



The role of greenspace in vitamin D status: cross-sectional, observational evidence from the UK Biobank

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Introduction

- Exposure to greenspace is associated with positive health outcomes.¹
- However, this relationship is poorly understood, with limited knowledge of the mechanisms through which greenspace affects health, including biomarkers.
- Greenspace can provide opportunities for exposure to ultraviolet radiation and consequent vitamin D increases.
- No study has investigated this relationship in middle-aged adults who spent considerable time outdoors.

AIM: we investigated the association between residential greenspace and serum 25-hydroxyvitamin D [25(OH)D] – a biomarker of vitamin D

Materials and methods

- A cross-sectional study design, using the UK Biobank cohort aged between 37 and 73 years at recruitment, 2006 – 2010
- Greenspace in 300 m and 1000 m buffer of participants' home location was defined using land cover map (LMC) 2007 data.
- Sinusoidal model was used to deseason serum 25(OH)D concentrations
- The Exposure-response curve using a generalised additive model (GAMs) showed significant deviation from linearity (**Figure 1**)
- A multinomial regression model was used to model the association between greenspace quartiles and deseasoned 25(OH)D categories (**Box 1**), with the first greenspace quartile and deficient 25(OH)D as reference points.

Box 1
Criteria adopted by Public Health England for 25(OH)D (SACN 2016):
Deficient < 25 nmol/L (n = 43, 926)
Insufficient ≤ 50 nmol/L (n = 207, 601)
Sufficient > 50 nmol/L (n = 192, 283)

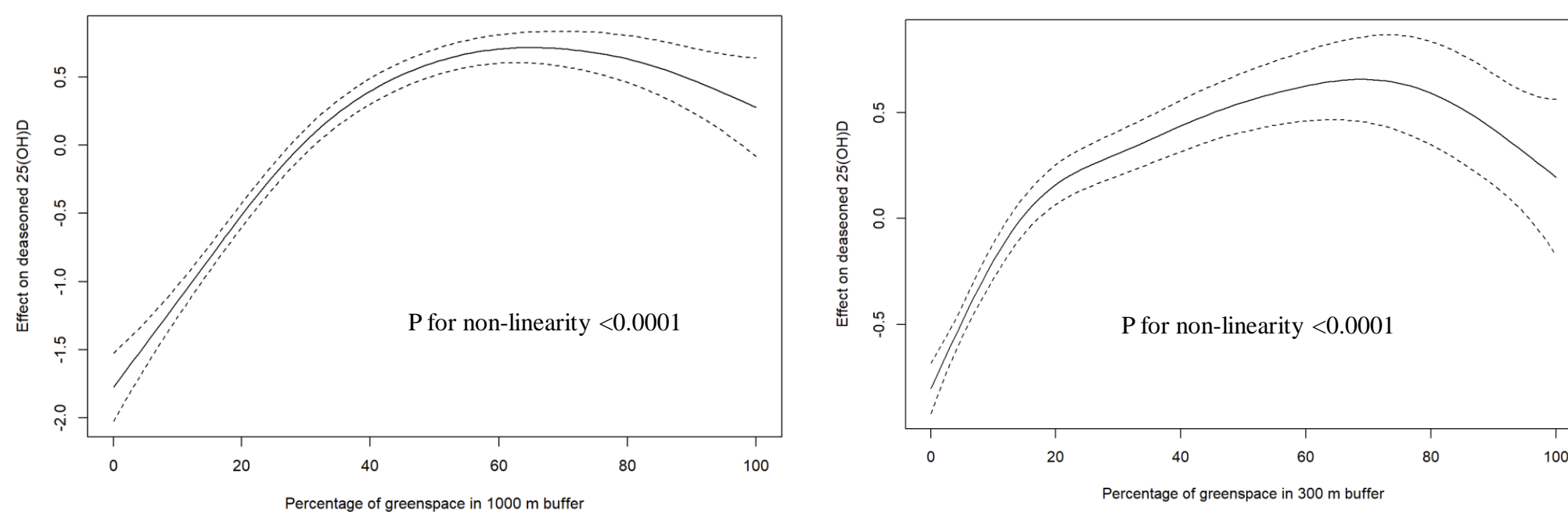


Figure 1. GAM shows the association of percentage of greenspace with deseasoned 25(OH)D concentrations.

