran*) OR (glucose NEAR/1 toleran*) OR [mh "Insulin Resistance"] OR (Insulin NEAR/1 Resistan*:ti,ab) OR Dysglycemia:ti,ab OR "fasting blood glucose" OR [mh "Hemoglobin A, Glycosylated"] OR [mh ^"Proteinuria"] OR Albuminuria OR [mh "Blood Pressure"] OR "blood pressure":ti,ab)

OR

[mh "Diabetes, Gestational"] OR (gestation* NEAR/1 diabet*) OR [mh "Pre-Eclampsia"] OR "Pre-Eclampsia":ti,ab OR preeclampsia:ti,ab OR [mh "Hypertension, Pregnancy-Induced"] OR Eclampsia OR [mh "Gestational Age"] OR [mh "Morning Sickness"] OR (Hyperemesis NEAR/3 Gravidarum) OR "Gestational Age":ti,ab OR [mh "Birth Weight"] OR "Birth Weight":ti,ab OR ((neonatal OR newborn) NEAR/3 weight) OR [mh "Obstetric Labor, Premature"] OR ((prematu*:ti,ab OR preterm:ti,ab) AND (baby:ti,ab OR infant*:ti,ab OR birth OR labor OR membrane* OR babies)) OR [mh "Fetal Growth Retardation"] OR IUGR:ti,ab OR "Intrauterine growth restriction" OR [mh ^"Fetal Development"] OR [mh "Fetal Weight"] OR [mh "Umbilical Arteries"] OR [mh "Uterine Artery"]

AND (diet:ti OR diets:ti OR dietary:ti OR meal*:ti,ab OR "prudent diet" OR nordiet:ti,ab OR omniheart OR "Optimal Macronutrient Intake Trial to Prevent Heart Disease" OR ((Index OR score OR indices OR scoring) NEAR/3 (dietary OR diet OR food OR eating)) OR "adequacy index" OR kidmed OR MedDietScore)

OR 'dietary approaches to stop hypertension':ti,ab OR omniheart:ti,ab OR omni:ti OR 'plant based diet' OR ((eating OR food OR diet* OR kalori*) NEAR/3 (pattern? OR habit? OR profile? OR recommendation? OR guideline? OR style* OR choice* OR intake OR quality))

OR

food*:ti,ab OR Eating:ti,ab OR (dietary NEAR/1 change*):ti,ab OR DASH:ti,ab OR vegan*:ab,ti OR vegetarian*:ab,ti OR omni:ti OR ((ethni* OR racial OR religio* OR asia* OR western OR Okinawa* OR adventist* OR 'mediterranean' OR Nordic* OR indo-mediterranean) NEAR/3 (calori* OR diet* OR food OR eating))

OR [mh "Diet, Mediterranean"] OR [mh "Diet, Vegetarian"] OR ([mh "Ethnic Groups"] AND ([mh diet] OR diet*:ti,ab OR [mh ^food] OR eat:ti,ab OR eating:ti,ab OR [mh "Eating"] OR [mh "food habits"])) OR

([mh "Guideline Adherence"] AND (diet OR food OR eating OR eat OR dietary)) OR ((adhere* OR adhering) AND (diet OR dietary OR food OR eat OR eating)) AND (guideline* OR guidance OR recommendation*) OR

[mh meals] OR [mh ^diet] OR diet*:ti,ab OR [mh ^"Food"] OR [mh "Eating"] OR [mh "food habits"]

CINAHL (Plus) with Full Text, EBSCO (Cumulative Index to Nursing and Allied Health Literature):

- Date(s) searched: January 1980 to January 2017
- Search Terms:

(MH "Food and Beverages") OR (MH "Food") OR (MH "Diet") OR (MH "Eating") OR (MH "Eating Behavior") OR (MH "Meals+") OR (MH "Food Preferences") OR (MH "Food Habits") OR (MH "Mediterranean Diet") OR (MH "Diet, Western") OR (MH "DASH Diet") OR (MH "Vegetarianism")

OR meal* OR "prudent diet" OR nordiet OR omniheart OR "Optimal Macronutrient Intake Trial to Prevent Heart Disease" OR ((Index OR score OR indices OR scoring) N3 (dietary OR diet OR food OR eating)) OR "adequacy index" OR kidmed OR MedDietScore

OR "dietary approaches to stop hypertension" OR "plant based diet" OR ((eating OR food* OR diet* OR kalori*) N3 (pattern? OR habit? OR profile? OR recommendation? OR guideline? OR style* OR choice* OR intake OR quality))

OR

(dietary NEAR/1 change*) OR vegan* OR vegetarian* OR ((ethni* OR racial OR religio* OR asia* OR western OR Okinawa* OR adventist* OR 'mediterranean' OR Nordic* OR indo-mediterranean OR omni*) N3 (calori* OR diet* OR food OR eating))

OR (MH "Ethnic Groups+") AND ((mh diet) OR diet* OR (MH food) OR eat OR eating OR (MH "Eating") OR MH "food habits")) OR

((adhere* OR adhering) N3 (diet OR dietary OR food OR eat OR eating)) AND (guideline* OR guidance OR recommendation*)

