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Differences in pre-pregnancy diet quality by occupation among employed women

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Abstract

Objective: Maternal risk factors for pregnancy outcomes are known to vary by employment status. We evaluated whether pre-pregnancy diet quality varies by occupation in a population-based sample.

Design: We analyzed interview data from 7,341 mothers in a national case-control study of pregnancy outcomes. Self-reported job(s) held during the 3 months before pregnancy were classified using Standard Occupational Classification (SOC) codes. Usual diet in the year before conception was assessed with a semi-quantitative FFQ and evaluated using the Diet Quality Index for Pregnancy (DQI-P). Using logistic regression, we calculated adjusted odds ratios (OR) and 95% confidence intervals (CI) to estimate associations between low diet quality (defined as the lowest quartile of DQI-P scores) and occupation types.

Setting: The National Birth Defects Prevention Study: Arkansas, California, Georgia, Iowa, Massachusetts, North Carolina, New Jersey, New York, Texas, Utah.

Participants: Employed mothers of infants born between 1997 and 2011.

Results: No occupation was strongly associated with low diet quality. Moderate but relatively imprecise associations were observed for women employed in management (OR: 1.3; 95% CI: 1.1, 1.7); arts, design, entertainment, sports, and media (OR: 1.4; 95% CI: 0.9, 2.1); protective service

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Authorship Contribution: T.A.D. developed the research question. I.Z. completed the data analysis. All authors contributed to study design, interpretation of the results, and writing of the article.

Conflicts of Interest: None.

Ethical Standards Disclosure: This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by Institutional Review Boards at the Centers for Disease Control and Prevention and each of the participating study centers. Verbal informed consent was obtained from all subjects/patients. Verbal consent was observed and formally recorded.

(OR 1.3; 95% CI: 0.7, 2.5); and farming fishing, and forestry occupations (OR: 0.5; 95% CI: 0.2, 1.1).

Conclusions: Our analyses suggest that women in certain occupations may have lower diet quality in the months before pregnancy. Further research is needed to determine whether certain occupations could benefit from interventions to improve diet quality in the workplace for women of reproductive age.

Keywords

Diet quality; Preconception health; Maternal occupation; Women's health; Pregnancy

Introduction

Maternal nutritional status before and during pregnancy is an important determinant of birth outcomes[1-5]. Many individual nutrients are critical for fetal growth and development, with the relation between folic acid and neural tube development among the most well-known examples. Since the US initiated fortification of enriched cereal grains with folic acid in 1998, there has been a 35% decrease in the prevalence of anencephaly and spina bifida and an estimated prevention of 1,300 neural tube defect cases annually[6].

Risk of adverse pregnancy and birth outcomes has been shown to vary by occupation[7-10]. Many studies have focused on chemical or physical exposures in the workplace potentially related to increased risk of adverse pregnancy outcomes[11-13]. Far fewer studies have explored whether these observed associations with occupation may be due to differences in the distribution of maternal behaviors, underlying health conditions, or other characteristics that are established risk factors for adverse pregnancy outcomes such as obesity, smoking, socio-economic status, and nutritional status.

Currently, there is very limited information about the association between diet quality and occupation, particularly for pregnant women or women of reproductive age[14-16]. Identifying occupational groups more likely to initiate pregnancy with low diet quality is important given the known relation between periconceptional diet quality and adverse reproductive outcomes. The fact that half of pregnancies in the United States are not planned[17] limits opportunities for individual pre-conception counseling, and thus population-level interventions are also needed. Workplace health promotion is one such population-level public health strategy which may provide targeted opportunities to improve diet quality for women of reproductive age, especially given that over half of first time mothers are employed during their pregnancy[18,19] and that employed individuals spend substantial proportions of their day at their workplace. Moreover, workplace policies and environmental factors that impact employee diet and nutrition (e.g., cafeteria selection, access to food storage, frequency and duration of breaks for meal times, etc.) are prime modifiable targets for intervention[20-22]. To further our understanding of the relation between maternal diet quality and occupation, the objective of this study was to explore whether there are measurable differences in pre-pregnancy diet quality across specific types of occupations using data from a large population-based study conducted in 10 U.S states between 1997 and 2011.

