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# Association Between Fruit and Vegetable Consumption and Sleep Quantity in Pregnant Women

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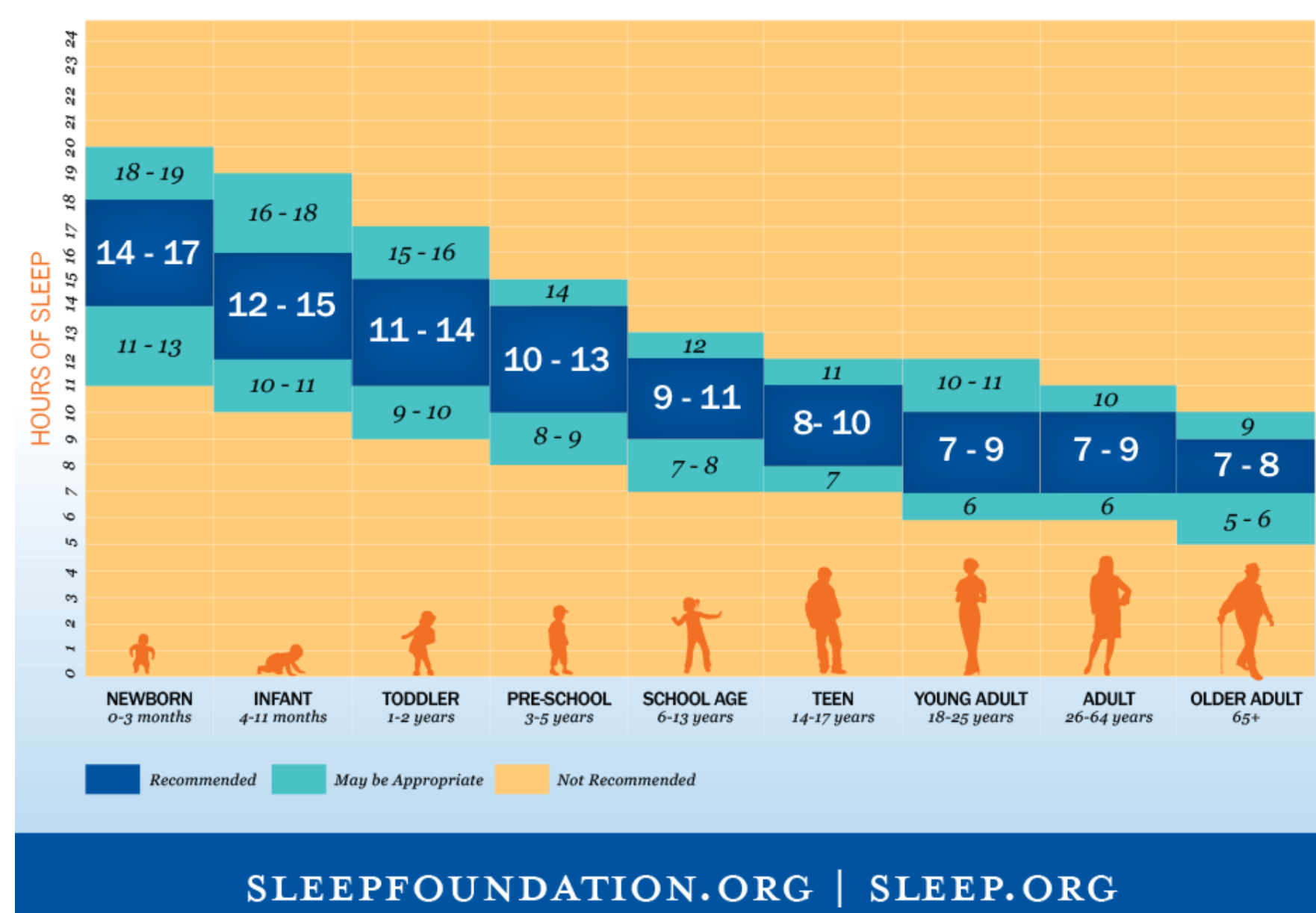
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## INTRODUCTION

- There are many factors to consider when leading a healthy lifestyle; adequate sleep and a well-balanced diet are two of these critical factors.
- The National Sleep Foundation recommends an average sleep duration of 7-9 hours per day for adults aged 18-64 years old.<sup>1</sup>
- Women are prone to encounter sleep disruptions during pregnancy that can prevent them from getting the recommended amount of sleep.<sup>2</sup>
- Poor sleep during pregnancy is associated with an increased risk for birth complications, including low birth weight and stillbirth.<sup>3</sup>
- Research has found that pregnant women who sleep fewer than 6 hours per night had longer labors and were 4.5 times more likely to have cesarean deliveries compared to women who averaged at least 7 hours of sleep per night.<sup>4</sup>



### SLEEP DURATION RECOMMENDATIONS



Accessed from: [https://sleepfoundation.org/sites/default/files/STREPFchanges\\_1.png](https://sleepfoundation.org/sites/default/files/STREPFchanges_1.png)

## OBJECTIVE

The objective of this study was to determine the association between fruit and vegetable consumption with overall sleep duration among pregnant women.