(MH "Maternal Nutritional Physiology+") OR (MH "Maternal Exposure") OR (MH "Pregnancy+") OR (MH "Pregnancy in Adolescence+") OR (MH "Maternal Age 14 and Under") OR (MH "Pregnancy Outcomes") OR (MH "Mothers+") OR (MH "Prenatal Nutritional Physiology") OR (MH "Infant, Newborn+") OR (MH "Postnatal Period+") OR (MH "Periconceptual Period")

AND

(MH "Hypertension+") OR (MH "Nausea and Vomiting+") OR (MH "Vomiting+") OR (MH "Birth Weight") OR (MH "Glucose Tolerance Test") OR (MH "Prediabetic State") OR (MH "Glucose Intolerance") OR (MH "Insulin Resistance+") OR (MH "Blood Pressure+") OR (MH "Proteinuria+") OR (MH "Hemoglobin A, Glycosylated")

OR

(MH "Diabetes Mellitus, Gestational") OR (MH "Gestational Age") OR (MH "Pre-Eclampsia+") OR (MH "Eclampsia+") OR (MH "Fetal Growth Retardation") OR (MH "Fetal Weight") OR (MH "Umbilical Arteries") OR (MH "Delivery,

Obstetric+")

Limiters - Published Date: 19800101-; Peer Reviewed; English Language;
Exclude MEDLINE records; Pregnancy

Narrow by SubjectMajor: - energy intake

Narrow by SubjectMajor: - vegetarianism

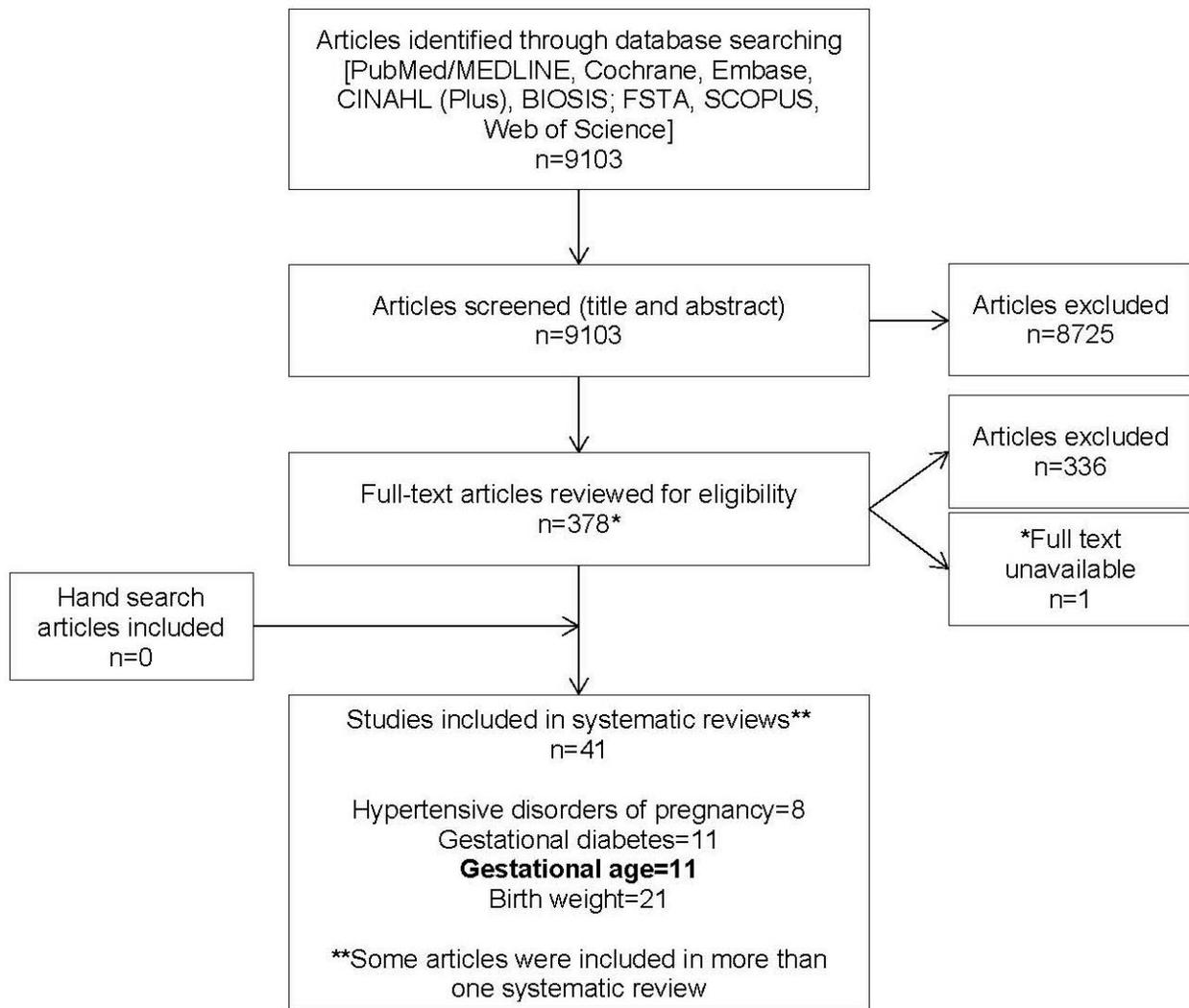
Narrow by SubjectMajor: - women's health

