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Patterns of use of insulin-sensitizing agents among diabetic, borderline diabetic and non-diabetic women in the National Health and Nutrition Examination Surveys

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Abstract

The purpose of this cross-sectional study based on the 2001–2006 National Health and Nutrition Examination Survey is to examine demographic, socioeconomic, lifestyle and reproductive characteristics that may distinguish users and non-users of insulin sensitizing agents among U.S. diabetic, borderline diabetic and non-diabetic women. Use of insulin-sensitizing agents was evaluated among 19579 (3882 diabetic, 387 borderline diabetic and 15310 non-diabetic) women. Overall, 2% of women in the study sample were users of insulin-sensitizers, including metformin, rosiglitazone and pioglitazone. Multivariate logistic regression models were constructed for predictors of insulin-sensitizer use according to diabetic status. In the overall sample, being younger or diabetic were the only factors associated with an increased odds of using insulin-sensitizing agents, after adjustment of confounders. Among diabetics, use of insulin-sensitizing agents was inversely related to age, but not other factors in the multivariable model. Among borderline and non-diabetics, body mass index (BMI) was the only predictor that remained significantly associated with use of insulin-sensitizing agents after controlling for confounders. In conclusion, the main predictors of insulin-sensitizer use are young age and diabetic status in all women, young age in diabetic women and high BMI in borderline and non-diabetic women.

Keywords

diabetes; insulin resistance; metformin; obesity; survey

Introduction

A wide range of anti-diabetic medications are used to treat type 1 and type 2 diabetes. Whereas type 1 diabetics are generally treated with insulin injections, the treatment of type 2 diabetics appears to be more complex even though insulin resistance is often the core problem to be addressed. The agents used for managing type 2 diabetes can promote insulin

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secretion by β-cells, enhance insulin sensitivity of target organs or diminish the rate of glucose absorption from the gastrointestinal tract[1–6].

Biguanides (metformin[7, 8], pheformin[9, 10], buformin[11]) and thiazolidinediones (roziglitazone[12], pioglitazone[13–15], troglitazone[16–19]) are two classes of insulin sensitizers that have sparked controversies over the years. Metformin's site of action is the liver and it is contra-indicated for patients with impaired liver or kidney function[20]. Although it is the first line of treatment for type 2 diabetes in overweight and obese individuals along with diet and exercise, metformin can result in gastrointestinal symptoms including diarrhea, nausea, abdominal pain, lactic acidosis and metallic taste. Besides type 2 diabetes, metformin was shown to be efficaceous in treating gestational diabetes mellitus (GDM) and polycystic ovary syndrome (PCOS). Furthermore, the metabolic syndrome is a condition associated with insulin resistance that affects nearly one quarter of the U.S. population [21] and is often treated with metformin. Experimental indications for metformin include non-alcoholic fatty liver disease and premature puberty. Also, this drug is suspected to have a direct action on breast, colon, ovarian, pancreatic, lung and prostate cancer cells. Additional benefits of metformin include reduction in low density lipoprotein and triglyceride levels and prevention of cardiovascular complications of diabetes. The two other biguanides (phenformin and buformin) are currently withdrawn from the market of most countries due to toxic effects, including risk of fatal lactic acidosis[22].

Unlike metformin, side-effects associated with many thiazolidinediones have resulted in their withdrawal. In the 1990s, troglitazone (Rezulin) was withdrawn from the markert due to hepatitis and liver damage risk. In 2010, roziglitazone (Avandia) was suspended from the European market for elevated cardiovascular risks. Although type 2 diabetes is the only approved use of thiazolidinediones, these drugs are being investigated for PCOS, non-alcoholic steatohepatitis, psoriasis, autism, ovarian hyperstimulation syndrome and other conditions[12, 13].

The expanding use of metformin and other insulin-sensitizing agents beyond the treatment of type 2 diabetes implies that users of these drugs are increasingly becoming heterogeneous in terms of their demographic, socioeconomic, lifestyle and reproductive characteristics. This heterogeneity is likely to exist among women since one of the emerging indications for insulin sensitizers is PCOS, a condition affecting only women. To our knowledge, no population-based studies have examined patterns of use of insulin-sensitizing agents according to diabetic status among women. In this study, we analyzed recent waves of the National Health and Nutrition Examination Surveys (NHANES) to examine demographic, socioeconomic, lifestyle and reproductive characteristics that may distinguish users and non-users of insulin sensitizing agents among U.S. diabetic, borderline diabetic and non-diabetic women.

