

# Serum vitamin D concentrations are non-linearly related to breast cancer risk in postmenopausal women

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## Introduction

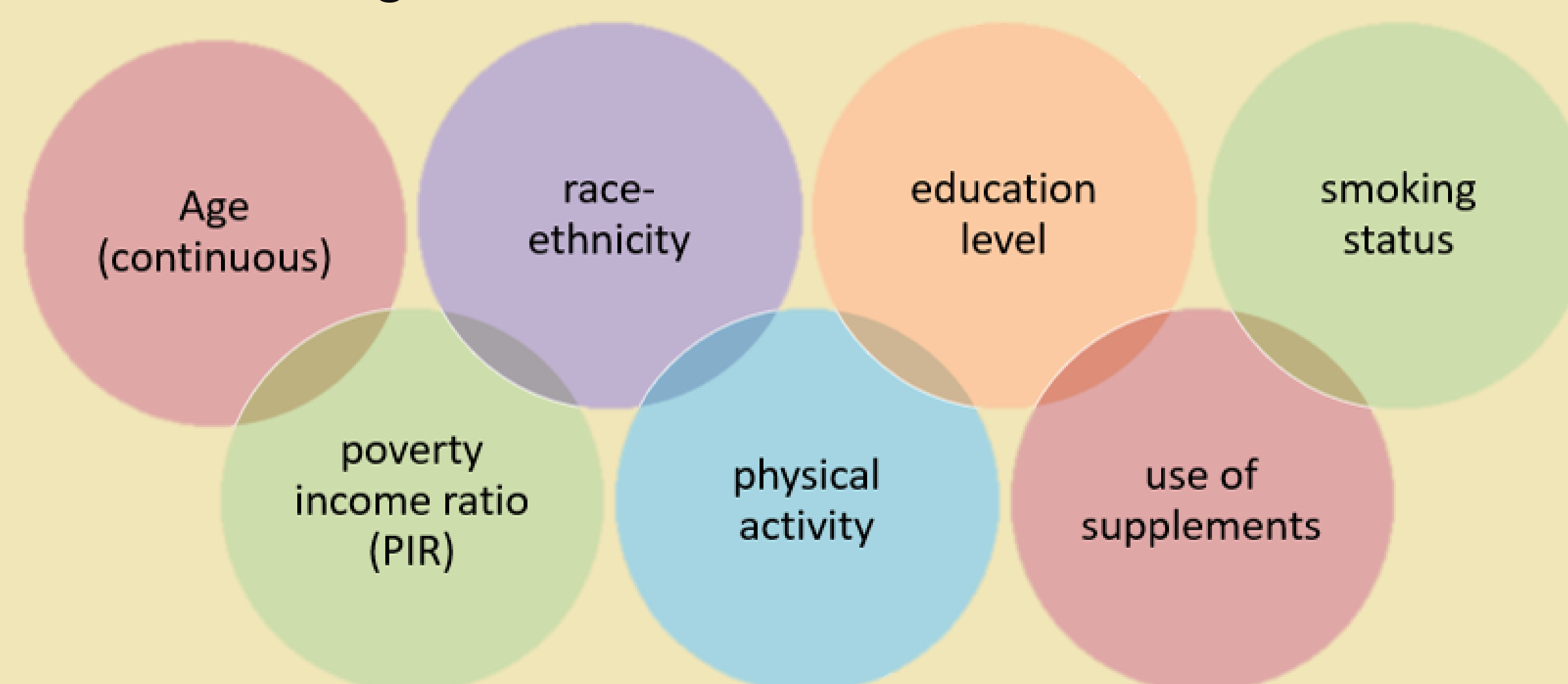
Serum D [25(OH)D] is commonly used as a biomarker of vitamin D status. Recently, the role of vitamin D in non-calcemic functions has received much attention. In the US, the prevalence of low serum 25(OH)D [ $<50\text{nmol/l}$ ] among postmenopausal women was 53%. Cancer is the second leading cause of death worldwide. Several studies have linked vitamin D deficiency with cancer. It is not known if suboptimal vitamin D concentrations are related to cancer risk in postmenopausal women.

## Objective

The aim of this study was to investigate the association between serum 25(OH)D concentration and breast cancer risk in postmenopausal women in the US

## Methodology

- Standardized serum 25(OH)D concentrations were used.
- Breast cancer was self-reported by participants.
- Serum 25(OH)D was stratified into 5 categories based on recommendations of Institute of Medicine and Endocrine Society. Multivariate-adjusted logistic regression analysis was performed to determine association between serum 25(OH)D and breast cancer after adjusting data for confounding variables (below).