Narrow by SubjectMajor: - pregnancy outcomes

Narrow by SubjectMajor: - pregnancy complications

Narrow by SubjectMajor: - food habits

Narrow by SubjectMajor: - diabetes mellitus, gestational

Figure 2: Flow chart of literature search and screening results

This flow chart illustrates the literature search and screening results for articles examining the relationship between dietary patterns before and during pregnancy and gestational age at birth. The results of the electronic database searches were screened independently by two NESR analysts in a step-wise manner by reviewing titles, abstracts, and full text articles to determine which articles met the criteria for inclusion. A manual search was done to ascertain articles not identified through the electronic database search. The systematic review on gestational age included 11 articles. The literature search was conducted for multiple systematic reviews that addressed the relationships between dietary patterns before and during birth and risk of hypertensive disorders of pregnancy, risk of gestational diabetes mellitus, gestational age, and sex- and age-adjusted birth weight; the systematic reviews on hypertensive disorders of pregnancy, gestational diabetes, and birth weight are reported elsewhere.

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The table below lists the excluded articles with at least one reason for exclusion, and may not reflect all possible reasons.

Table 7. Excluded articles

	Citation	Rationale
1	Aaltonen, J, Ojala, T, Laitinen, K et al. Risk Reduction of Infant Insulin Resistance by Dietary Intervention during Pregnancy and Breastfeeding. Pediatric Academic Societies Annual Meeting; 2009 May 2 5; Baltimore MD, United States, 2009	Dependent variable
2	Abel, Ht, Bannert, N, Starke, I et al. Study into Ca/P homeostasis in premature babies on different diets. Klin Padiatr, 1991, 203	Independent variable
3	Adami, G. F., Friedman, D., Cuneo, S. et al. Intravenous nutritional support in pregnancy. Experience following biliopancreatic diversion. Clinical Nutrition, 1992, 11: 106-109	Independent variable
4	Akbari, Z., Mansourian, M., Kelishadi, R. Relationship of the intake of different food groups by pregnant mothers with the birth weight and gestational age: Need for public and individual educational programs. J Educ Health Promot, 2015, 4. PMID:25883993.	Independent variable
5	Alfonso, H. Preventing preeclampsia: the evidence on nutrients. Nurs Womens Health, 2009, 13: 419-21. PMID:19821918.	Study design
6	Ali, H. I., Jarrar, A. H., El Sadig, M. et al. Diet and carbohydrate food knowledge of multi-ethnic women: a comparative analysis of pregnant women with and without Gestational Diabetes Mellitus. PLoS One, 2013, 8. PMID:24069200.	Study design
7	Alwan, N. A., Greenwood, D. C., Simpson, N. A. et al. Dietary iron intake during early pregnancy and birth outcomes in a cohort of British women. Hum Reprod, 2011, 26: 911-9. PMID:21303776.	Independent variable
8	Andreasyan, K., Ponsonby, A. L., Dwyer, T. et al. Higher maternal dietary protein intake in late pregnancy is associated with a lower infant ponderal index at birth. Eur J Clin Nutr, 2007, 61: 498-508. PMID:17136041.	Independent variable
9	Arkkola, T., Uusitalo, U., Kronberg-Kippila, C. et al. Seven distinct dietary patterns identified among pregnant Finnish women--associations with nutrient intake and sociodemographic factors. Public Health Nutr, 2008, 11: 176-82. PMID:17610760.	Dependent variable

	Citation	Rationale
10	Asaka, A., Imaizumi, Y., Inouye, E. Analysis of multiple births in Japan. V. Effects of gestational age, maternal age and other factors on growth rate of weight in twins. <i>Jinrui Idengaku Zasshi</i> , 1981, 26: 83-90. PMID:7328851.	Independent variable
11	Asbee, Sm, Jenkins, Tr, Butler, Jr et al. Dietary counseling prevents excessive weight gain during pregnancy, a randomized controlled trial. <i>Obstet Gynecol</i> , 2008, 111	Dependent variable
12	Asp, N. G. Nutrition and human development. <i>Scandinavian Journal of Food and Nutrition</i> , 2006, 50	Independent variable, study design
13	Babson, Sg, Bramhall, Jl. Diet and growth in the premature infant. <i>Journal of Pediatrics</i> , 1969, 74: 890-900	Date
14	Bakouei, S., Reisian, F., Lamyian, M. et al. High Intake of Manganese During Second Trimester, Increases the Risk of Preterm Delivery: A Large Scale Cohort Study. <i>Glob J Health Sci</i> , 2015, 7: 226-32. PMID:26156900.	Independent variable
15	Bao, W., Bowers, K., Tobias, D. K. et al. Prepregnancy low-carbohydrate dietary pattern and risk of gestational diabetes mellitus: a prospective cohort study. <i>Am J Clin Nutr</i> , 2014, 99: 1378-84. PMID:24717341.	Independent variable
16	Bao, W., Li, S., Chavarro, J. E. et al. Low Carbohydrate-Diet Scores and Long-term Risk of Type 2 Diabetes Among Women With a History of Gestational Diabetes Mellitus: A Prospective Cohort Study. <i>Diabetes Care</i> , 2016, 39: 43-9. PMID:26577416.	Dependent variable
17	Bao, W., Tobias, D. K., Hu, F. B. et al. Pre-pregnancy potato consumption and risk of gestational diabetes mellitus: prospective cohort study. <i>Bmj</i> , 2016, 352. PMID:26759275.	Independent variable
18	Bao, W., Tobias, D. K., Olsen, S. F. et al. Pre-pregnancy fried food consumption and the risk of gestational diabetes mellitus: a prospective cohort study. <i>Diabetologia</i> , 2014, 57: 2485-91. PMID:25303998.	Independent variable
19	Baron, R., Te Velde, S. J., Heymans, M. W. et al. The Relationships of Health Behaviour and Psychological Characteristics with Spontaneous Preterm Birth in Nulliparous Women. <i>Matern Child Health J</i> , 2016, . PMID:27581004.	Independent variable
20	Bell, E. H., Geyer, J., Jones, L. A structured intervention improves breastfeeding success for ill or preterm infants. <i>MCN Am J Matern Child Nurs</i> , 1995, 20: 309-14. PMID:8551932.	Dependent variable
21	Berntorp, K. E. Gestational diabetes: what's up?. <i>Diabetologia</i> , 2016, 59: 1382-1384	Study design