## METHODS

- Data from the 2011 and 2012 cycles of the Behavioral Risk Factors Surveillance System (BRFSS) were used for this study.<sup>5</sup>
- To assess sleep quantity, the BRFSS asked participants to report their average number of hours of sleep in a 24-hour period.
- Four questions on fruit and vegetable consumption from the BRFSS were used. These variables were then calculated to represent consumption per day and then add together to create a 5<sup>th</sup> total fruit and vegetable consumption variable.
- Covariates in our analysis included age, race/ethnicity, education, exercise, marital status, income, and employment. Each of these variables were considered as possible confounders with sleep and/or fruit and vegetable consumption.
- Data were analyzed using the SAS software (version 9.4). Weighted means  $\pm$  standard error and frequencies were calculated where appropriate.
- Simple linear regression with ANOVA was used for bivariate analysis to assess potential confounders.
- Linear regression was used to assess the relationship between fruit and vegetable consumption variables and daily sleep hours, controlling for confounders. Regression coefficients with 95% confidence intervals and p-values were calculated.

## RESULTS

- A total of 2,951 women were included in this study.
- The mean duration of sleep pregnant women received each night was 7.41 hours ( $\pm$  0.05).
- These women consumed fruit and vegetables an average of 3.02  $\pm$  .07 times per day.
- Overall, total daily fruit and vegetable consumption was not found to be associated with sleep duration among pregnant women [ $\beta$ = -0.03, (-0.07, 0.002)].
- Orange and green vegetable consumption were both found to be inversely associated with sleep duration [ $\beta$ = -0.19, (-0.38, -0.01) and  $\beta$ = -0.20, (-0.33, -0.08) respectively].
- Other vegetable consumption and fruit consumption were not associated with sleep duration.
- When examining the effect of physical activity with total daily fruit and vegetable consumption and sleep duration, a positive association was found, resulting in approximately 20 minutes of additional sleep for those who exercise compared to those who do not [ $\beta$ = 0.32 (0.16, 0.49)].
- Longer sleep duration was noticed in the youngest age group (18-24 years) as well as the middle age group (25-34 years) across all models when compared to the 35 to 44 year age group.
- Similarly, employment status showed a positive association with sleep quantity. An additional 25 minutes per day of sleep was observed in employed women compared to non-employed women (homemaker, unable to work, etc.) across all models.

Table 1: Study Demographics

Age, in years N (%)		Education N (%)		Employment N (%)	
18-24	666(30%)	Some high school or less	247 (16%)	Employed (including self employed)	1747 (54%)
25-34	1710(53%)	High school graduate or GED	673 (24%)	Unemployed	303 (11%)
35-44	566(17%)	Some college or technical school	808 (31%)	Student	174 (9%)
		College 4 years or more (College Graduate)	1222 (29%)	Retired, homemaker, unable to work	726 (26%)
		Missing	1	Missing	1
<b>Race/Ethnicity N (%)</b>		<b>Marital Status N (%)</b>		<b>Hours of sleep per night Mean (SE)</b>	7.41 (0.05)
White, Non-Hispanic	1939 (33%)	Married	1907 (56%)	<b>Green Vegetables Per Day Mean (SE)</b>	0.58 (0.02)
Black, Non-Hispanic	232 (12%)	Not Married	1044 (44%)	<b>Orange Vegetables Per Day Mean (SE)</b>	0.32 (0.02)
Asian, Non-Hispanic	103 (6%)			<b>Other Vegetables Per Day Mean (SE)</b>	0.82 (0.02)
American Indian/Alaska Native, Non-Hispanic	71 (1%)			<b>Fruit Per Day Mean (SE)</b>	1.30 (0.04)
Hispanic	465 (26%)	<b>Income N (%)</b>		<b>All Fruit and Vegetables Per Day Mean (SE)</b>	3.02 (0.07)
Other, Non-Hispanic	141 (3%)	1 \$0- \$19,999	567(29%)		
		2 \$20,000-\$34,999	539(20%)		
<b>Exercise N(%)</b>		3 \$35,000-\$74,999	759(26%)		
Yes	2141(71%)	8 \$75,000 or more	774(25%)		
No	784(29%)	Missing	312		
Missing	17				

