MJA
The Medical Journal of Australia

Supporting Information

Supplementary methods and results

**This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.**

Appendix to: Bhattacharyya P, Schemann K, Min SS, et al. Serum vitamin C status of people in New South Wales: retrospective analysis of findings at a public referral hospital. *Med J Aust* 2023; doi: 10.5694/mja2.52132.

Table 1. Univariable proportional odds ordinal models and Brant test results for the proportional odds assumption

	Odds ratio (95% confidence interval)	Brant test[a]
Year		χ^2=60.4, df=4, p<0.001
2017	1	
2018	1.28 (1.15–1.44)	
2019	1.54 (1.38–1.72)	
2020	1.53 (1.38–1.70)	
2021	1.45 (1.31–1.61)	
Age (per year)	0.98 (0.98–0.98)	χ^2=10.8, df=1, p=0.001
Gender (women)	1.21 (1.14–1.30)	χ^2=7.3, df=1, p=0.007
Socio-economic status (IRSAD quintile)		χ^2=12.3, df=4, p=0.016
Q1	1	
Q2	0.91 (0.83–1.00)	
Q3	1.16 (1.05–1.27)	
Q4	1.30 (1.17–1.45)	
Q5 -least	1.66 (1.50–1.84)	
Remoteness		χ^2=0.95, df=3, p=0.81
Remote/very remote	1	
Outer regional	1.41 (0.94–2.13)	
Inner regional	1.64 (1.10–2.46)	
Major city	2.17 (1.46–3.23)	

[a] The Brant test tests the null hypothesis that the parallel regression/ proportional odds assumption holds. Reference: Brant, R. Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics* 1990; 46: 1171–1178.

Table 2. Age distribution of 12 934 people whose serum vitamin C levels were assessed at the Royal Prince Alfred Hospital, 2017–2021, overall and by vitamin C status

	Minimum	Maximum	Mean (SD)	Median (interquartile range)
Normal	0.0	102.0	35.8 (28.2)	32.0 (8.0-62.0)
Hypovitaminosis C	0.1	102.0	46.8 (25.7)	51.0 (24.0-68.0)
Significant deficiency	0.0	100.0	51.4 (23.9)	56.0 (36.0-70.0)
Overall	0.0	102.0	42.9 (27.3)	47.0 (15.0-66.0)

Figure 1. Violin plots of the distribution of the continuous variable Age (in years) overall and by the outcome Vitamin C status in a study of 12,934 samples