	Citation	Rationale
22	Bertolotto, A., Volpe, L., Calianno, A. et al. Physical activity and dietary habits during pregnancy: effects on glucose tolerance. <i>J Matern Fetal Neonatal Med</i> , 2010, 23: 1310-4. PMID:20334531.	Independent variable, study design
23	Bhatia, B. D., Banerjee, D., Agarwal, D. K. et al. Fetal growth: relationship with maternal dietary intakes. <i>Indian J Pediatr</i> , 1983, 50: 113-20. PMID:6618569.	Country
24	Bjerregaard, P., Hansen, J. C. Effects of smoking and marine diet on birthweight in Greenland. <i>Arctic Med Res</i> , 1996, 55: 156-64. PMID:9115541.	Independent variable
25	Bloomfield, F. H., Oliver, M. H., Hawkins, P. et al. A periconceptional nutritional origin for noninfectious preterm birth. <i>Science</i> , 2003, 300. PMID:12714735.	Independent variable, health status
26	Bo, S., Rosato, R., Ciccone, G. et al. Simple lifestyle recommendations and the outcomes of gestational diabetes. A 2 x 2 factorial randomized trial. <i>Diabetes Obes Metab</i> , 2014, 16: 1032-5. PMID:24646172.	Independent variable, health status
27	Bobinski, R., Mikulska, M., Mojska, H. et al. Assessment of the diet components of pregnant women as predictors of risk of preterm birth and born baby with low birth weight. <i>Ginekol Pol</i> , 2015, 86: 292-9. PMID:26117989.	Independent variable, study design
28	Bobinski, R., Mikulska, M., Mojska, H. et al. The Dietary Composition of Women Who Delivered Healthy Full-Term Infants, Preterm Infants, and Full-Term Infants Who Were Small for Gestational Age. <i>Biol Res Nurs</i> , 2015, 17: 495-502. PMID:25358685.	Independent variable, study design
29	Borberg, C., Gillmer, M. D., Brunner, E. J. et al. Obesity in pregnancy: the effect of dietary advice. <i>Diabetes Care</i> , 1980, 3: 476-81. PMID:6993162.	Independent variable
30	Borgen, I., Aamodt, G., Harsem, N. et al. Maternal sugar consumption and risk of preeclampsia in nulliparous Norwegian women. <i>Eur J Clin Nutr</i> , 2012, 66: 920-5. PMID:22713766.	Independent variable
31	Bower, D. The influence of dietary salt intake on pre-eclampsia. <i>Journal of obstetrics and gynaecology of the British Commonwealth</i> , 1961, 63: 123-6	Date
32	Bowers, K., Tobias, D. K., Yeung, E. et al. A prospective study of prepregnancy dietary fat intake and risk of gestational diabetes. <i>Am J Clin Nutr</i> , 2012, 95: 446-53. PMID:22218158.	Independent variable

	Citation	Rationale
33	Brantsaeter, A. L., Haugen, M., Myhre, R. et al. Diet matters, particularly in pregnancy – Results from MoBa studies of maternal diet and pregnancy outcomes. <i>Norsk Epidemiologi</i> , 2014, 24: 63-77	Study design
34	Brantsaeter, A. L., Myhre, R., Haugen, M. et al. Intake of probiotic food and risk of preeclampsia in primiparous women: the Norwegian Mother and Child Cohort Study. <i>Am J Epidemiol</i> , 2011, 174: 807-15. PMID:21821542.	Independent variable
35	Breslow, S, Belafsky, Ha, Shangold, Je et al. Control of weight gain in pregnancy: double blind study of a dieting aid. <i>Clinical medicine</i> , 1963, 70: 931-8	Date
36	Brooke, O. G. Low birth weight babies. <i>Nutrition and feeding. Br J Hosp Med</i> , 1982, 28: 462-9. PMID:7171896.	Dependent variable
37	Brooke, O. G. Nutrition in the preterm infant. <i>Lancet</i> , 1983, 1: 514-6. PMID:6131220.	Study subjects
38	Brown, J. E., Kahn, E. S., Hartman, T. J. Profet, profits, and proof: do nausea and vomiting of early pregnancy protect women from harmful vegetables?. <i>Am J Obstet Gynecol</i> , 1997, 176: 179-81. PMID:9024110.	Independent variable
39	Brumfield, C. G., Huddleston, J. F. The management of diabetic ketoacidosis in pregnancy. <i>Clin Obstet Gynecol</i> , 1984, 27: 50-9. PMID:6423330.	Independent variable
40	Bruno, R., Petrella, E., Bertarini, V. et al. Adherence to a lifestyle programme in overweight/obese pregnant women and effect on gestational diabetes mellitus: a randomized controlled trial. <i>Matern Child Nutr</i> , 2016, . PMID:27647837.	Independent variable, study design
41	Buchanan, T. A., Kjos, S. L. Diabetes and pregnancy. <i>Curr Ther Endocrinol Metab</i> , 1994, 5: 278-83. PMID:7704732.	Study design
42	Bul, E, Rijpkema, A, Steegers, E et al. Chronic dietary sodium restriction in pregnancy reduces calcium intake. <i>J Perinat Med</i> , 1992, 20	Independent variable
43	Campbell, Dm. Dietary restriction in obesity and its effect on neonatal outcome. <i>Nutrition in Pregnancy. Proceedings of 10th Study Group of the Rcoq</i> ; 1983; London, UK, 1983, : 243-50	Not peer-reviewed
44	Canda, M. T., Sezer, O., Demir, N. An audit of seafood consumption awareness during pregnancy and its association with maternal and fetal outcomes in a Turkish population. <i>J Obstet Gynaecol</i> , 2011, 31: 293-7. PMID:21534748.	Independent variable