Methods

Study sample

We used data from the National Birth Defects Prevention Study (NBDPS), a case-control study of birth defects[23]. Specifically, we used data for women who delivered infants without birth defects (i.e., "controls" from the parent study). Per NBDPS protocol, approximately 100 mothers per year per state were randomly sampled as controls from birth certificates or hospital delivery records in each of the 10 states that contributed to the NBDPS: Arkansas, California, Georgia, Iowa, Massachusetts, North Carolina, New Jersey, New York, Texas, and Utah. Eligible women delivered a liveborn infant(s) without a birth defect between 1997 and 2011. Given the population-based sampling framework by which NBDPS controls were selected, this group of women has been shown to be generally representative of their base population with regard to various factors including maternal age, number of previous livebirths, smoking history, and diabetes[24].

All women were invited to participate in a computer-assisted telephone interview (CATI) in either English or Spanish between 6 weeks and 24 months after the expected date of delivery. During the maternal interview, each woman reported information on a multitude of factors, including maternal age, race/ethnicity, education, pre-pregnancy body mass index (BMI), pre-pregnancy diabetes, country of birth, folic acid-containing supplement use, smoking, and alcohol consumption before and during pregnancy. Approximately 65% of eligible women participated in the NBDPS interview.

Classification of occupation

Occupational histories were collected during the interview. Employed mothers were asked to provide occupational information on jobs they held for at least one month during the time period starting 3 months before conception and ending at delivery. Information collected for each job included the name of the company, job title, main duties/activities, month and year the job started/ended, number of days and hours worked per week, and what the company made or did. Occupational epidemiologists and industrial hygienists affiliated with the study then used this information to systematically assign a code that best represented the reported occupations based on the 2000 Standard Occupational Classification System (SOC)[25]. The SOC system was developed by the United States Bureau of Labor Statistics and is a federal statistical standard used to classify workers into occupational categories based on job characteristics within discrete occupations[25]. It utilizes a six-digit code with increasing level of occupational specificity at each successive digit to categorize occupations at 4 different levels: 1) major group; 2) minor group; 3) broad occupation; and 4) detailed occupation[25]. There are 23 major occupational groups at the 2-digit level (e.g., 25-0000; education, training, and library occupations). This process has been previously described in more detail[26].

To account for changes in occupation or employment status that may have been due to pregnancy recognition or other pregnancy-related factors, we restricted our sample to women who were employed during the three months preceding conception, from here on referred to as "pre-pregnancy" or "before conception". Each job reported during pre-

pregnancy was classified into one of the 23 major occupational groups based on the corresponding SOC code. If a mother reported having more than one job during this time, a primary job was assigned based on the number of days and hours per week worked at each job. To reduce bias from various sources including the healthy worker effect[(27)], we excluded women who were not employed, women who reported their exclusive occupation to be student, women who worked at some point during pregnancy but not pre-pregnancy, and mothers who were on active military duty.

Assessment of pre-pregnancy diet quality

To capture pre-pregnancy nutritional information, the maternal interview included a modified Willet food frequency questionnaire (FFQ)[(28)]. The original 61-item Willet FFQ was modified to better suit the NBDPS study population and research objectives. For example, the FFQ was modified to more fully assess frequency and timing of intake of food items known to have particular relevance to adverse pregnancy outcomes, such as alcohol, sweetened and caffeinated beverages, and enriched cereals. Another modification was the addition of some food items such as refried beans and avocados to better represent commonly reported foods among the large proportion of Hispanic study participants. This semi-quantitative FFQ captured usual intake of 58 food items in the year before pregnancy; each item was presented with its standard serving size (e.g., whole milk [8 oz glass]), and mothers reported their average intake for each item (range: never or < 1 per month to 6 or more times per day)[(2)]. We used this information, as well as the detailed information on consumption of cereals and sodas during the three months before pregnancy, to estimate usual dietary intake. Usual dietary intakes of specific nutrients were determined using the U.S. Department of Agriculture’s nutrient database (version 27)[(29)]. Our analyses utilized the information gathered from the interview to evaluate pre-pregnancy maternal diet in two ways: 1) overall diet quality as measured by the Diet Quality Index for Pregnancy (DQI-P), and 2) individual DQI-P component scores to explore potential explanations for overall low diet quality.

