Vitamin D Supplementation Among Women of Childbearing Age: Prevalence and Disparities

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Deficiency Associations

- Cardiovascular disease
- Cancers
- Metabolic disease
- Lowe bone strength
- Autism
- Multiple sclerosis
- Diabetes
- Mental illness
- Obesity-related illnesses
- All-cause mortality

Deficiency Pregnancy Associations

- Fertility
- Higher Caesarian rates
- Lower birth weight
- Gestational diabetes
- Preterm delivery
- Preeclampsia,
- Infant fetal development,
- Infant muscular and bone development
- Child adiposity risks.

Deficiency Prevalence

Widespread across virtually all populations. Disparities exist.

More prevalent among:

Women than men

Pregnant women than non-pregnant women

Children than young adults

Along lines of **race/ethnicity**

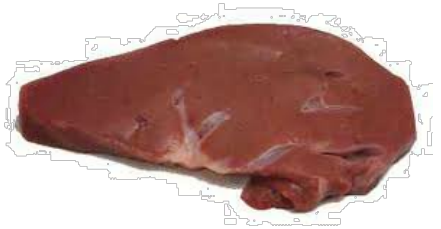
Exacerbating Disparities

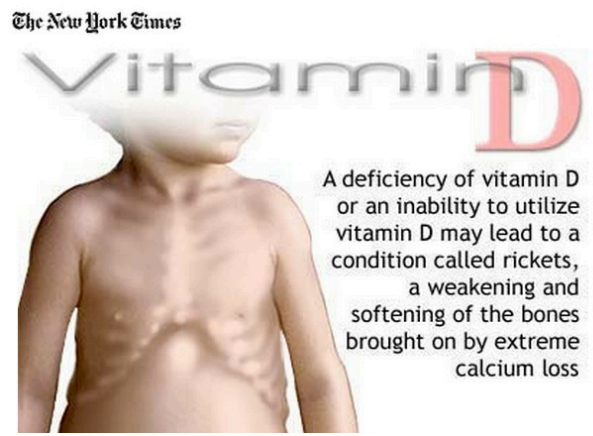