Table 2: Results of Linear Regression Analysis

Variables	Estimate (95% CI)				
	Model 1	Model 2	Model 3	Model 4	Model 5
<b>Total Fruit and Vegetable Consumption (times per day)</b>	-0.03 [-0.07, 0.002]				
<b>Fruit Consumption (times per day)</b>		0.01 [-0.05, 0.07]			
<b>Orange Vegetable Consumption (times per day)</b>			-0.19 [-0.38, -0.01]		
<b>Green Vegetable Consumption (times per day)</b>				-0.20 [-0.33, -0.08]	
<b>Other Vegetable Consumption (times per day)</b>					-0.04 [-0.13, 0.05]
<b>Age, in years N (%)</b>					
18-24	0.35 [0.10, 0.60]	0.36 [0.11, 0.61]	0.35 [0.10, 0.60]	0.35 [0.09, 0.61]	0.35 [0.10, 0.60]
25-34	0.26 [0.02, 0.51]	0.25 [0.01, 0.49]	0.27 [0.02, 0.51]	0.27 [0.01, 0.52]	0.25 [0.00, 0.50]
35-44*					
<b>Race/Ethnicity N (%)</b>					
White, Non-Hispanic*					
Black, Non-Hispanic	0.08 [-0.11, 0.27]	0.09 [-0.09, 0.28]	0.08 [-0.11, 0.27]	0.09 [-0.10, 0.28]	0.09 [-0.10, 0.27]
Other	0.05 [-0.15, 0.24]	0.04 [-0.15, 0.24]	0.07 [-0.13, 0.26]	0.06 [-0.14, 0.26]	0.04 [-0.15, 0.23]
<b>Education N (%)</b>					
High School/GED or less*					
More than High School	-0.06 [-0.18, 0.07]	-0.06 [-0.19, 0.07]	-0.06 [-0.19, 0.06]	-0.06 [-0.19, 0.06]	-0.6 [-0.18, 0.07]
<b>Physical Activity</b>					
Yes	0.32 [0.16, 0.49]	0.30 [0.13, 0.46]	0.32 [0.16, 0.48]	0.33 [0.17, 0.50]	0.30 [0.14, 0.47]
No*					
<b>Income N (%)</b>					
<\$35,000*					
>= \$35,000	0.06 [-0.07, 0.19]	0.05 [-0.07, 0.18]	0.05 [-0.07, 0.18]	0.07 [-0.06, 0.20]	0.05 [-0.07, 0.18]
<b>Employment N (%)</b>					
Employed	0.42 [0.29, 0.55]	0.42 [0.29, 0.55]	0.42 [0.29, 0.55]	0.41 [0.27, 0.54]	0.42 [0.29, 0.55]
Unemployed*					

\* Denotes reference group

## STRENGTHS & LIMITATIONS

- This study is the first to examine the association between fruit and vegetable consumption and sleep duration in pregnant women.
- The study used a nationally representative population and robust data using multiple years of BRFSS data while controlling for potential confounders.
- This study is limited by the cross-sectional design, which cannot evaluate temporal associations of sleep disturbance during pregnancy.
- The fruit and vegetable questions did not account for serving size, nor were any questions asked about other food groups.
- The BRFSS offered an optional module on sleep quality in 2011 and 2012, but these data were not included in our study since only three states included the module in their survey. These questions could provide additional insight to the association between consumption of fruit and vegetables and sleep.

## CONCLUSIONS

- Our findings are contrary to those of previous studies among the general population, which found positive associations between fruit and vegetable consumption and sleep duration.<sup>6,7</sup>
- This discrepancy may be influenced by the wording of the sleep and diet questions in the BRFSS or by the study population itself, as pregnant women were excluded from previous studies.
- Although there was a negative association between fruit and vegetable consumption and sleep quantity among pregnant women, it is still vital to mention that fruit and vegetable consumption is important during pregnancy.
- Doctors, nurses, and public health officials should also emphasize the need for exercise during pregnancy and educate women on the health benefits it can convey, both to the mother and baby.
- Future research should evaluate additional comorbidities such as gestational diabetes, family medical history, Category C sleep aids and other medications as potential confounders.
- Future research should also be done to further explore the amount and intensity of exercise needed to improve sleep quantity and quality.

## REFERENCES

- <sup>1</sup>Hirshkowitz, M., Whiton, K., Albert, S., Alessi, C., Bruni, O., & DonCarlos, L., & ... Hillard, P. (2015). National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health, 1*(1), 40-43.
- <sup>2</sup>Okun, M. L. (2013). Sleep in pregnancy and the postpartum. In C. A. Kushida (Ed.), *Encyclopedia of sleep* (pp. 674-679). Waltham, MA: Academic Press.
- <sup>3</sup>Owusu, J., Anderson, F., Coleman, J., Oppong, S., Seffah, J., Aikins, A., & O'Brien, L. (2013). Association of maternal sleep practices with pre-eclampsia, low birth weight, and stillbirth among Ghanaian women. *International Journal Of Gynecology & Obstetrics, 121*(3), 261-265.
- <sup>4</sup>Lee, K., & Gay, C. (2004). Sleep in late pregnancy predicts length of labor and type of delivery. *American Journal Of Obstetrics And Gynecology, 191*(6), 2041-2046.
- <sup>5</sup>CDC: BRFSS. The Behavioral Risk Factor Surveillance System (BRFSS). Available at: <http://www.cdc.gov/brfss/about>. Accessed October 21, 2015.
- <sup>6</sup>Kruger, A., Reither, E., Peppard, P., Krueger, P., & Hale, L. (2014). Do sleep-deprived adolescents make less-healthy food choices?. *British Journal Of Nutrition, 111*(10), 1898-1904.
- <sup>7</sup>Hoefelmann, L., Lopes, A., Silva, K., Silva, S., Cabral, L., & Nahas, M. (2012). Lifestyle, self-reported morbidities, and poor sleep quality among Brazilian workers. *Sleep Medicine, 13*(9), 1198-1201.