The DQI-P, modified specifically for the NBDPS, positively scored mothers on six components (grains, vegetables, fruits, folate, iron, and calcium) and negatively on two (percentage of calories from fat and sweets)[(2)]. Servings per day as reported on the FFQ were tallied to rank each individual component into quartiles based on the observed distribution within the study sample. Component scores were then summed to obtain the DQI-P score[(2)], which we also categorized into quartiles. Low diet quality was defined as a DQI-P score in the lowest quartile of scores based on the observed distribution within the study sample.

Analysis

We first examined the distribution of the 23 major occupational groups within our study sample and constructed a directed acyclic graph (DAG) to identify factors *a priori* that may be associated with maternal occupation and pre-pregnancy nutrition (Figure S-1)[(30)]. A minimally sufficient adjustment set was selected after eliminating covariates that had substantial missing data (>5%) or presented data sparsity issues but did not substantially change the overall association (>10%). Potential mediators (e.g., household income) were also excluded. Each model adjusted for study center, energy intake (continuous), age at conception (continuous), education (< high school, = high school, > high school), pre-pregnancy BMI (underweight [<18.5]; normal weight [18.5 – 24.9]; overweight [25.0–29.9]; obese body mass index ([≥30.0 kg/m^2]), and race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, other). Distributions for several excluded covariates or covariates known to be important to the pre-pregnancy period were also examined (i.e., nativity, pre-pregnancy diabetes, folic acid supplement use, smoking, and alcohol consumption).

To assess the association between maternal occupation and pre-pregnancy low diet quality, multivariable logistic regression was used to estimate adjusted odds ratios (aORs), 95% confidence intervals (CIs), and Bonferroni-adjusted p-values for occupations represented by at least 30 mothers. The reference group for each occupational group was all the other occupational groups combined.

As a supplementary analysis, general linear models (GLMs) were examined to evaluate overall diet quality as a continuous measure (range: 0-24). Regression coefficients and 95% confidence intervals were estimated to determine differences in mean DQI-P scores between individual occupational groups and the reference group. Similar to the primary analysis, the reference for each occupational group was all other occupational groups combined and estimates were only calculated for groups with at least 30 mothers. All analyses were conducted using complete case analysis methods in SAS version 9.4 (SAS Institute, Inc; Cary, NC).

Results

A total of 11,829 mothers of infants without a birth defect participated in the NBDPS. We excluded 3,282 (27.7%) women who were not employed at any point during pregnancy or the 3 months before; 534 (4.5%) who were employed at some point during pregnancy but not during the 3 months before conception; and 403 (3.4%) with missing employment information. Of the remaining 7,610 women, we excluded 4 (0.1%) women with insufficient information to classify occupation and 265 (3.5%) women missing more than 1 item on the FFQ and/or having an estimated daily caloric intake <500 or >5000 kcal. The final analysis sample consisted of 7,341 women.

Mothers most frequency held office and administrative support occupations (19.2%), sales and related occupations (11.0%), and education, training, and library occupations (9.7%) (Table 1). Least commonly held occupations included construction and extraction (0.3%), installation, maintenance, and repair (0.2%), and non-active duty military service (0.1%). Distributions of maternal characteristics stratified by major occupational group are reported in Supplemental Tables S-1a and S-1b. A majority of women in each occupational group were Non-Hispanic white with the exception of building and grounds cleaning occupations, farming, fishing and forestry occupations, transportation and material moving occupations, and military specific occupations. Over half of women in each occupational group were born in the United States except for women employed in farming, fishing, and forestry occupations (born in the U.S.: 27.7%; n=84). Moreover, BMI values were typically within the normal range (18.5-24.9) among women in most occupational groups; however, a high percentage of overweight (47.4%) and obese (21.1%) women were observed within the small sample (n=20) of construction and extraction professionals. Notably, the food preparation and serving occupations category was the only group to have a mean age at conception below 25 years (23.4 years). Also, nearly two thirds of women employed in farming, fishing, and forestry occupations had less than a high school education (62.7%).