Parallel **Nutritional Disparities**

Parallel disparities for **associated health risks**

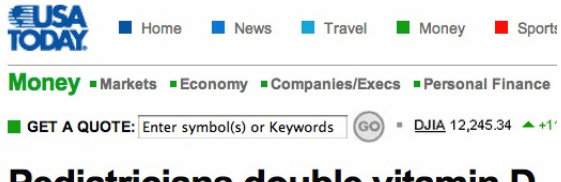
Obesity ⟷ Vitamin D **deficiency**

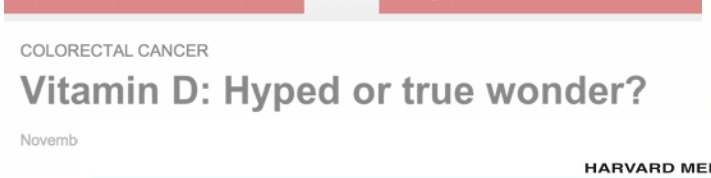
Sources of Vitamin D

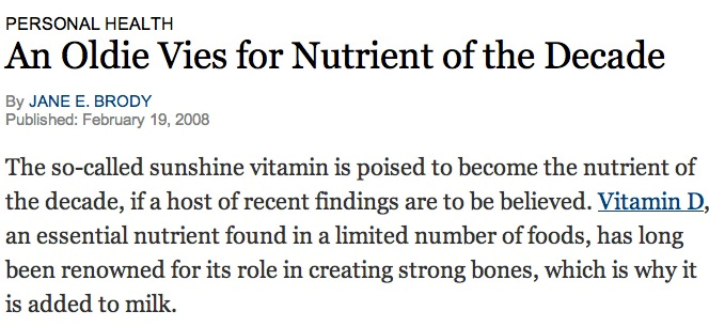




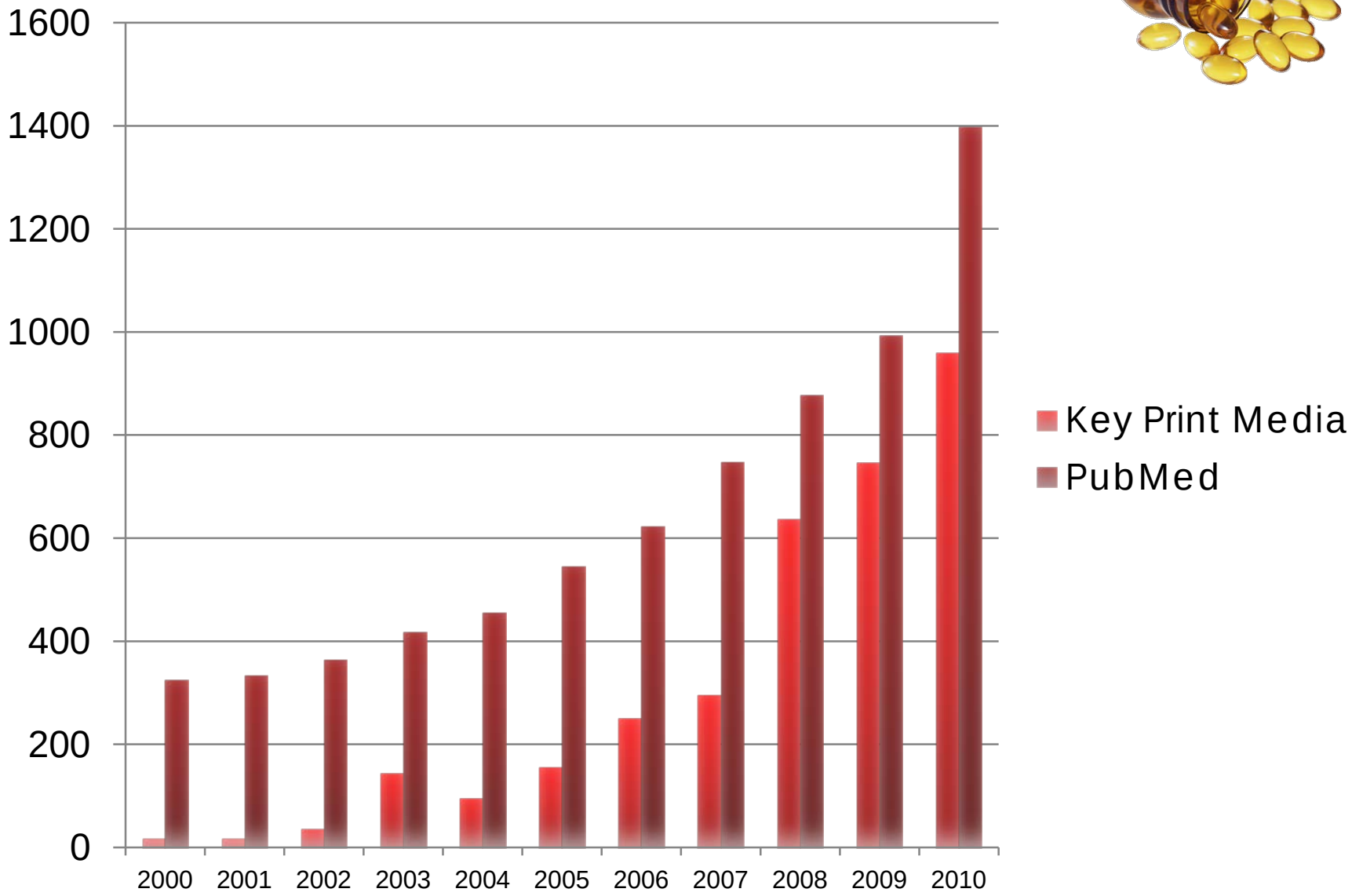
Vitamin D Made Headlines In 2007, 2008







Attention to Vitamin D



Supplementation Among

Women of Childbearing Age

Research Aims

- Examine the **prevalence, disparities, and predictors** of vitamin D supplementation among women of childbearing age (16-49 years) in the United States and within multiple subgroups in three broad areas:

  - Demographic
  - Socioeconomic
  - Health

Study Design

Format

- Population-based cross-sectional secondary analysis

Source

- NHANES (National Health And Nutrition Examination Survey) CDC NCHS

Study Design

Population	• Women of childbearing age (16-49) (n=1749)
Years	• 2007-2008 Survey Data