- Subgroup analyses for various races were also performed. Restrict cubic spline method with three knots at 5th, 50th and 95th were used to analyze the non-linear trend. Statistical significance:  $p < 0.05$ .

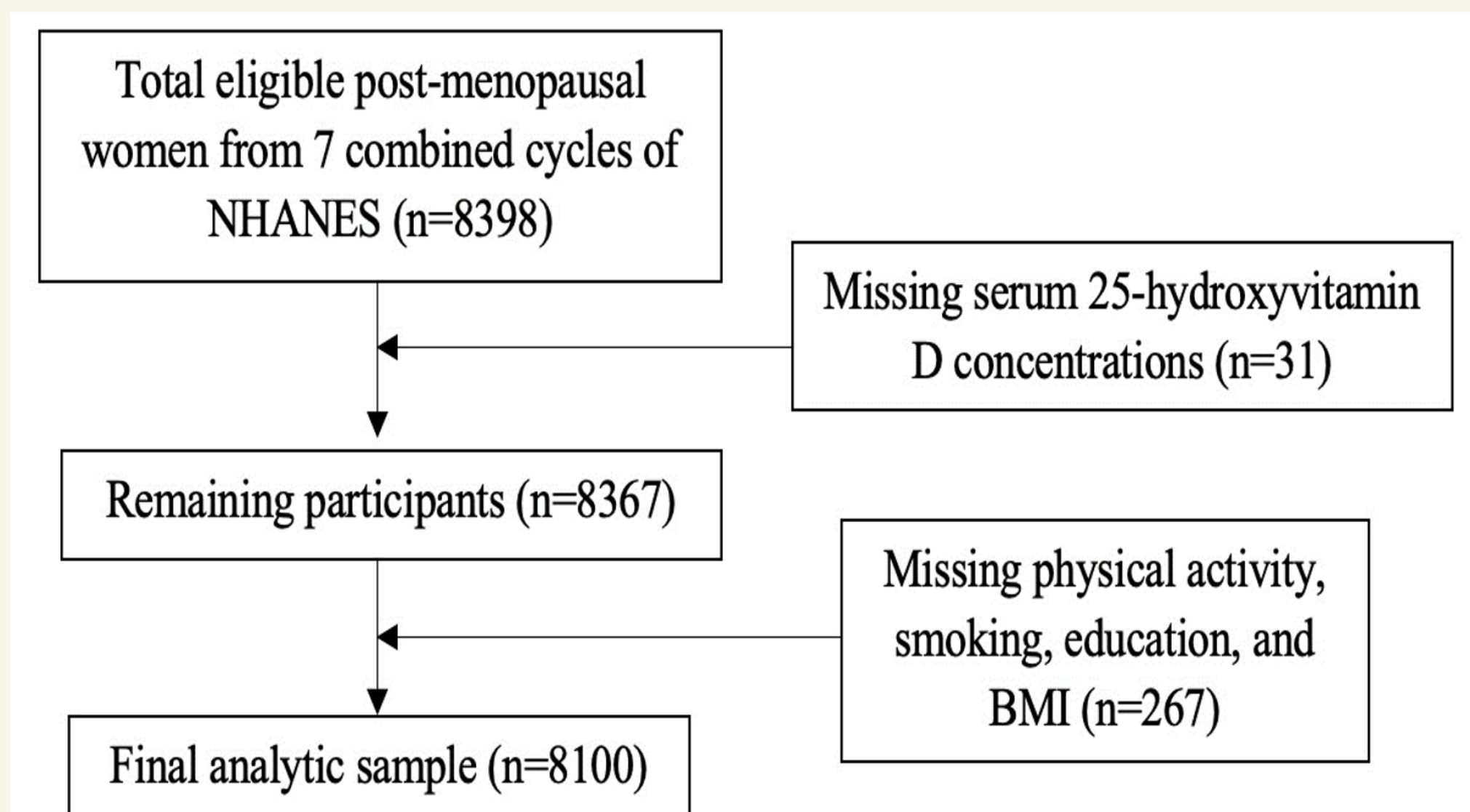


Figure 1: Sample derivation, National Health and Nutrition Examination Survey 2001-2014.

## Results

Age, race, education, smoking, alcohol intake, season of the survey, BMI, supplement intake, HRT, physical activity, and PIR were significantly related to serum 25(OH)D ( $P < 0.001$ ).