Results for Diet Quality Index for Pregnancy

In general, no occupation(s) were strongly associated with low diet quality. However, a few occupations had slight negative or positive associations with low diet quality. These patterns were observed in both the crude and adjusted analyses, though none of the adjusted estimates remained statistically significant after accounting for multiple comparisons (Table 1). Women employed in arts, design, entertainment, sports, and media (aOR: 1.4; 95% CI: 0.9, 2.1), management (aOR: 1.3; 95% CI: 1.1, 1.7) and protective service occupations (aOR: 1.3; 95% CI: 0.7, 2.5) were more likely to have low diet quality when compared to women employed in any other occupational group. In contrast, those employed in farming, fishing, and forestry (aOR: 0.5; 95% CI: 0.2, 1.1) were less likely to have low diet quality when compared to all other occupations (Table 1). No meaningful differences in results were observed in analyses of DQI-P as a continuous variable (Table S2).

Results for individual diet quality components

Associations between each of the 8 components of the DQI-P and each occupational group were individually assessed to investigate whether specific dietary components might explain any observed associations with overall low diet quality. The majority of aORs for individual components were between 0.8 and 1.4 and relatively imprecise (Table 2). Stronger associations (aOR ≤ 0.7 or aOR ≥ 1.5) were most commonly detected among protective service (folate, grains, and iron), farming, fishing, and forestry (calcium, fruits, and percent calories from fat) and architecture and engineering occupations (fruits, iron, percent calories from sweets, and percent calories from fat).

Discussion

The results of our study indicate that pre-pregnancy diet quality may differ across some maternal occupations, though the majority of our results were relatively imprecise with no strong associations. Observed differences in pre-pregnancy diet quality could reflect differences in worksite policies around food storage and meal breaks, occupation related stressors (physical and psychosocial), and other socio-demographic or lifestyle characteristics. We found that women employed in farming, fishing, and forestry occupations are less likely to have low diet quality; we might hypothesize, for example, that these women may have greater access to fresh fruits and vegetables, thereby scoring higher on the DQI-P.

Though socioeconomic factors including education and income are known to be associated with overall diet quality[31,32], there is scant literature on the relation between maternal occupation and diet quality among women of reproductive age. In 2012, Kachan et al. evaluated nutrient intake and adherence to dietary guidelines among U.S. workers (n=8,987) using NHANES data[14]. The authors reported differences in intake of several nutrients including fiber, calories from saturated fat, and calories from carbohydrates among "blue collar", "white collar", farming, and service occupations, but results were not stratified by age or sex and thus not specific to women of reproductive age. Another study conducted in Japan, which utilized data from a prospective cohort (i.e., the Osaka Maternal and Child Health Study; n= 1,002), concluded that occupation was not a factor strongly associated with the intake of several assessed nutrients and foods among pregnant women[15], but this study only compared women who were employed outside of the home to those not employed. Similarly, a study from New Zealand concluded that occupational status did not strongly influence nutrient intake among pregnant women (n= 196)[16], However, this study classified women's occupations based on the occupation of each woman's husband/partner. In the context of such limited research, our study makes a unique contribution to the literature by leveraging a larger population-based sample of employed women in several U.S. states for whom pre-pregnancy occupation could be systematically classified.

Previous research has shown differences in various health outcomes and health-related behaviors by occupation including the Whitehall Study of British civil servants[33]. As it pertains to nutrition-related outcomes, results from different studies among employed individuals provide some insight on factors that can partially explain the association between occupation and diet. For example, data from workers in Minneapolis, Minnesota found that psychological work demands were associated with an increased intake of foods high in fat in men and associated with an increased BMI in women[34]. Moreover, participants from a research study in the United States cited several workplace dynamics such as a lack of healthy food options at their worksite, the price of healthy food options, stress-related eating, and working through lunch as factors that can negatively influence their worksite eating behaviors[35]. These findings point to several structural and psychosocial dynamics that need further research in the context of occupation and diet quality, since these are modifiable factors that can be considered in future worksite interventions.