Methods and Variables

Age

- 16-19
- 20-35
- 36-49

BMI

- <25
- 25-30
- 30-35
- ≥35

Waist Circumference

- <35 inches
- ≥35 inches

Methods and Key Variables

Vitamin D Supplement Intake

- 30 Days
- 1, 2 Day 24-hour recall
- Duration of Intake
- Dose (IU)

Methods and Variables

Tried to lose weight in past year

- 16-19
- 20-35
- 36-49

Diabetes

- Doctor told had diabetes
- Diabetes during pregnancy

Race/Ethnicity

- Mexican-American
- Other Hispanic
- Non-Hispanic White
- Non-Hispanic Black
- Other or Multi-Racial

Methods and Variables

Years in the US

- 1-2 (non-citizens)
- 3-5 (non-citizens)
- 6-10 (non-citizens)
- 10+ (citizens & non-citizens)

Household Income

- <$25,000 per year
- $25,000-$45,000 per year
- $45,000-$65,000 per year
- $65,000-$75,000 per year
- >$75,000 per year

Food Security (adult)

- Full food security
- Marginal food security
- Low food security
- Very low food security

Methods and Variables

Health Insurance Status

- Insured
- Private Insurance
- Government
- Uninsured

Education Level Age 16-19

- At grade level
- Below grade level

Education Level Adult

- Less than high school
- High school/GED/equiv.
- Some college or AA
- College graduate or above

Methods and Variables

Parity

- Has been or is pregnant
- Never been pregnant
- Has breastfed a child 1+ mo
- Has never breastfed a child

Moderate or Vigorous Exercise

- None
- Avg 1-30 minutes per day
- Avg 30+ minutes per day

Vitamin D Intake from Food

- < 400 IU from food avg day
- ≥400 IU from food avg day

Results

- Of total 1749 Women, 459 or 33% took Vitamin D supplements in the last 30 Days

Results

Age	n total	n supplementing
16-19	290	47 (23.2%)
20-35	739	188 (30.7%)
36-49	720	224 (37.7%)

Results

Waist Circumference	n total	n supplementing
< *35 inches*	766	222 (36.6%)
≥ *35 inches*	983	237 (29.7%)

Results

Race/Ethnicity	n total	n supplementing
Mexican-American	363	63 (18.3%)
Other Hispanic	233	53 (22.7%)
Non-Hispanic White	690	228 (37.4%)
Non-Hispanic Black	390	93 (26.2%)
Other Race or Multi-Racial	73	22 (34.6%)

Results

Years in US	n total	n supplementing
1-2 (non-citizens)	76	11 (15.8%)
3-5 (non-citizens)	232	58 (31.9%)
6-10 (non-citizens)	92	23 (27.5%)
10+ (citizens & non-citizens)	1349	367 (33.8%)

Results

Household Income	n total	n supplementing
<$25,000 per year	161	28 (20.3%)
$25,000-$45,000 per year	145	47 (36.7%)
$45,000-$65,000 per year	253	67 (32.2%)
$65,000-$75,000 per year	98	30 (35.1%)
>$75,000 per year	399	161 (44.9%)

Results

Food Security	n total	n supplementing
Full food security	1160	347 (36.9%)
Marginal food security	257	59 (23.7%)
Low food security	205	36 (18.8%)
Very low food security	116	16 (18.7%)

Results

Health Insurance	n total	n supplementing
Insured	1255	375 (26.2%)
Private Insurance	884	310 (40.4%)
Government	379	66 (20.5%)
Uninsured	491	84 (21.3%)

Results

Education Level Youth 16-19	n total	n supplementing
At grade level	265	43 (23.9%)
Below grade level	25	4 (12.3%)

Results

Education Level Adult	n total	n supplementing
Less than high school	375	55 (17.9%)
High school/GED/equiv.	323	77 (27.3%)
Some college or AA	473	152 (37.3%)
College graduate or above	287	128 (46.8%)

Results

Parity	n total	n supplementing
Has been or is pregnant	1039	301 (35.6%)
Never been pregnant	237	69 (33.9%)
Has breastfed a child 1+ mo	572	187 (40.4%)
Has never breastfed a child	412	91 (25.5%)