	Citation	Rationale
45	Carmichael, S. L., Yang, W., Shaw, G. M. Maternal dietary nutrient intake and risk of preterm delivery. <i>Am J Perinatol</i> , 2013, 30: 579-88. PMID:23208764.	Independent variable, study design
46	Carter, J. P., Furman, T., Hutcheson, H. R. Preeclampsia and reproductive performance in a community of vegans. <i>South Med J</i> , 1987, 80: 692-7. PMID:3589760.	Independent variable
47	Carver, Jd, Saste, Md, Sosa, R et al. Dietary nucleotide (NT) effects on superior mesenteric artery (SMA) blood flow in preterm infants. <i>Pediatr Res</i> , 2000, 47	Independent variable
48	C'De Baca, J., Lapham, S. C., Skipper, B. J. et al. Use of computer interview data to test associations between risk factors and pregnancy outcomes. <i>Comput Biomed Res</i> , 1997, 30: 232-43. PMID:9281330.	Independent variable
49	Chamberlain, G. Epidemiology and aetiology of the preterm baby. <i>Clin Obstet Gynaecol</i> , 1984, 11: 297-314. PMID:6478726.	Study design
50	Chandler-Laney, P. C., Schneider, C. R., Gower, B. A. et al. Association of late-night carbohydrate intake with glucose tolerance among pregnant African American women. <i>Matern Child Nutr</i> , 2016, 12: 688-98. PMID:25786515.	Independent variable
51	Chavarro, J. E., Halldorsson, T. I., Leth, T. et al. A prospective study of trans fat intake and risk of preeclampsia in Denmark. <i>Eur J Clin Nutr</i> , 2011, 65: 944-51. PMID:21559043.	Independent variable
52	Chen, C. M., Weng, H. C., Li, Y. C. et al. The evaluation of dietary intervention on the blood glucose level of gestational diabetes mellitus pregnant women. <i>Nutritional Sciences Journal</i> , 1999, 24: 250-261	Language
53	Chen, L., Hu, F. B., Yeung, E. et al. Prospective study of pre-gravid sugar-sweetened beverage consumption and the risk of gestational diabetes mellitus. <i>Diabetes Care</i> , 2009, 32: 2236-41. PMID:19940226.	Independent variable
54	Chong, M. F., Chia, A. R., Colega, M. et al. Maternal Protein Intake during Pregnancy Is Not Associated with Offspring Birth Weight in a Multiethnic Asian Population. <i>J Nutr</i> , 2015, 145: 1303-10. PMID:25948786.	Independent variable
55	Christian, K, Andreas, M, Martin, F. Diet and lifestyle modification in mothers with burnout syndrome: Ayurvedic versus conventional standard counselling-design of a randomised clinical pilot study (VEDA-Trial) [abstract]. <i>European journal of integrative medicine</i> [abstracts of the 5th european congress for integrative medicine; 2012 sept 21-22; flo, 2012, 4: 47-8	Dependent variable