Methods

The NHANES is a nationally representative survey designed to evaluate the health and nutritional status of the U.S. civilian non-institutionalized population[23]. Stratified, multistage, probability survey samples are routinely obtained whereby counties, blocks, households and persons are selected within households[23] and low income individuals, adults aged 60 years or older, African-Americans and Mexican-Americans are over-sampled[24]. Demographic, socioeconomic and health data are collected by trained staff using household interviews. Also, a mobile examination center (MEC) run by health professionals collects anthropometric, blood pressure, and laboratory measurements either on all or a sub-group of study participants. Informed consent is obtained for all participants

and the institutional review board of the National Center for Health Statistics, Centers for Disease Control and Prevention, approves all protocols for the NHANES[25].

Since 1999, NHANES became a continuous surveillance system. For this analysis, we combined three NHANES waves, namely 2001–2002, 2003–2004 and 2005–2006. We restricted the study sample to females 18–85 years of age that can be classified as either diabetic, borderline diabetic or non-diabetic, resulting in a total of 19579 study participants (2001–2002: n=6493; 2003–2004: n=6706; 2005–2006: n=6380).

Variables examined in this study were obtained from multiple NHANES modules that focus on demographics, medical history, prescription drugs, weight, smoking and reproductive history. Study participants were asked to self-report whether or not they had been previously diagnosed by a physician with pre-diabetes or diabetes. This question was used to classify them into three groups, namely ‘diabetic’, ‘pre-diabetic’ or ‘non-diabetic’. The latter two groups were then combined to compare those with and without a diagnosis of type 1 or type 2 diabetes. Irrespective of diabetic status, enquiries were made concerning the use of diverse medications, including insulin-sensitizers. The Food and Drug Administration National Drug Code (FDA/NDC) directory was applied for NHANES participants, and used in this study to determine if a subject was a user of insulin-sensitizers individually or as a combination. The prevalent use of insulin sensitizers was evaluated according to characteristics of study participants, including demographic (age, race/ethnicity, marital status), socioeconomic (education, household income), health (smoking status, body mass index (BMI), self-rated health) and reproductive (age at first menstrual period, ever pregnant, number of pregnancies, number of live births, age at first live births, age at last live births, breastfeeding, menopausal status) factors. The same characteristics were also evaluated as determinants of diabetic and pre-diabetic status.

Statistical analyses were conducted using STATA version 8. Using survey commands, we applied recommended weighting procedures for the period of 2001–2006. Bivariate associations were analyzed using Pearson’s Chi-square tests for independence. Odds ratios (OR) were computed with their 95 percent confidence intervals (CI) using svylogit commands, taking sampling weights into consideration. These weights were defined to represent the U.S. civilian, non-institutionalized population while accounting for over-sampling of certain age and ethnic groups and interview non-response. Two-sided statistical tests were performed at an alpha level of 0.05.

Results

Out of 19579 women in the 2001–2006 NHANES sample, 19.8% were diabetic (n=3882), 1.9% were borderline diabetic (n=387) and 78.2% were non-diabetic (n=15310). The distribution of the total study sample as well as diabetic, borderline diabetic and non-diabetic women by demographic, socioeconomic, health and reproductive characteristics is presented in Table I. Nearly 35% of women in the study were at least 65 years of age, 56% were non-Hispanic Whites, 81.2% were ever married, 45% had more than high school education and 70% had a household income of at least $20000. Whereas 44% of women reported a history of smoking, 37% were obese and 33% reported a fair or poor self-rated health. For the vast majority of women in the study sample, the age at menarche was 12 to 14 years (63.3%). In addition, most of these women had experienced at least one pregnancy (85.2%) and were non-menopausal (70.9%). For 62% of the study sample, age at first live birth was less than 25 years and age at last live birth was 25 to 29 years. Taking non-diabetics as a reference, diabetics and borderline diabetics differed in their distribution by age, education and BMI. Specifically, borderline diabetic and diabetic women were older, less educated and more likely to have high BMI than their non-diabetic counterparts.

Moreover, being non-Hispanic Black, being ever married, having a household income of < $20000, reporting health status of fair or poor, grand multiparity (five or more live births), delayed childbearing (age at first or last live birth of 35 years or older), no breastfeeding and pre-menopausal status were all significantly associated with higher risks of diabetes.