Our analysis has limitations that need to be considered. Our study sample consists of women who successfully conceived and progressed to deliver a liveborn infant; thus, results could be affected by selection bias since infertility and pregnancy loss are also related to pre-pregnancy nutritional status, and the distribution of such outcomes may differ by employment or occupation. Measurement error is also a potential issue because mothers retrospectively reported occupation and usual diet; however, we have no evidence that women in specific occupations would be systematically more or less likely to misreport either their job details or details about their usual food intake. It is also important to note that the timeframes reported for occupation and diet are slightly different (i.e., job details – the 3 months before conception; usual diet – the year before pregnancy). Given that the FFQ in NBDPS was semi-quantitative, we could not evaluate diet quality in reference to recommended dietary allowances (RDA) for specific nutrients. Moreover, while the DQI-P is a validated measure of optimal diet quality for pregnancy, it does lack some specificity; for example, different types of grains (i.e., refined vs whole) and fats (i.e., saturated and unsaturated) are weighted equally. As in most epidemiologic studies, there is a potential concern for unmeasured or uncontrolled confounding (e.g., marital status). In the current study, the lack of marital status in the adjustment set may relate to residual confounding by socioeconomic status. Despite this concern, the NBDPS is a rich data source with information about many covariates, and we were able to adjust for several important confounders as identified by the DAG including maternal education and race/ethnicity. We also performed sensitivity analyses which demonstrated there was no additional confounding control when household income was included in the adjustment set. Lastly, we were unable to assess occupations with further granularity due to small sample size constraints. Since we expect some heterogeneity in jobs and job characteristics within each major occupational group, we may have masked some important differences in diet quality within these groups by using such broad occupational classifications in the current analysis.

This analysis has several strengths. First, eligible study participants were randomly selected for a population-based study of pregnancy outcomes from several states across the U.S. over a period of 14 years. This study population is demographically diverse and women in the study sample were employed in a wide range of occupations. Mothers of infants without birth defects who participated in the NBDPS were found in a separate analyses to be generally representative of their base populations[(24)]. While the 23 major occupational groups used in our analysis are broad, the SOC system is a standardized method for classifying occupations in research[(36-38)], and has the additional benefit of allowing for between-study comparisons. However, a few occupational groups had relatively small sample sizes, which negatively impacted the precision of their estimated odds ratios. We restricted to mothers who worked in the 3 months before pregnancy, thereby minimizing potential misclassification due to changes in occupation or employment status due to pregnancy planning or awareness. Further, we reduced errors in assignment to occupational groups among women with multiple jobs by leveraging the detailed self-reported occupational information to determine a primary job. Lastly, our ability to assess pre-pregnancy diet quality using an index specific to pregnancy-based recommendations is a major strength of our study. Diet quality indices are informative metrics that represent overall food consumption patterns and often serve as better predictors of health outcomes than measures based on individual nutrients[(39,40)]. Unlike the Healthy Eating Index, which quantifies an individual’s overall diet quality based on his or her compliance with the current Dietary Guidelines for Americans[(41)], the DQI-P was designed specifically for women of reproductive age and includes nutrients critical to optimal pregnancy health (e.g., folate). Despite the advantages of using the DQI-P for our research question, we strongly emphasize that we are not advocating dietary changes based on any specific elements of the index (e.g., we would not recommend lower intake of fat, or higher intake of grains, without further attention to the types of fats or grains). Such recommendations are outside the scope of this study; rather, our purpose is to describe differences among occupational groups as a first step toward identifying potential avenues for improvement.

Although the relationship between worksite eating habits and overall nutritional status is not well understood, our results emphasize a need to consider women of reproductive age when developing worksite food environment interventions and healthy eating campaigns. Worksite interventions have proven to be effective methods for improving the diets of workers[(20)] and are particularly valuable since employees with chronic conditions such as obesity have been found to have a greater degree of absenteeism than those with lower BMI values[(42,43)]. Federal agencies and other organizations have developed food service guidelines to help employers provide healthier food and beverage options by operationalizing dietary guidance[44,45]. It is important to note that these guidelines are designed to help adults meet their daily dietary requirements, and they are not intended for adults with special dietary needs such as pregnant and lactating women. However, employers may be able to use these guidelines as a starting place to help support women of reproductive age better meet their daily nutritional needs.