	Citation	Rationale
56	Clapp, J. F. Effects of Diet and Exercise on Insulin Resistance during Pregnancy. <i>Metab Syndr Relat Disord</i> , 2006, 4: 84-90. PMID:18370754.	Study design
57	Clausen, T., Slott, M., Solvoll, K. et al. High intake of energy, sucrose, and polyunsaturated fatty acids is associated with increased risk of preeclampsia. <i>Am J Obstet Gynecol</i> , 2001, 185: 451-8. PMID:11518908.	Independent variable
58	Coelho Nde, L., Cunha, D. B., Esteves, A. P. et al. Dietary patterns in pregnancy and birth weight. <i>Rev Saude Publica</i> , 2015, 49. PMID:26398873.	Study design
59	Cooney, G. Food for thought. <i>Midwives</i> , 2008, 11: 30-1. PMID:24902215.	Study design
60	Cooper, M. L. Stories to learn from: toxemia in pregnancy. <i>Midwifery Today Int Midwife</i> , 2014, : 18-21. PMID:25980103.	Not peer-reviewed
61	Corbett, M. A., Burst, H. V. Nutritional intervention in pregnancy. <i>J Nurse Midwifery</i> , 1983, 28: 23-9. PMID:6554311.	Study design, independent variable
62	Cosgrove, M., Davies, D. P. Poor diet in pregnancy may be a proxy for some other hostile influence on fetal growth [8]. <i>Br Med J</i> , 1996, 312: 1478-1479	Independent variable, study design
63	Costa-Orvay, Ja, Figueras-Aloy, J, Romera, G et al. The effects of varying protein and energy intakes on the growth and body composition of very low birth weight infants. <i>Nutr J</i> , 2011, 10	Independent variable
64	Crozier, S. R., Inskip, H. M., Godfrey, K. M. et al. Nausea and vomiting in early pregnancy: Effects on food intake and diet quality. <i>Matern Child Nutr</i> , 2016, . PMID:27896913.	Dependent variable
65	Dancause, K. N., Mutran, D., Elgbeili, G. et al. Dietary change mediates relationships between stress during pregnancy and infant head circumference measures: the QF2011 study. <i>Matern Child Nutr</i> , 2016, . PMID:27562643.	Independent variable
66	Darling, A. M., Mitchell, A. A., Werler, M. M. Preconceptional Iron Intake and Gestational Diabetes Mellitus. <i>Int J Environ Res Public Health</i> , 2016, 13. PMID:27231921.	Independent variable
67	Davidson, J. K. Newer approaches to diet management of diabetes: calorie control. <i>Med Times</i> , 1980, 108: 35-40. PMID:7374404.	Study design

Citation	Rationale
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	Citation	Rationale
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85	Drake, A. J., McPherson, R. C., Godfrey, K. M. et al. An unbalanced maternal diet in pregnancy associates with offspring epigenetic changes in genes controlling glucocorticoid action and foetal growth. Clin Endocrinol (Oxf), 2012, 77: 808-15. PMID:22642564.	Dependent variable
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	Citation	Rationale
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96	Fard, N Mehrabian F Sarraf-Zadegan NS. Fat-modified diets during pregnancy and lactation and serum lipids after birth. Indian J Pediatr, 2004, 71: 683-7	Country
97	Farland, L. V., Rifas-Shiman, S. L., Gillman, M. W. Early Pregnancy Cravings, Dietary Intake, and Development of Abnormal Glucose Tolerance. J Acad Nutr Diet, 2015, 115. PMID:26099686.	Study design, independent variable
98	Ferland, S., O'Brien, H. T. Maternal dietary intake and pregnancy outcome. J Reprod Med, 2003, 48: 86-94. PMID:12621791.	Independent variable
99	Flynn, A. C., Seed, P. T., Patel, N. et al. Dietary patterns in obese pregnant women; influence of a behavioral intervention of diet and physical activity in the UPBEAT randomized controlled trial. Int J Behav Nutr Phys Act, 2016, 13. PMID:27894316.	Health status
100	Ford, J. H. Preconception risk factors and SGA babies: Papilloma virus, omega 3 and fat soluble vitamin deficiencies. Early Hum Dev, 2011, 87: 785-9. PMID:21705161.	Independent variable
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Citation	Rationale
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107 Gesteiro, E., Rodriguez Bernal, B., Bastida, S. et al. Maternal diets with low healthy eating index or Mediterranean diet adherence scores are associated with high cord-blood insulin levels and insulin resistance markers at birth. <i>Eur J Clin Nutr</i> , 2012, 66: 1008-15. PMID:22828732.	Dependent variable
108 Ghebremeskel, K., Leighfield, M., Ashwell, M. et al. Infant brain lipids and diet [1]. <i>Lancet</i> , 1992, 340: 1093-1094	Dependent variable
109 Gillen, L., Tapsell, L. C., Martin, G. S. et al. The type and frequency of consumption of carbohydrate-rich foods may play a role in the clinical expression of insulin resistance during pregnancy. <i>Dietetics</i> , 2002, 59: 135-143	Dependent variable
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111 Godfrey, K., Robinson, S., Barker, D. J. et al. Maternal nutrition in early and late pregnancy in relation to placental and fetal growth. <i>Bmj</i> , 1996, 312: 410-4. PMID:8601112.	Independent variable

Citation	Rationale
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113 Gray-Donald, K., Robinson, E., Collier, A. et al. Intervening to reduce weight gain in pregnancy and gestational diabetes mellitus in Cree communities: an evaluation. <i>Cmaj</i> , 2000, 163: 1247-51. PMID:11107459.	Independent variable
114 Grivell, R. M., Yelland, L. N., Deussen, A. et al. Antenatal dietary and lifestyle advice for women who are overweight or obese and the effect on fetal growth and adiposity: the LIMIT randomised trial. <i>Bjog</i> , 2016, 123: 233-43. PMID:26841216.	Independent variable
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118 Haas, A. V. Diet du jour! Pregnancy and popular diets. <i>Midwifery Today Int Midwife</i> , 2014, : 53-5. PMID:25975083.	Study design, non peer-reviewed
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130 Hellmuth, C., Lindsay, K. L., Uhl, O. et al. Association of maternal prepregnancy BMI with metabolomic profile across gestation. <i>Int J Obes (Lond)</i> , 2017, 41: 159-169. PMID:27569686.	Dependent variable
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Citation	Rationale
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144 Hui, A. L., Ludwig, S. M., Gardiner, P. et al. Community-based exercise and dietary intervention during pregnancy: A pilot study. Canadian Journal of Diabetes, 2006, 30: 169-175	Independent variable