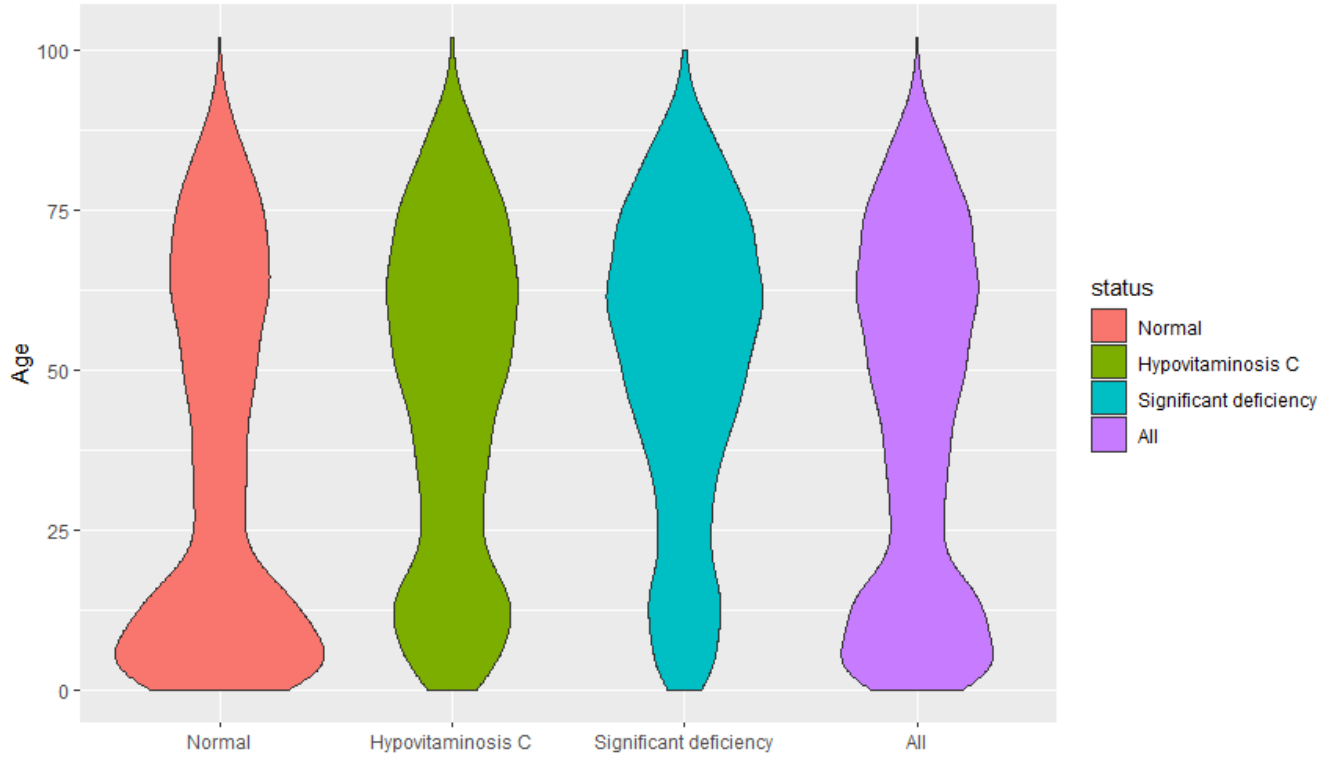

Table 3. Results of two-way interaction testing for Year with Gender added to the main effects only multinomial model for Vitamin C status

	Vitamin C status comparison	
	Hypovitaminosis C v Normal	Significant deficiency v Normal
Term	Adjusted odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)
Model 1		
Age (per year)	1.02 (1.01-1.02)	1.02 (1.01-1.02)
Year		
2017	1	1
2018	0.59 (0.47-0.72)	0.74 (0.58-0.93)
2019	0.43 (0.35-0.52)	0.59 (0.47-0.74)
2020	0.42 (0.34-0.51)	0.47 (0.38-0.58)
2021	0.48 (0.40-0.58)	0.45 (0.36-0.56)
IRSAD Quintile		
5th – least disadvantaged	1	1
4th	1.2 (1.04-1.39)	1.41 (1.19-1.67)
3rd	1.21 (1.06-1.38)	1.83 (1.57-2.13)
2nd	1.32 (1.16-1.51)	2.18 (1.88-2.54)
1st – most disadvantaged	1.35 (1.19-1.54)	2.07 (1.79-2.4)
Gender		
Women	1	1
Men	0.96 (0.77-1.19)	1.29 (1.02-1.64)
Year: Gender		
2017: Men	1	1
2018: Men	0.99 (0.73-1.33)	1 (0.73-1.38)
2019: Men	1.16 (0.87-1.56)	1.01 (0.74-1.38)
2020: Men	1.25 (0.95-1.66)	1.12 (0.83-1.53)
2021: Men	1.25 (0.95-1.64)	1.15 (0.85-1.56)

IRSAD = Index of Relative Socio-economic Advantage and Disadvantage.

Interaction testing: Type II Analysis of deviance test:

Year: Gender, likelihood ratio: Chi sq = 6.37, df=8, p = 0.61.