The findings of this analysis are important because they improve our understanding of the relation between maternal occupation and pre-pregnancy diet quality. The differences in maternal diet by occupation described in this analysis provide valuable information that, taken in context with existing and future research, can be considered by healthcare providers who provide preconception counseling, employers who have the potential to implement positive changes to the workplace such as offering healthy food choices, and health behavior professionals who design workplace wellness programs. Future studies should consider utilizing larger study samples in an effort to assess more specific occupational groups and potentially include complementary qualitative research that help elucidate structural barriers and lifestyle factors that may impact the nutritional status and overall health of women of reproductive age in the workforce.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Association between maternal occupation and pre-pregnancy low diet quality among mothers of infants born between 1997 and 2011, National Birth Defects Prevention Study (n=7,341)

Occupational Group†	No. (%) women	Diet Quality Index for Pregnancy (DQI-P): No. classified as low diet quality	No. above lowest quartile	Crude odds ratio	95% CI	Adjusted odds ratio‡	95% CI
Management	491 (6.7)	189	302	1.5	(1.2, 1.8)**	1.3	(1.1, 1.7)*
Business and Financial Operations	308 (4.2)	112	196	1.3	(1.0, 1.7)*	1.1	(0.8, 1.4)
Computer and Mathematical	117 (1.6)	34	83	0.9	(0.6, 1.4)	0.8	(0.5, 1.3)
Architecture and Engineering	34 (0.5)	10	24	0.9	(0.5, 2.0)	1.0	(0.4, 2.4)
Life, Physical, and Social Sciences	118 (1.6)	33	85	0.9	(0.6, 1.3)	1.0	(0.7, 1.7)
Community and Social Service	180 (2.5)	51	129	0.9	(0.6, 1.2)	0.8	(0.6, 1.2)
Legal	89 (1.2)	31	58	1.2	(0.8, 1.9)	1.1	(0.7, 1.8)
Education, Training, and Library	710 (9.7)	190	520	0.8	(0.7, 1.0)*	0.8	(0.6, 0.9)*
Arts, Design, Entertainment, Sports, and Media	146 (2.0)	46	100	1.0	(0.7, 1.5)	1.4	(0.9, 2.1)
Healthcare Practitioners and Technical	637 (8.7)	179	458	0.9	(0.7, 1.1)	0.8	(0.6, 1.0)*
Healthcare Support	339 (4.6)	114	225	1.2	(0.9, 1.5)	1.1	(0.8, 1.5)
Protective Service	64 (0.9)	22	42	1.2	(0.7, 2.0)	1.3	(0.7, 2.5)
Food Preparation and Serving Related	667 (9.1)	192	475	0.9	(0.8, 1.1)	1.0	(0.8, 1.3)
Building and Grounds Cleaning	197 (2.7)	42	155	0.6	(0.4, 0.9)*	1.0	(0.6, 1.5)
Personal Care and Service	441 (6.0)	123	318	0.9	(0.7, 1.1)	0.8	(0.6, 1.0)
Sales and Related	807 (11.0)	244	563	1.0	(0.8, 1.2)	1.0	(0.8, 1.2)
Office and Administrative Support	1406 (19.2)	494	912	1.3	(1.1, 1.5)**	1.2	(1.0, 1.4)*
Farming, Fishing, and Forestry	84 (1.1)	11	73	0.3	(0.2, 0.6)**	0.5	(0.2, 1.1)
Construction and Extraction§	20 (0.3)	-	-	-	-	-	-
Installation, Maintenance, and Repair§	14 (0.2)	-	-	-	-	-	-
Production	308 (4.2)	81	227	0.8	(0.6, 1.0)	0.9	(0.7, 1.3)
Transportation and Material Moving	159 (2.2)	39	120	0.7	(0.5, 1.1)	1.1	(0.7, 1.8)
Military Specific§	5 (0.1)	-	-	-	-	-	-

[†] The reference group for each occupational group was all the other occupational groups combined

[‡] Adjusted for energy intake, study center, maternal age at conception, maternal education, maternal pre-pregnancy body mass index, and maternal race/ethnicity

[§] Odds ratios were not estimated for occupational groups with fewer than 30 women

[*] p-value ≤ 0.05;

[**] Bonferroni-adjusted p-value ≤ 0.0025

Table 2.