Citation	Rationale
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148 Jing, W., Huang, Y., Liu, X. et al. The effect of a personalized intervention on weight gain and physical activity among pregnant women in China. <i>Int J Gynaecol Obstet</i> , 2015, 129: 138-41. PMID:25697965.	Independent variable
149 Johnson, A. A., Knight, E. M., Edwards, C. H. et al. Dietary intakes, anthropometric measurements and pregnancy outcomes. <i>J Nutr</i> , 1994, 124. PMID:8201444.	Independent variable
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152 Jowett, N. I., Nichol, S. G. Diabetic pregnancy. <i>Midwives Chron</i> , 1987, 100: 33-6. PMID:3645266.	Study design
153 Kafatos, A. G., Vlachonikolis, I. G., Codrington, C. A. Nutrition during pregnancy: the effects of an educational intervention program in Greece. <i>Am J Clin Nutr</i> , 1989, 50: 970-9. PMID:2816804.	Independent variable
154 Kalhan, S. C., Tserng, K. Y., Gilfillan, C. et al. Metabolism of urea and glucose in normal and diabetic pregnancy. <i>Metabolism</i> , 1982, 31: 824-33. PMID:7098852.	Dependent variable
155 Kaseb, F., Kimiagar, M., Ghafarpoor, M. et al. Effect of traditional food supplementation during pregnancy on maternal weight gain and birthweight. <i>Int J Vitam Nutr Res</i> , 2002, 72: 389-93. PMID:12596505.	Independent variable

Citation	Rationale
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157 Kesmodel, U., Olsen, S. F., Salvig, J. D. Marine n-3 fatty acid and calcium intake in relation to pregnancy induced hypertension, intrauterine growth retardation, and preterm delivery. A case-control study. <i>Acta Obstet Gynecol Scand</i> , 1997, 76: 38-44. PMID:9033242.	Independent variable
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159 Khoury, J, Henriksen, T, Seljeflot, I et al. Effects of a cholesterol-lowering diet during pregnancy on cardiovascular risk factors and pregnancy outcome: a randomized clinical trial [Study design]. <i>Atherosclerosis. Supplements</i> , 2006, 7	Study design
160 Khoury, J., Haugen, G., Tonstad, S. et al. Effect of a cholesterol-lowering diet during pregnancy on maternal and fetal Doppler velocimetry: the CARRDIP study. <i>Am J Obstet Gynecol</i> , 2007, 196. PMID:17547890.	Independent variable
161 Kinnunen, T. I., Pasanen, M., Aittasalo, M. et al. Preventing excessive weight gain during pregnancy - a controlled trial in primary health care. <i>Eur J Clin Nutr</i> , 2007, 61: 884-91. PMID:17228348.	Independent variable
162 Kinnunen, T. I., Puhkala, J., Raitanen, J. et al. Effects of dietary counselling on food habits and dietary intake of Finnish pregnant women at increased risk for gestational diabetes - a secondary analysis of a cluster-randomized controlled trial. <i>Matern Child Nutr</i> , 2014, 10: 184-97. PMID:22735030.	Independent variable, dependent variable
163 Kizirian, N. V., Kong, Y., Muirhead, R. et al. Effects of a low-glycemic index diet during pregnancy on offspring growth, body composition, and vascular health: a pilot randomized controlled trial. <i>Am J Clin Nutr</i> , 2016, 103: 1073-82. PMID:26936333.	Independent variable
164 Klebanoff, M. A., Harper, M., Lai, Y. et al. Fish consumption, erythrocyte fatty acids, and preterm birth. <i>Obstet Gynecol</i> , 2011, 117: 1071-7. PMID:21508745.	Independent variable
165 Knudsen, V. K., Heitmann, B. L., Halldorsson, T. I. et al. Maternal dietary glycaemic load during pregnancy and gestational weight gain, birth weight and postpartum weight retention: a study within the Danish National Birth Cohort. <i>Br J Nutr</i> , 2013, 109: 1471-8. PMID:22906835.	Independent variable