Result

- Living in higher quartiles of greenspace in 300 and 1000 m buffer was positively associated with sufficient 25(OH)D, which remained robust after adjustments of covariates (Figure 2) and sensitivity analyses.
- Further adjustment of 14 genetic variants (previously associated with 25(OH)D variations) or potential mediators did not alter the relationship
- The greenspace effects were particularly pronounced among males, and those in most deprived areas (Box 2)

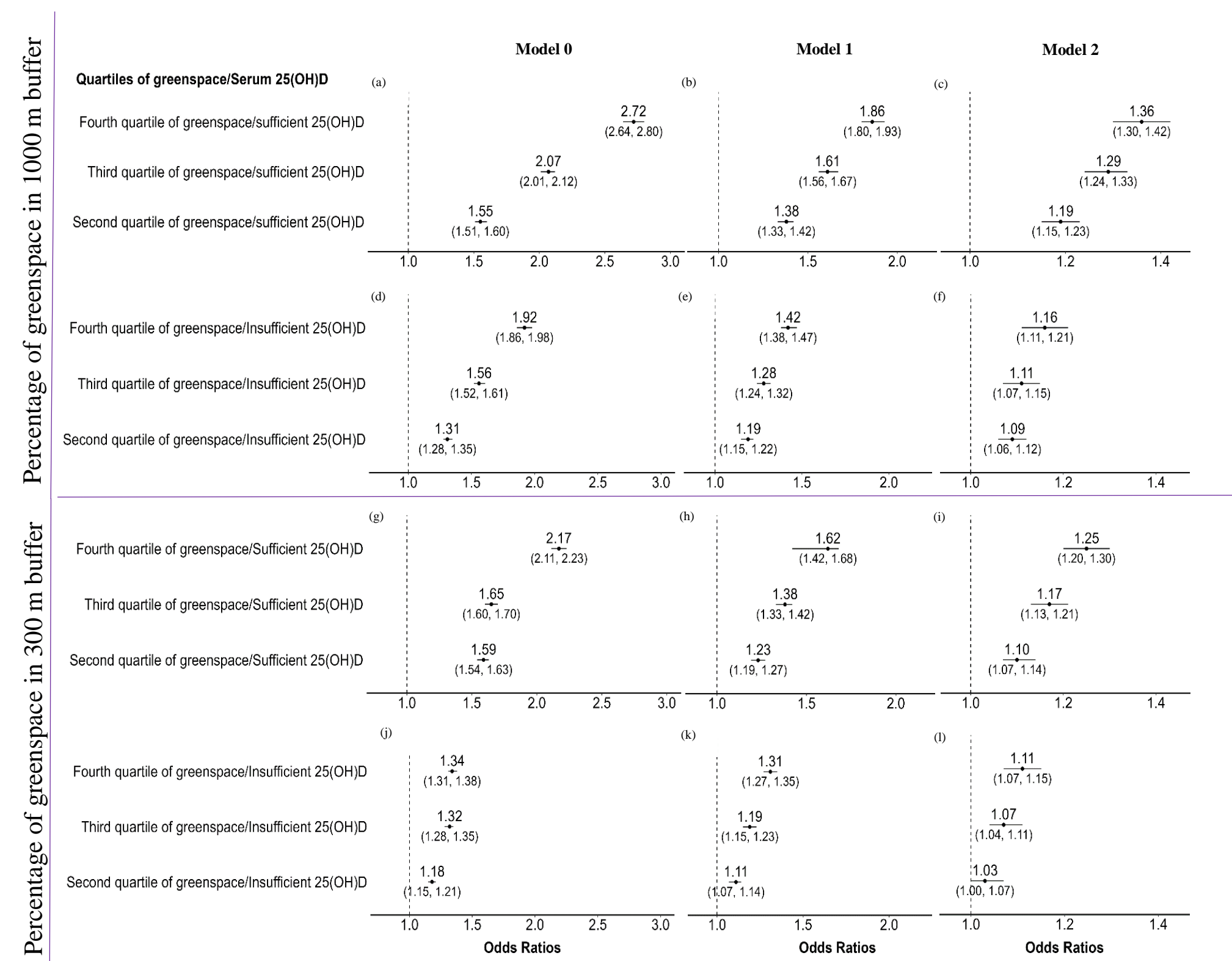


Figure 2. Association of percentage of greenspace quartiles with deseasoned 25(OH)D categories. **Model 0** – unadjusted. **Model 1** – adjusted for individual-level covariates (age, sex, waist circumference, skin colour, smoking status, alcohol intake frequency, education levels, ethnicity, latitude, oily fish intake, vitamin D and associated supplement use, and use of UV protection). **Model 2** - adjusted for model 1 plus area-level covariates such as urbanicity and Townsend deprivation index.

Box 2. Association of highest greenspace quartile and sufficient 25(OH)D [OR (95% CI)]
Sex stratified { males: 1.43 (1.34, 1.52) level of deprivation { most deprived: 1.61 (1.47, 1.77)
females: 1.31 (1.24, 1.38) least deprived: 1.32 (1.19, 1.45)

Conclusion

- Our findings have implications for greening policies aimed at improving health and well-being while reducing vitamin D deficiency through controlled sun exposure.

Reference: 1. Markevych et al., 2017