Overall, 2% of women in the study sample were users of insulin-sensitizing agents. Specifically, 11.6% of diabetics and 2 per 1,000 of borderlie diabetics and non-diabetics reported using at least one of the following drugs: metformin, rosiglitazone and pioglitazone. As shown in Table II, the use of insulin sensitizers in the total sample increased with age until 54 years, and levelled off thereafter. White non-Hispanic women, those with more than high school education or a BMI < 25 kg/m^2 were least likely to be users of insulin sensitizing agents. Women who rated their health as fair or poor were significantly more prone to using insulin sensitizers than those who rated their health as excellent, very good or good. Most of these relationships appear to be confounded by presence of diabetes in women. Stratified analyses by diabetic status suggest that higher BMI predicted greater use of insulin-sensitizers among non-diabetic women. Other socio-demographic and health characteristics were not significantly associated with use of insulin sensitizers among either diabetic or non-diabetic women. Furthermore, women who reported grand-multiparity, no breastfeeding and pre-menopausal status were more likely to be users of insulin sensitizers. These relationships became statistically non-significant after stratification by diabetic status. Among diabetic women, delayed childbearing was associated with a lower prevalence of insulin sensitizer use. Among borderline and non-diabetic women, the prevalence of insulin sensitizer use was considerably increased in the absence of childbearing history.

Table III presents multivariate logistic regression models for demographic, socioeconomic, health and reproductive predictors of insulin-sensitizers use among diabetic, borderline diabetic and non-diabetic women. Overall, being younger or diabetic were the only factors associated with an increased odds of using insulin-sensitizing agents, after adjustment of confounders. Among diabetics, use of insulin-sensitizers was inversely related to age, but not other factors in the multivariable model. Among non-diabetics and borderline diabetics, BMI was the only predictor that remained significantly associated with use of insulin-sensitizers after controlling for age, race/ethnicity, education, self-rated health, number of live births, breastfeeding and menopausal status.

Discussion

In this study, we evaluated personal characteristics that can predict the use of insulin-sensitizing agents among female participants in the 2001–2006 NHANES study. Our results indicate that women were more likely to use metformin and other insulin-sensitizers if they were younger or diabetic. Also, diabetic women were more likely to use insulin-sensitizers if they were younger. Finally, overweight and obesity predicted use of insulin-sensitizers among non-diabetics and borderline diabetics. Other characteristics were not significantly associated with use of insulin-sensitizers in the multivariable models.

The finding that young age is a key determinant for use of insulin sensitizers is not unexpected. In fact, metformin, the most commonly prescribed insulin sensitizer, is also indicated for type 2 diabetes in youths. Our results also suggest that women of reproductive age and those less prone to comorbid conditions are more likely to be treated with insulin-sensitizers. Whereas, insulin-sensitizers may be used to treat infertility in women of reproductive age, the presence of comorbid conditions in older age groups may preclude the use of these medications for safety concerns.

Although indications for insulin sensitizer use besides type 2 diabetes are diverse, our study suggests that a high BMI may be a key predictor for using an insulin sensitizer. Overweight and obese women are prone to developing numerous health problems associated with insulin resistance, including PCOS, GDM and the metabolic syndrome. These women may be prescribed an insulin-sensitizer to facilitate weight loss, improve the chance of pregnancy and reduce the risk of adverse outcomes of pregnancy, among other indications.

To our knowledge, the present study is the first to comprehensively describe the use of insulin-sensitizers in the general population of U.S. women. Nevertheless, interpretation of study findings should take into account several limitations. First, the NHANES study has a cross-sectional design which precludes the establishment of causal relationships. Second, retrospective self-reporting may be problematic, especially for medications which assume health literacy. In particular, metformin use may have been under-estimiated given that it is currently the most commonly prescribed anti-diabetic medication. Third, reliance on a public-use dataset reduces our ability to conduct in-depth analyses that would elucidate the underlying causes of insulin-sensitizer use, including indications such as PCOS, GDM and the metabolic syndrome. Finally, the descriptive nature of this study renders it suitable for hypothsis generation rather than hypothesis-testing. In conclusion, insulin-sensitizers remain primarily targeted at individuals diagnosed with type 2 diabetes, although the indications for their use are expanding. Further studies are needed to elucide the growing use of metformin and other insulin-sensitizers for alternative indications besides diabetes.