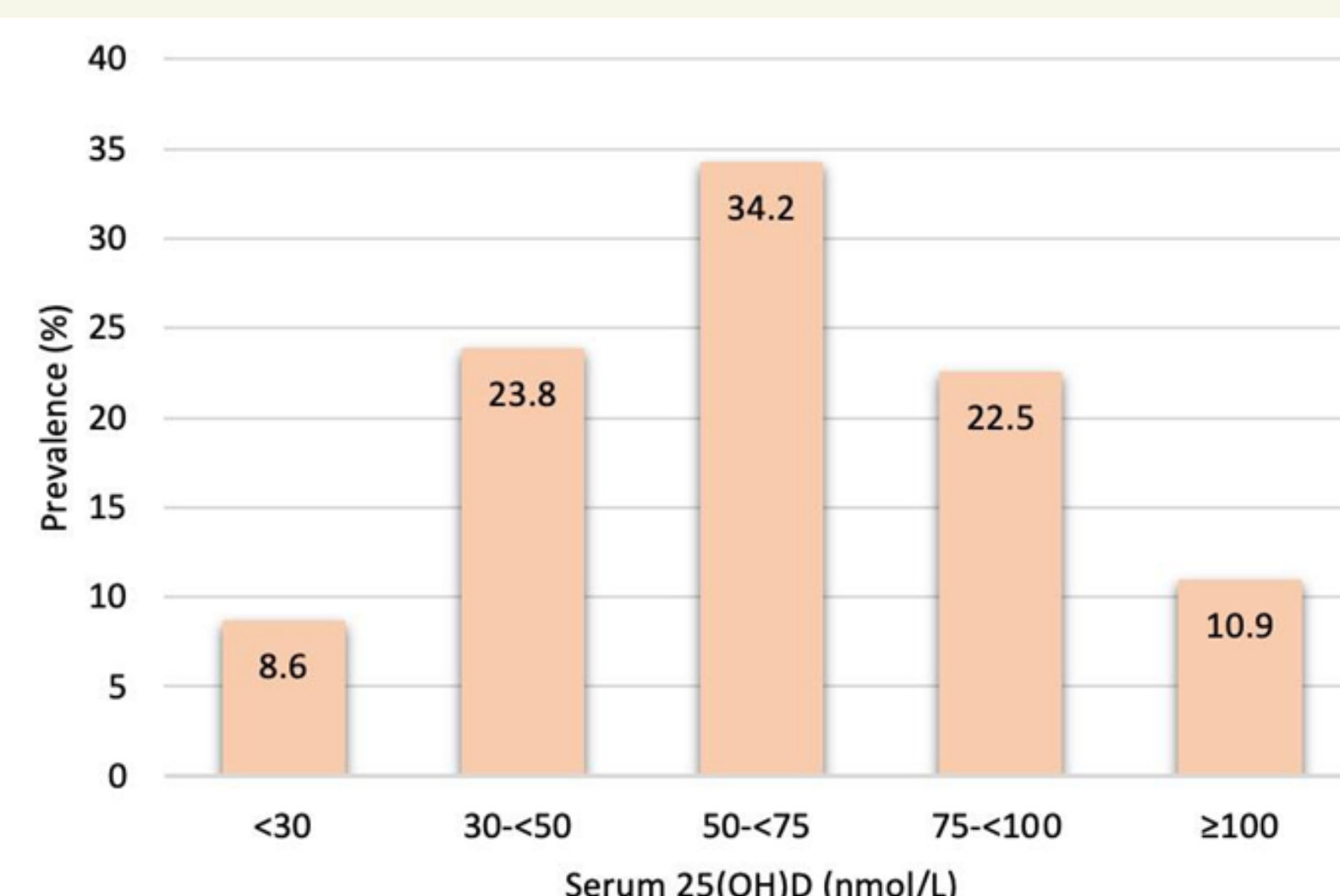


Figure 2: Prevalence of serum 25(OH)D in post-menopausal women

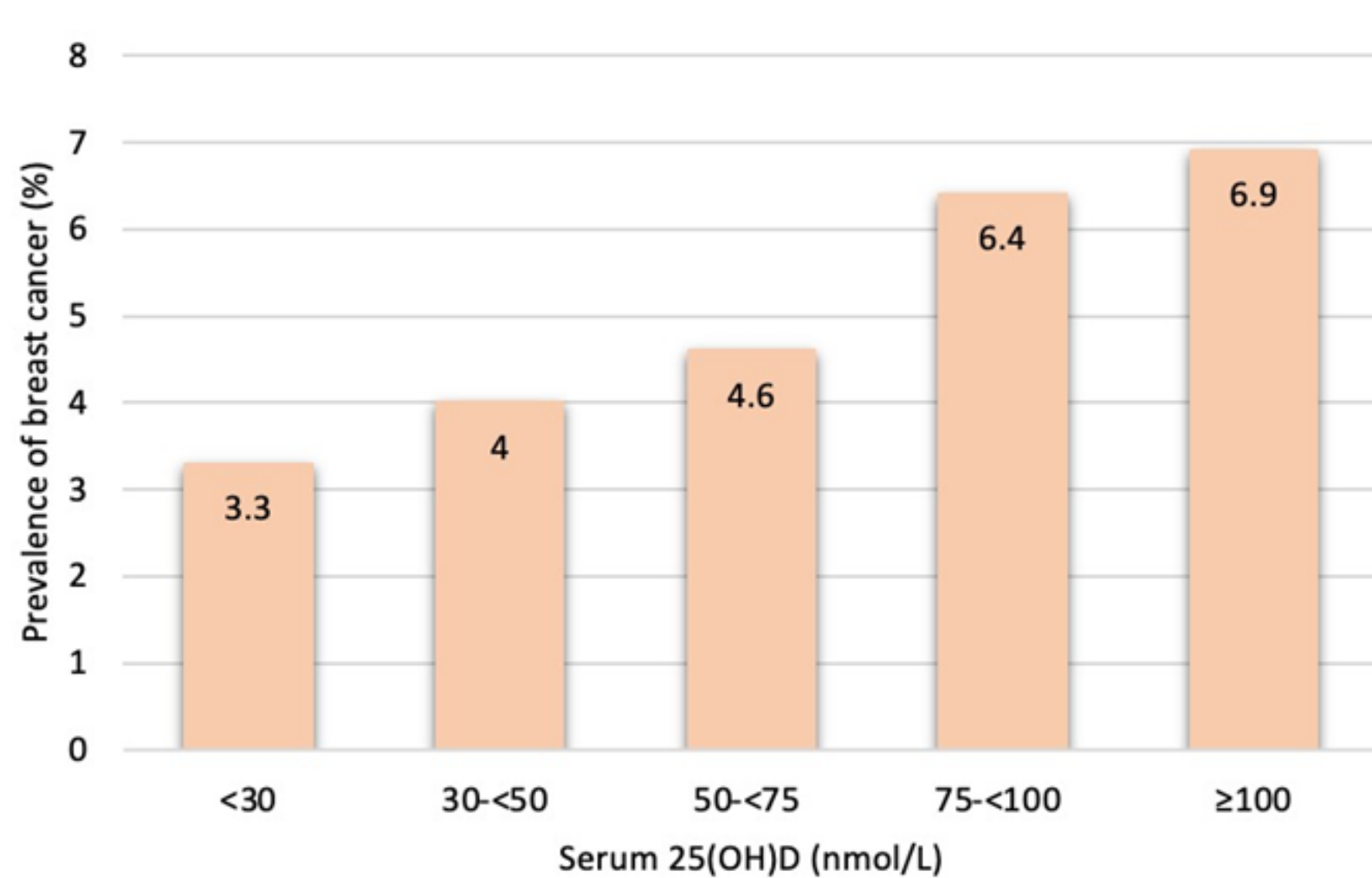


Figure 3: Prevalence of breast cancer in post-menopausal women

	Serum 25(OH)D concentrations					p for trend <sup>3</sup>
	<30 nmol/L <sup>2</sup> n=697	30-50 nmol/L n=1929	50-75 nmol/L n=2774	75-100 nmol/L n=1821	$\geq 100$ nmol/L n=879	
Unadjusted	1	1.7 (1.0-3.0)	2.0 (1.2-3.4)	2.7 (1.6-4.5)	2.4 (1.4-4.2)	$<0.001^4$
Race adjusted	1	1.7 (0.9-2.9)	1.8 (1.1-3.1)	2.4 (1.4-4.0)	2.1 (1.2-3.7)	$0.007^4$
Multivariate-adjusted <sup>5</sup>	1	1.7 (0.9-3.1)	1.8 (1.0-3.3)	2.2 (1.2-4.0)	1.7 (0.9-3.4)	$0.032^6$

<sup>1</sup>Values are OR and 95% CI. <sup>2</sup>Referent category. <sup>3</sup>Significance in logistic regression between serum 25(OH)D and breast cancer. <sup>4</sup>Significance for linear trend. <sup>5</sup>Adjusted for age, race, PIR, education, physical activity, season of survey, smoking, alcohol, BMI, supplements intake, and HRT. <sup>6</sup>Significance for non-linear trend.