Results

Exercise	n total	n supplementing
None	899	187 (25.1)
Avg 1-30 minutes per day	91	34 (43.1)
Avg 30+ minutes per day	759	238 (38.6)
None	899	187 (25.1)

Results

D Intake from Food	n total	n supplementing
< 400 IU from food avg day	1672	433 (32.5%)
≥400 IU from food avg day	77	26 (42.4%)

Results

PARTICIPANTS	Total	DURATION OF ONGOING VITAMIN D SUPPLEMENT USE n (%)		
		≤1 year	1-2 years	>2 years
Women of childbearing age	1749	241 (44.7%)	58 (14.9%)	160 (40.4%)

Results

PARTICIPANTS	Total	AVG DOSE PER DAY (30 day) (IU)* n (%100) [low] *≤ 400*	[med] *>400 & <800*	[high] *≥ 800*
Women of childbearing age	1749	345 (73.0%)	46 (12.7%)	64 (14.3%)

Predictors of Supplementation — Age

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
age16_19	.5001624	.121424	-2.85	0.011	.2989526	.8367961
age20_35	.7308728	.0708332	-3.23	0.005	.5951342	.8975708
_cons	.6049733	.0625811	-4.86	0.000	.4858461	.75331

Predictors of Supplementation — BMI

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
bmi25_30	.9755281	.1437848	-0.17	0.869	.7137427	1.333331
bmi30_25	.9444374	.214234	-0.25	0.804	.5838914	1.527616
bmi35up	.4953084	.1317164	-2.64	0.018	.2818679	.8703737
_cons	.5577776	.0860393	-3.78	0.002	.402203	.7735294

Predictors of Supplementation — Race/Ethnicity

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
black_nh	.5952558	.128544	-2.40	0.029	.3766073	.940846
hispanic	.4910924	.0980331	-3.56	0.003	.3216459	.7498051
otherrace	.885824	.219212	-0.49	0.631	.5242204	1.496859
mexamerican	.3764179	.0578723	-6.36	0.000	.271721	.5214557
_cons	.5965417	.0806312	-3.82	0.002	.4479194	.7944777

Predictors of Supplementation — Years in the US

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
usyear3_5	2.49152	1.087294	2.09	0.053	.9878456	6.284052
usyears6_9	2.020136	.9326651	1.52	0.147	.7591454	5.375716
usyears10up	2.722384	.8257396	3.30	0.005	1.431194	5.178455
_cons	.1876933	.0647368	-4.85	0.000	.0903452	.3899351

Predictors of Supplementation — Income

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
incomeunder25	.7536639	.1532646	-1.39	0.183	.489725	1.159853
income25to45	1.714742	.3849124	2.40	0.029	1.065455	2.759703
income65to75	1.593857	.5347174	1.39	0.184	.782671	3.245782
incomeover75	2.404324	.4114115	5.13	0.000	1.672844	3.455656
_cons	.3386964	.0416548	-8.80	0.000	.260965	.4395811

Predictors of Supplementation — Food Security

tookDinlast30days	Odds Ratio	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
marginalfoodsecure	.5333549	.1575193	-2.13	0.049	.2851745	.9975208
lowfoodsecure	.3973535	.0648144	-5.66	0.000	.2811919	.561502
verylowfoodsecure	.3957843	.1068818	-3.43	0.003	.2232713	.7015914
_cons	.5808102	.0689079	-4.58	0.000	.451654	.7469003

Strengths

- Detailed demographics
- Groundwork for 09-10 data
- Angles of vitamin D supplementation (duration, dose, intake/not)
- Broad, representative sample

Limitations

- Recall/Epidemiology
- Date/season of collection
- Limited race/ethnicity data
- Could not measure serum status
- Sun exposure
- Some statistical power
- Few pregnant women

Implications for public health and future research

- Who is getting vitamin D supplementation message? Disparities
- May enhance existing disparities
- Advocacy
- Practice
- Messaging/media
- Study of 2009-2010 NHANES data
- Study of pregnant/breastfeeding women in more detail with new data

Acknowledgements

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- Mario Kratz, PhD, MSc
- Daniel Enquobahrie, PhD, MPH, MD

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