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Table I

Demographic, socioeconomic, health and reproductive characteristics of diabetic, borderline diabetic and non-diabetic women in the National Health and Nutrition Examination Surveys 2001–2006

Characteristics:	**Total (N=19579)**	**Diabetic (N=3882)**		**Borderline Diabetic (N=387)**		**Non-Diabetic (N=15310)**	
	N (%)	**%**	**P**	**%**	**P**	**%**	**P**
Demographic:							
Age (yrs):		N=3882	<0.0001	N=387	0.013	N= 15310	Ref.
18–24	2077 (10.6)	0.9		1.5		8.5	
25–29	1072 (5.5)	1.4		2.9		6.1	
30–34	1029 (5.3)	2.0		1.3		6.7	
35–39	1034 (5.3)	2.9		3.3		7.8	
40–44	1281 (6.5)	5.3		6.8		9.5	
45–49	1356 (6.9)	5.9		4.9		11.0	
50–54	1569 (8.0)	13.7		8.0		10.6	
55–59	1339 (6.8)	15.0		17.2		8.9	
60–64	2046 (10.5)	10.4		8.4		7.3	
65+	6776 (34.6)	42.7		45.8		23.6	
Race/Ethnicity:		N=3382	<0.0001	N=387	0.47	N=15310	Ref.
Hispanic	3846 (19.6)	9.2		5.3		7.9	
White, non-Hispanic	10980 (56.1)	65.3		76.7		78.2	
Black, non-Hispanic	3989 (20.4)	18.5		14.7		9.5	
Other	764 (3.9)	6.9		3.3		4.3	
Marital status:		N=3882	0.0012	N=386	0.19	N=15307	Ref.
Ever-married	15883 (81.2)	89.6		82.6		81.4	
Never-married	3692 (18.9)	10.4		17.4		18.6	
Socioeconomic:							
Education:		N=3880	<0.0001	N=386	0.002	N=14933	Ref.
Less than high school	5527 (28.8)	27.2		35.7		17.3	
High school	5109 (26.6)	33.1		32.9		26.2	
More than high school	8563 (44.6)	39.7		31.4		56.5	
Household income:		N=3585	<0.0001	N=362	0.063	N=14294	Ref.
<$20000	5471 (29.9)	32.1		35.2		20.3	

Characteristics:	Total (N=19579)	Diabetic (N=3882)		Borderline Diabetic (N=387)		Non-Diabetic (N=15310)	
	N (%)	%	P	%	P	%	P
≥$20000	12770 (70.0)	67.8		64.8		79.7	
Health:							
Smoking status:		N=3873	0.066	N=386	0.96	N=14259	Ref.
Non-smoker	10315 (55.7)	54.3		52.4		52.1	
Ex-Smoker	4896 (26.4)	29.3		28.0		26.2	
Current smoker	3307 (17.9)	16.4		19.6		21.6	
Body Mass Index (kg/m^2):		N=3742	<0.0001	N=385	0.0001	N=14852	Ref.
< 24.9	6553 (34.5)	16.2		7.9		39.9	
25–29.9	5473 (28.8)	25.1		37.7		28.6	
> 30	6953 (36.6)	58.7		54.3		31.5	
Self-rated health:		N=3352	<0.0001	N=351	0.35	N=13586	Ref.
Excellent/VeryGood/Good	11577 (66.9)	45.8		66.8		77.5	
Fair/Poor	5712 (33.0)	54.2		33.3		22.5	
Reproductive:							
Age at first menst. period		N=3225	0.061	N=343	0.021	N=13353	Ref.
<12	3611 (21.3)	23.5		10.3		21.2	
12–14	10726 (63.3)	59.8		69.1		65.9	
≥ 15	2614 (15.4)	16.7		20.6		12.9	
Ever pregnant:		N=3255	0.12	N=343	0.52	N=13340	Ref.
Yes	14435 (85.2)	87.3		86.9		83.5	
No	2503 (14.8)	12.8		13.1		16.5	
Number of pregnancies:		N=3250	0.005	N=343	0.59	N=13339	Ref.
0	2503 (14.8)	12.8		13.1		16.5	
1	1849 (10.9)	7.5		17.0		12.4	
2	3114 (18.4)	19.8		16.9		21.0	
3	2972 (17.6)	20.2		25.0		18.5	
4	2438 (14.4)	13.8		8.8		13.8	
5+	4056 (23.9)	25.9		19.1		17.9	
Number of live births:		N=3223	<0.0001	N=335	0.68	N=13008	Ref.
0	3069 (18.5)	13.9		16.2		20.8	