Table 1. Association between 25(OH)D and breast cancer prevalence in post-menopausal women (n=8100)

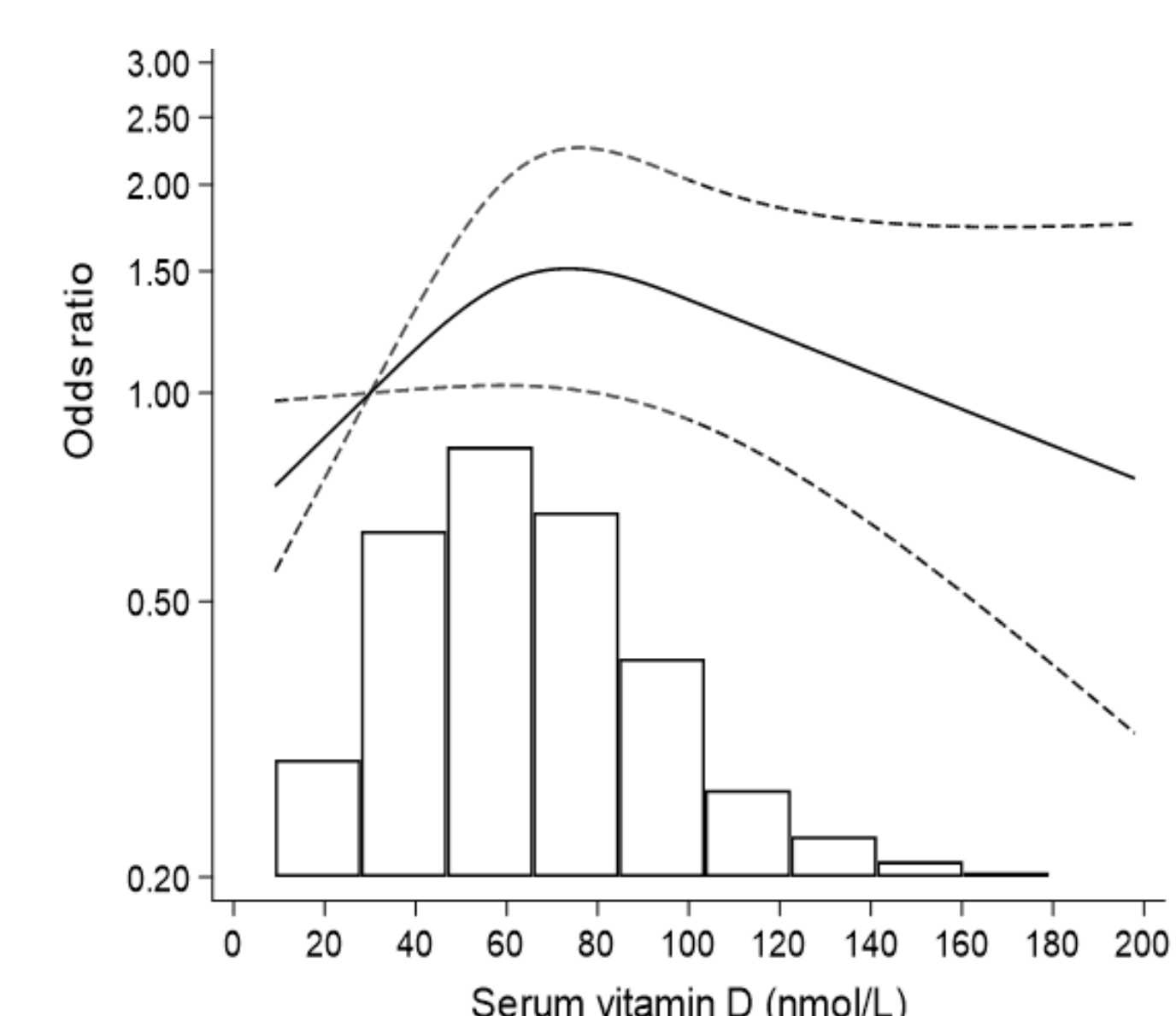


Figure 4: Non-linear association between serum 25(OH)D and breast cancer prevalence in all post-menopausal women (n=8100) in multivariate-adjusted analysis ( $P=0.032$ ).