Adjusted association between occupational group and low scores on components of the diet quality index* among mothers of liveborn infants without a birth defect employed during the pre-pregnancy period, National Birth Defects Prevention Study, 1997-2011 (n=7,341)

Occupational Group†	Calcium (mg)		Folate (µg DFE)		Fruits (servings)		Grains (servings)	
	Odds ratio‡	95% CI	Odds ratio‡	95% CI	Odds ratio‡	95% CI	Odds ratio‡	95% CI
Management	1.0	(1.0, 1.2)	1.1	(0.9, 1.4)	1.2	(1.0, 1.5)	1.2	(0.9, 1.4)
Business and Financial Operations	1.3	(1.0, 1.7)	1.1	(0.8, 1.4)	1.0	(0.8, 1.3)	0.8	(0.6, 1.0)
Computer and Mathematical	0.7	(0.4, 1.2)	0.9	(0.6, 1.5)	0.9	(0.6, 1.4)	0.6	(0.4, 1.0)
Architecture and Engineering	1.0	(0.4, 2.6)	1.2	(0.5, 2.8)	0.6	(0.2, 1.5)	0.9	(0.4, 2.0)
Life, Physical, and Social Sciences	0.8	(0.5, 1.4)	1.4	(0.9, 2.3)	0.8	(0.5, 1.2)	1.2	(0.8, 1.9)
Community and Social Service	1.1	(0.7, 1.6)	0.9	(0.6, 1.3)	1.0	(0.7, 1.5)	0.8	(0.6, 1.2)
Legal	0.7	(0.4, 1.2)	1.3	(0.8, 2.2)	1.5	(0.9, 2.3)	1.1	(0.6, 1.7)
Education, Training, and Library	0.7	(0.6, 0.9)	0.8	(0.7, 1.0)	0.8	(0.6, 0.9)	1.1	(0.9, 1.3)
Arts, Design, Entertainment, Sports, and Media	0.9	(0.6, 1.5)	0.9	(0.6, 1.5)	0.9	(0.6, 1.4)	1.0	(0.7, 1.6)
Healthcare Practitioners and Technical	0.8	(0.7, 1.1)	0.9	(0.7, 1.1)	0.9	(0.7, 1.1)	1.0	(0.8, 1.2)
Healthcare Support	1.3	(1.0, 1.8)	1.1	(0.8, 1.5)	0.9	(0.7, 1.2)	0.9	(0.7, 1.2)
Protective Service	1.0	(0.5, 1.9)	1.9	(1.0, 3.6)	1.1	(0.6, 2.0)	1.6	(0.9, 2.8)
Food Preparation and Serving Related	1.0	(0.8, 1.3)	1.1	(0.9, 1.4)	1.0	(0.8, 1.2)	1.2	(0.9, 1.4)
Building and Grounds Cleaning	1.5	(0.9, 2.3)	0.9	(0.6, 1.5)	1.3	(0.8, 1.9)	0.9	(0.6, 1.3)
Personal Care and Service	1.0	(0.8, 1.3)	0.8	(0,6, 1.0)	0.9	(0.7, 1.1)	0.9	(0.7, 1.2)
Sales and Related	1.0	(0.8, 1.2)	0.9	(0.7, 1.1)	1.2	(1.0, 1.4)	1.1	(0.9, 1.2)
Office and Administrative Support	1.2	(1.0, 1.4)	1.1	(0.9, 1.2)	1.2	(1.0, 1.4)	1.0	(0.9, 1.1)
Farming, Fishing, and Forestry	0.3	(0.1, 0.8)	0.8	(0.4, 1.6)	0.6	(0.2, 1.3)	1.1	(0.5, 2.1)
Production	1.1	(0.8, 1.5)	1.0	(0.7, 1.4)	0.9	(0.6, 1.2)	0.9	(0.6, 1.2)
Transportation and Material Moving	1.1	(0.7, 1.7)	1.3	(0.8, 2.1)	0.8	(0.5, 1.2)	0.9	(0.6, 1.4)
Occupational Group†	Iron (mg)		Vegetables (servings)		Percent calories from sweets§		Percent calories from fat§	
	Odds ratio‡	95% CI	Odds ratio‡	95% CI	Odds ratio‡	95% CI	Odds ratio‡	95% CI
Management	1.0	(0.8, 1.3)	1.2	(1.0, 1.5)	1.2	(0.9, 1.4)	0.8	(0.6, 1.1)
Business and Financial Operations	0.9	(0.7, 1.3)	1.2	(0.9, 1.6)	0.9	(0.7, 1.2)	0.9	(0.7, 1.2)