Citation	Rationale
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167 Koivusalo, S. B., Rono, K., Klemetti, M. M. et al. Gestational Diabetes Mellitus Can Be Prevented by Lifestyle Intervention: The Finnish Gestational Diabetes Prevention Study (RADIEL): A Randomized Controlled Trial. <i>Diabetes Care</i> , 2016, 39: 24-30. PMID:26223239.	Independent variable
168 Kokanali, M. K., Tokmak, A., Kaymak, O. et al. The effect of treatment on pregnancy outcomes in women with one elevated oral glucose tolerance test value. <i>Ginekol Pol</i> , 2014, 85: 748-53. PMID:25546925.	Independent variable
169 Kolu, P., Raitanen, J., Rissanen, P. et al. Cost-effectiveness of lifestyle counselling as primary prevention of gestational diabetes mellitus: findings from a cluster-randomised trial. <i>PLoS One</i> , 2013, 8. PMID:23457562.	Independent variable
170 Korpi-Hyovalti, E., Schwab, U., Laaksonen, D. E. et al. Effect of intensive counselling on the quality of dietary fats in pregnant women at high risk of gestational diabetes mellitus. <i>Br J Nutr</i> , 2012, 108: 910-7. PMID:22093485.	Independent variable
171 Kubota, K., Itoh, H., Tasaka, M. et al. Changes of maternal dietary intake, bodyweight and fetal growth throughout pregnancy in pregnant Japanese women. <i>J Obstet Gynaecol Res</i> , 2013, 39: 1383-90. PMID:23815608.	Independent variable
172 Kumar, P., Nangia, S., Saili, A. et al. Growth and morbidity patterns of exclusively breast-fed preterm babies. <i>Indian Pediatr</i> , 1999, 36: 296-300. PMID:10713842.	Dependent variable
173 Lakin, V., Haggarty, P., Abramovich, D. R. et al. Dietary intake and tissue concentration of fatty acids in omnivore, vegetarian and diabetic pregnancy. <i>Prostaglandins Leukot Essent Fatty Acids</i> , 1998, 59: 209-20. PMID:9844995.	Independent variable
174 Langley-Evans, A. J., Langley-Evans, S. C. Relationship between maternal nutrient intakes in early and late pregnancy and infants weight and proportions at birth: prospective cohort study. <i>J R Soc Promot Health</i> , 2003, 123: 210-6. PMID:14669495.	Independent variable
175 Laraia, B. A., Siega-Riz, A. M., Kaufman, J. S. et al. Proximity of supermarkets is positively associated with diet quality index for pregnancy. <i>Prev Med</i> , 2004, 39: 869-75. PMID:15475018.	Dependent variable
176 Latva-Pukkila, U., Isolauri, E., Laitinen, K. Dietary and clinical impacts of nausea and vomiting during pregnancy. <i>J Hum Nutr Diet</i> , 2010, 23: 69-77. PMID:19943842.	Dependent variable

	Citation	Rationale
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178	Lechtig, A, Habicht, Jp, Delgado, H et al. Effect of food supplementation during pregnancy on birthweight. <i>Pediatrics</i> , 1975, 56: 508-20	Date
179	Lenders, C. M., Hediger, M. L., Scholl, T. O. et al. Gestational age and infant size at birth are associated with dietary sugar intake among pregnant adolescents. <i>J Nutr</i> , 1997, 127: 1113-7. PMID:9187625.	Independent variable
180	Ley, S. H., Hanley, A. J., Retnakaran, R. et al. Effect of macronutrient intake during the second trimester on glucose metabolism later in pregnancy. <i>Am J Clin Nutr</i> , 2011, 94: 1232-40. PMID:21955650.	Independent variable, study design
181	L'Heureux, J. Got sugar? Tips on preventing diabetes. <i>Posit Living</i> , 2002, 11: 12-4. PMID:12083048.	Study design
182	Li, S., Zhu, Y., Chavarro, J. E. et al. Healthful Dietary Patterns and the Risk of Hypertension Among Women With a History of Gestational Diabetes Mellitus: A Prospective Cohort Study. <i>Hypertension</i> , 2016, 67: 1157-65. PMID:27091899.	Dependent variable
183	Lilja, G, Dannaeus, A, Foucard, T et al. Effects of maternal diet during late pregnancy and lactation on the development of atopic disease in infants up to 18 months of age - in-vivo results. <i>Clinical and Experimental Allergy</i> , 1989, 19: 473-9	Dependent variable
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Citation	Rationale
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Citation	Rationale
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Citation	Rationale
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Citation	Rationale
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Citation	Rationale
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Citation	Rationale
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	Citation	Rationale
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290	Soto, R., Guilloty, N., Anzalota, L. et al. Association between maternal diet factors and hemoglobin levels, glucose tolerance, blood pressure and gestational age in a Hispanic population. <i>Arch Latinoam Nutr</i> , 2015, 65: 86-96. PMID:26817380.	Independent variable
291	Souza, Lalitha, Jayaweera, Hiranthi, Pickett, Kate E. Pregnancy diets, migration, and birth outcomes. <i>Health Care Women Int</i> , 2016, 37: 964-978	Study design
292	Sparks, J. W. Fetal growth and diet. <i>Mead Johnson Symp Perinat Dev Med</i> , 1984, : 21-7. PMID:6545381.	Study design
293	Standards of care of diabetes mellitus in pregnancy. <i>Diabetologie Metabolismus Endokrinologie Vyziva</i> , 2007, 10: 229-231	Study design, language
294	Stegers, E. A., Van Lakwijk, H. P., Jongsma, H. W. et al. (Patho)physiological implications of chronic dietary sodium restriction during pregnancy; a longitudinal prospective randomized study. <i>Br J Obstet Gynaecol</i> , 1991, 98: 980-7. PMID:1751444.	Independent variable
295	Stegers, E. A. P., Van Lakwijk, H. P. J. M., Jongsma, H. W. et al. (Patho)physiological implications of chronic dietary sodium restriction during pregnancy; a longitudinal prospective randomized study. <i>Br J Obstet Gynaecol</i> , 1991, 98: 980-987	Duplicate
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297	Stein, A. Addressing disturbances in the relationship between mothers with eating disorders and their infants: a randomized controlled trial. Personal communication, 2004,	Independent variable, not peer reviewed
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Citation	Rationale
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