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Characteristics:	Total (N=19579)	Diabetic (N=3882)		Borderline Diabetic (N=387)		Non-Diabetic (N=15310)	
	N (%)	%	P	%	P	%	P
1	2400 (14.5)	10.9		20.5		15.4	
2	3838 (23.2)	28.8		28.4		27.3	
3	3087 (18.6)	18.3		15.1		19.7	
4	1734 (10.5)	11.1		7.3		8.6	
5+	2438 (14.7)	16.8		12.5		8.1	
Age at first live birth (yrs):		N=2861	0.0024	N=280	0.46	N=10976	Ref.
No live birth	3069 (21.7)	15.7		23.3		24.7	
<25	8733 (61.9)	68.9		58.6		56.6	
25–29	1782 (12.6)	11.2		14.0		14.5	
30–34	434 (3.1)	2.9		3.4		3.6	
35+	99 (0.7)	1.2		0.7		0.6	
Age at last live birth (yrs):		N=3005	0.0025	N=307	0.29	N=11790	Ref.
No live birth	3069 (20.3)	14.8		17.7		22.8	
<25	2263 (14.9)	20.8		25.5		14.7	
25–29	9226 (61.1)	60.1		49.8		58.7	
30–34	434 (2.9)	2.7		6.9		3.3	
35+	110 (0.7)	1.6		0.0		0.5	
Breastfeeding:		N=2870	<0.0001	N=290	<0.0001	N=10157	Ref.
Ever	7326 (55.0)	42.2		43.5		58.4	
Never	5991 (45.0)	57.8		56.5		41.6	
Menopausal status:		N=3192	<0.0001	N=329	0.12	N=11878	Ref.
No	10928 (71.0)	86.5		86.5		64.7	
Yes	4471 (29.0)	13.5		13.4		35.3	

Table II

Socio-demographic, health and reproductive predictors of insulin-sensitizing agent use among diabetic, borderline diabetic and non-diabetic women in the National Health and Nutrition Examination Surveys 2001–2006

Characteristics:	Total (N=19579)		Diabetic (N=3882)		Borderline/Non-Diabetic (N=15697)	
	%	P	%	P	%	P
Demographic:						
Age (yrs):	N=19579	< 0.0001	N=3882	0.073	N=13696	0.39
18–24	0.3		9.4		0.1	
25–29	1.1		20.3		0.2	
30–34	1.2		21.8		0.0	
35–39	1.1		13.9		0.2	
40–44	1.4		10.3		0.4	
45–49	1.5		15.1		0.06	
50–54	2.9		14.5		0.06	
55–59	2.7		10.6		0.1	
60–64	2.7		12.4		0.3	
65+	2.7		9.6		0.2	
Race/Ethnicity:	N=19579	0.0015	N=3882	0.43	N=15697	0.95
Hispanic	2.6		13.3		0.2	
White, non-Hispanic	1.7		11.1		0.2	
Black, non-Hispanic	3.1		11.2		0.1	
Other	3.6		14.3		0.2	
Marital status:	N=19575	0.20	N=3882	0.25	N=15693	0.57
Ever-married	2.1		11.3		0.2	
Never-married	1.6		14.1		0.2	
Socioeconomic:						
Education:	N=19199	0.0001	N=3880	0.82	N=15319	0.89
Less than high school	2.9		11.9		0.2	
High school	2.4		11.8		0.2	
More than high school	1.5		11.1		0.2	
Household income:	N=18241		N=3585	0.54	N=14656	0.78
<$20000	2.6		10.8		0.1	

Characteristics:	Total (N=19579)		Diabetic (N=3882)		Borderline/Non-Diabetic (N=15697)	
	%	P	%	P	%	P
≥$20000	1.7		11.5		0.2	
Health:						
Smoking status:	N=0.14		N=3873	0.085	N=14645	0.04
Non-smoker	2.3		12.8		0.2	
Ex-smoker	1.9		9.2		0.3	
Current smoker	1.5		11.8		0.01	
Body Mass Index (kg/m^2):	N=18979	< 0.0001	N=3742	0.93	N=15237	0.0003
< 24.9	0.8		11.5		0.01	
25–29.9	1.8		11.8		0.2	
> 30	3.2		11.4		0.4	
Self-rated health:	N=17289	< 0.0001	N=3352	0.13	N=13937	0.24
Excellent/Very Good/Good	1.4		12.8		0.2	
Farir/Poor	3.4		10.6		0.08	
Reproductive:						
Age at first menst. period	N=16951	0.14	N=3255	0.52	N=13696	0.27
<12	2.3		13.0		0.05	
12–14	1.8		11.4		0.2	
≥ 15	2.4		11.3		0.2	
Ever pregnant:	N=16938	0.48	N=3255	0.10	N=13683	0.03
Yes	1.9		11.2		0.1	
No	2.2		15.4		0.3	
Number of pregnancies:	N=16932	0.43	N=3250	0.33	N=13682	0.09
0	2.2		15.4		0.3	
1	1.4		11.4		0.3	
2	1.9		12.0		0.1	
3	1.9		11.7		0	
4	1.8		11.1		0.03	
5+	2.3		10.3		0.2	
Number of live births:	N= 16566	0.049	N=3223	0.49	N=13343	0.24
0	1.9		15.0		0.3	