Occupational Group[†]	Calcium (mg)		Folate (µg DFE)		Fruits (servings)		Grains (servings)	
	Odds ratio[‡]	95% CI	Odds ratio[‡]	95% CI	Odds ratio[‡]	95% CI	Odds ratio[‡]	95% CI
Computer and Mathematical	1.1	(0.7, 1.7)	1.4	(0.9, 2.2)	1.4	(1.0, 2.2)	1.2	(0.8, 1.8)
Architecture and Engineering	1.5	(0.7, 3.3)	0.8	(0.3, 1.9)	1.5	(0.7, 3.1)	0.7	(0.3, 1.7)
Life, Physical, and Social Sciences	1.1	(0.7, 1.8)	1.1	(0.7, 1.7)	1.4	(0.9, 2.1)	1.0	(0.6, 1.5)
Community and Social Service	0.7	(0.5, 1.1)	0.6	(0.4, 0.9)	1.0	(0.7, 1.5)	1.4	(1.0, 2.0)
Legal	1.4	(0.8, 2.3)	0.9	(0.6, 1.6)	0.9	(0.6, 1.5)	0.9	(0.5, 1.5)
Education, Training, and Library	1.0	(0.8, 1.2)	0.9	(0.7, 1.1)	1.0	(0.8, 1.2)	0.9	(0.7, 1.1)
Arts, Design, Entertainment, Sports, and Media	1.4	(0.9, 2.1)	0.8	(0.5, 1.2)	1.3	(0.9, 1.9)	0.4	(0.2, 0.7)
Healthcare Practitioners and Technical	0.9	(0.8, 1.2)	0.9	(0.7, 1.1)	1.0	(0.9, 1.3)	1.1	(0.9, 1.3)
Healthcare Support	1.2	(0.9, 1.6)	0.9	(0.7, 1.1)	1.2	(0.9, 1.6)	0.9	(0.7, 1.2)
Protective Service	1.5	(0.8, 2.9)	1.4	(0.8, 2.5)	1.1	(0.6, 2.0)	1.3	(0.7, 2.2)
Food Preparation and Serving Related	1.0	(0.8, 1.3)	1.0	(0.8, 1.3)	1.0	(0.8, 1.2)	1.0	(0.8, 1.3)
Building and Grounds Cleaning	0.7	(0.4, 1.2)	0.9	(0.6, 1.1)	0.8	(0.5, 1.3)	0.8	(0.5, 1.1)
Personal Care and Service	1.0	(0.7, 1.2)	0.8	(0.6, 1.1)	1.1	(0.8, 1.4)	1.0	(0.8, 1.3)
Sales and Related	1.0	(0.8, 1.2)	1.2	(1.0, 1.4)	0.9	(0.7, 1.1)	1.0	(0.9, 1.2)
Office and Administrative Support	0.9	(0.8, 1.1)	1.1	(1.0, 1.3)	0.9	(0.8, 1.0)	1.1	(0.9, 1.2)
Farming, Fishing, and Forestry	1.3	(0.6, 2.8)	0.8	(0.4, 1.6)	1.0	(0.5, 2.1)	2.6	(1.5, 4.3)
Production	1.1	(0.8, 1.6)	0.8	(0.6, 1.1)	0.8	(0.5, 1.1)	1.2	(0.9, 1.5)
Transportation and Material Moving	1.0	(0.6, 1.7)	1.0	(0.6, 1.5)	1.1	(0.7, 1.7)	0.9	(0.6, 1.4)

[*] Low diet quality is defined as having a DQI value in the lowest quartile based on the observed distribution within the study sample

[†] The reference group for each occupational group was all the other occupational groups combined

[‡] Adjusted for energy intake, study center, maternal age at conception, maternal education, maternal pre-pregnancy body mass index, and maternal race/ethnicity

[§] Negatively scored components (i.e., a low-quartile value is considered preferable)