Table 4. Results of two-way interaction testing for Year with SEIFA IRSAD Disadvantage Quintile added to the main effects only multinomial model for Vitamin C status

	Vitamin C status comparison	
	Hypovitaminosis C v Normal	**Significant deficiency v Normal**
Term	**Adjusted odds ratio (95% confidence interval)**	**Adjusted odds ratio (95% confidence interval)**
Age (continuous)	1.02 (1.01-1.02)	1.02 (1.02-1.03)
Year		
2017	1	1
2018	0.74 (0.54-1.02)	0.73 (0.5-1.08)
2019	0.48 (0.35-0.67)	0.60 (0.41-0.88)
2020	0.45 (0.33-0.62)	0.34 (0.23-0.50)
2021	0.55 (0.41-0.75)	0.50 (0.35-0.72)
IRSAD quintile		
5th – least disadvantaged	1	1
4th	1.70 (1.15-2.50)	1.47 (0.92-2.33)
3rd	1.30 (0.93-1.82)	1.68 (1.14-2.46)
2nd	1.14 (0.82-1.60)	1.73 (1.19-2.51)
1st – most disadvantaged	1.49 (1.08-2.07)	2.13 (1.48-3.07)
Gender		
Female	1	1
Male	1.10 (1.01-1.19)	1.38 (1.26-1.51)
Year: IRSAD quintile (v quintile 5)		
2018: 4th	0.50 (0.30-0.85)	0.92 (0.50-1.69)
2019: 4th	0.68 (0.41-1.15)	0.96 (0.53-1.74)
2020: 4th	0.76 (0.47-1.25)	1.28 (0.70-2.33)
2021: 4th	0.70 (0.44-1.13)	0.79 (0.45-1.41)
2018: 3rd	0.81 (0.51-1.28)	1.11 (0.66-1.86)
2019: 3rd	0.92 (0.58-1.44)	0.94 (0.56-1.56)
2020: 3rd	1.04 (0.67-1.61)	1.47 (0.88-2.45)
2021: 3rd	0.91 (0.60-1.39)	1.03 (0.63-1.68)
2018: 2nd	0.89 (0.56-1.41)	1.13 (0.68-1.89)
2019: 2nd	1.19 (0.75-1.88)	1.16 (0.71-1.91)
2020: 2nd	1.33 (0.85-2.06)	1.91 (1.15-3.16)
2021: 2nd	1.25 (0.82-1.90)	1.17 (0.73-1.88)
2018: 1st – most	0.70 (0.45-1.09)	0.86 (0.53-1.42)
2019: 1st – most	0.94 (0.61-1.45)	0.89 (0.55-1.44)
2020: 1st – most	0.99 (0.65-1.51)	1.48 (0.90-2.42)
2021: 1st – most	0.92 (0.60-1.39)	0.79 (0.49-1.27)

IRSAD = Index of Relative Socio-economic Advantage and Disadvantage.

Interaction testing – Type II Analysis of deviance test:

Year: Quintile, likelihood ratio: Chi sq = 27.1, df=32, p = 0.72.

Table 5. Geographic distribution of hypovitaminosis C and significant deficiency test results above 30 per 100 000 resident population during 2017-2021 in regional and metropolitan NSW

SA3[a]	Number with hypovitaminosis C or significant deficiency	Number of tests	Population	Rate per 100 000
Liverpool	142	259	125395	113.2
Coffs Harbour	73	103	88884	82.1
Parramatta	110	217	151071	72.8
Camden	43	82	66687	64.5
Lithgow - Mudgee	28	53	47762	58.6
Bringelly - Green Valley	62	112	112607	55.1
St Marys	30	51	56066	53.5
Mount Druitt	62	90	117192	52.9
Tamworth - Gunnedah	40	69	82834	48.3
Maitland	29	56	77800	37.3
Blacktown	51	96	142159	35.9
Richmond - Windsor	13	25	37724	34.5
Clarence Valley	17	25	51266	33.2
Gosford	56	113	175144	32.0
Lower Murray	4	7	12785	31.3

[a] SA3 = Statistical Area Level 3