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Characteristics:	Total (N=19579)		Diabetic (N=3882)		Borderline/Non-Diabetic (N=15697)	
	%	P	%	P	%	P
1	1.4		10.6		0.1	
2	2.0		11.7		0.1	
3	1.8		11.9		0.0	
4	2.1		10.8		0.0	
5+	3.2		10.5		0.5	
Age at first live birth (yrs):	N=14117	0.50	N=2861	0.012	N=11256	0.17
No live birth	1.9		15.0		0.3	
<25	2.2		10.9		0.07	
25–29	2.3		16.4		0.2	
30–34	0.8		4.5		0.2	
35+	1.8		6.2		0	
Age at last live birth (yrs):	N=15102	0.47	N=3005	0.095	N=12097	0.16
No live birth	1.9		15.0		0.3	
<25	2.3		10.9		0.01	
25–29	2.0		11.7		0.1	
30–34	0.8		4.5		0.2	
35+	1.6		4.5			
Breastfeeding:	N=13317	0.0007	N=2870	0.56	N=10447	0.59
Ever	1.6		11.7		0.09	
Never	2.5		10.9		0.1	
Menopausal status:	N=15399	< 0.0001	N=3192	0.64	N=12207	0.91
No	2.5		11.4		0.1	
Yes	1.0		12.2		0.2	

Table III

Multivariate logistic regression models for demographic, socioeconomic, health and reproductive predictors of insulin-sensitizing agent use among diabetic, borderline diabetic and non-diabetic women in the National Health and Nutrition Examination Surveys 2001–2006

Characteristics:	Total (N=19579) OR (95% CI)	Diabetic (N=3882) OR (95% CI)	Borderline/Non-Diabetic (N=15697) OR (95% CI)
Diabetes status:			
Diabetic	1.00	--	--
Non-Diabetic	0.002 (0.0006–0.007)	--	--
Borderline Diabetic	0.22 (0.09–0.55)	--	--
Age (years):	0.98 (0.97–0.99)	0.98 (0.96–0.99)	1.02 (0.98–1.07)
Race/Ethnicity:			
Hispanic	1.00	1.00	1.00
White, non-Hispanic	0.92 (0.70–1.21)	0.96 (0.71–1.29)	0.35 (0.09–1.45)
Black, non-Hispanic	0.87 (0.66–1.14)	0.89 (0.65–1.22)	0.40 (0.05–3.46)
Other	0.77 (0.37–1.61)	0.81 (0.39–1.68)	--
Education:			
Less than high school	1.00	1.00	1.00
High school	0.89 (0.63–1.27)	0.90 (0.62–1.31)	0.49 (0.08–2.92)
More than high school	0.73 (0.48–1.11)	0.70 (0.45–1.09)	0.76 (0.15–3.68)
Body Mass Index (kg/m^2):			
< 24.9	1.00	1.00	1.00
25–29.9	1.01 (0.64–1.60)	0.93 (0.58–1.49)	25.70 (4.19–157.45)
> 30	0.91 (0.62–1.34)	0.86 (0.58–1.27)	13.16 (2.06–83.96)
Self-rated health:			
Excellent/Very Good/Good	1.00	1.00	1.00
Fair/Poor	0.83 (0.58–1.19)	0.87 (0.60–1.25)	0.25 (0.04–1.62)
Number of live births:	1.01 (0.91–1.14)	1.00 (0.89–1.13)	1.32 (0.64–2.71)
Breastfeeding status:			
Yes	1.00	1.00	1.00
No	0.91 (0.67–1.34)	0.88 (0.65–1.19)	2.66 (0.72–9.86)
Menopausal status:			
Yes	1.00	1.00	1.00
No	0.75 (0.51–1.12)	0.74 (0.49–1.09)	0.93 (0.13–6.43)