

The association between area-level demographic and socioeconomic parameters and vitamin D status in Ireland

D. Johnston¹, F. Byrne¹, H. Scully², E. Laird², P. Bellew⁴, L. Hendrick⁴, H. Johnson⁴,
D. Byrne^{3,5}, J. B. Walsh^{2,3}, M. Healy², V. Crowley⁶ and D. McCartney¹

¹School of Biological and Health Sciences, TU Dublin, Dublin, Ireland,

²Mercer's Institute for Successful Ageing, St James's Hospital, Dublin, Ireland,

³Department of Medical Gerontology, Trinity College Dublin, Ireland,,

⁴Health Intelligence Unit, HSE, Dublin, Ireland,

⁵Medicine Directorate, St James's Hospital, Dublin, Ireland and

⁶Department of Clinical Biochemistry, St James's Hospital, Dublin, Ireland.

There is an emergent association between vitamin D deficiency (VDD) and the risk of SARS-CoV-2 infection. The prevalence of VDD in Ireland is high,⁽¹⁾⁽²⁾⁽³⁾ particularly in older institutionalised adults⁽⁴⁾ and low SES groups⁽²⁾ as a consequence of suboptimal sun exposure, inadequate dietary intake, unfavourable lifestyle habits, and low supplementation rates; these same groups are at higher risk of SARS-CoV-2 infection.⁽⁵⁾ This research project aimed to establish a method for area-level prediction of VDD to aid in the identification of spatial areas at higher risk of VDD which might also be more vulnerable to SARS-CoV-2 infection. This study was a retrospective cross-sectional analysis of area-level vitamin D status amongst community-dwelling adults in Ireland. Serum 25(OH)D concentrations from 7,708 GP-ordered patient samples from counties Dublin, Meath, Wicklow, and North Kildare were derived from the electronic patient database at St James's Hospital, Dublin. These samples were geo-coded by the electoral division (ED) of the residential address using the Health Atlas Ireland/GeoDirectory application. The demographic profile (ethnic mix) and socioeconomic status (the relative Pobal Haase-Pratschke affluence/deprivation score) at the ED level was based on the Census 2016 Small Area Population Statistics (SAPS) published by the Central Statistics Office. The associations between the demographic and socioeconomic parameters and the mean and median ED-level 25(OH)D were examined by univariate (one-way ANOVA with Tukey's *post hoc* multiple comparison test, Kruskal-Wallis with Dunn's *post hoc* multiple comparison test) and multivariate (linear regression, multinomial logistic regression) analyses. There were 412 EDs with indicative 25(OH)D measures. VDD at area-level was defined as mild if the mean ED-level 25(OH)D was 50 - 74 nmol/L, moderate if the mean ED-level 25(OH)D was 30 - 49 nmol/L, or severe if the mean ED-level 25(OH)D was less than 30 nmol/L. ED-level socioeconomic disadvantage was associated with a higher risk of mild, moderate, and severe VDD (OR 1.042 for mild VDD, $p=0.004$; OR 1.059 for moderate VDD, $p=0.003$; OR 1.060 for severe VDD, $p=0.071$ with each one-unit reduction in relative deprivation index score). Each percentage point increment in the prevalence of Asian and Asian Irish ethnicity at ED-level was associated with a higher risk of mild VDD (OR 1.120, $p=0.041$). Low socioeconomic status and the prevalence of non-white ethnicity at ED-level are predictive of VDD in community-dwelling Irish adults. These findings support the use of area-level population statistics to predict VDD at area-level.

References

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