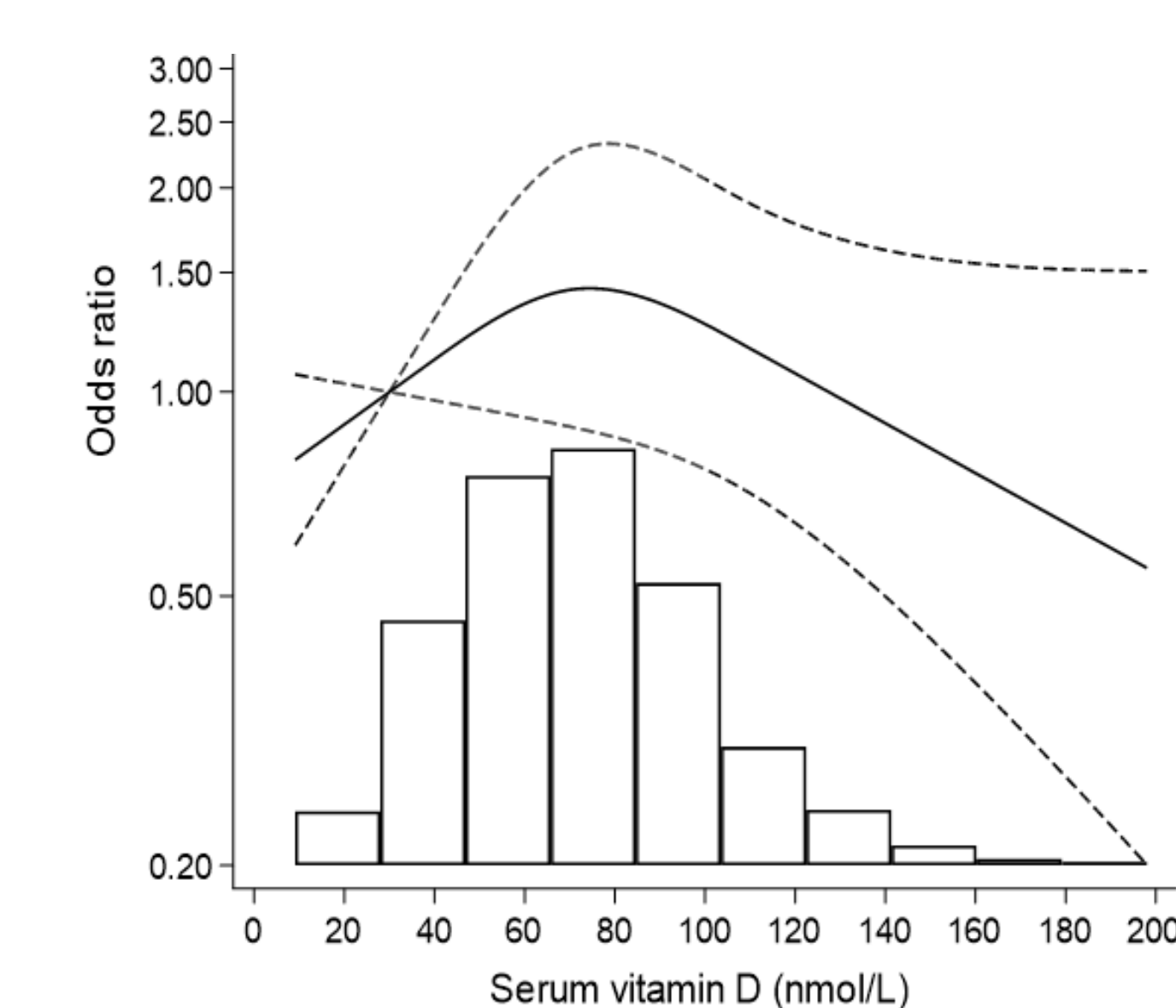


Figure 5: Non-linear association between 25(OH)D and breast cancer in post-menopausal white women (n=4298) in multivariate-adjusted analysis ( $P=0.07$ ).

## Conclusion

- A direct association was observed between serum 25(OH)D and breast cancer up to 100 nmol/L.
- It appears that more than 100 nmol/L may be protective against breast cancer in all post-menopausal women and specifically in NHW.
- Controlled trials are needed to study the association between serum 25(OH)D and breast cancer risk and to elucidate the mechanism of vitamin D in cancer pathogenesis in post-menopausal women.

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