**Supplementary Material**

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| *Supplementary Table 1 Correlation matrix of plasma carotenoids and vitamins in Aboriginal people in Australia (n=324)* |
|  | β-cryptoxanthin | β-carotene | Lycopene | Lutein-zeaxanthin | α-tocopherol |
| Pearson’s r | Pearson’s r | Pearson’s r | Pearson’s r | Pearson’s r |
| β-cryptoxanthin  | - |  |  |  |  |
| β-carotene | 0.59\*\* | - |  |  |  |
| Lycopene | 0.40\*\* | 0.36\*\* | - |  |  |
| Lutein-zeaxanthin | 0.52\*\* | 0.25\*\* | 0.43\*\* | - |  |
| α-tocopherol | 0.27\*\* | 0.22\*\* | 0.25\*\* | 0.57\*\* | - |
| Retinol | 0.10 | 0.08 | 0.10 | 0.25\*\* | 0.43\*\* |
| *\*\* Correlation is significant at the level 0.01. \* Correlation is significant at the level 0.05* |

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| *Supplementary Table 2 Total Variance Explained (for Kaiser’s criterion as part of the PCA)* |
| Component | Total | Initial Eigenvalues | Extraction Sums of Squared LoadingsRetinol | Rotation Sums of Squared Loadings\*Total |
| % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 2.67 | 44.45 | 44.45 | 2.67 | 44.45 | 44.45 | 2.36 |
| 2 | 1.23 | 20.49 | 64.94 | 1.23 | 20.49 | 64.94 | 1.88 |
| 3 | 0.74 | 12.41 | 77.35 |  |  |  |  |
| 4 | 0.63 | 10.44 | 87.79 |  |  |  |  |
| 5 | 0.46 | 7.68 | 95.47 |  |  |  |  |
| 6 | 0.27 | 4.53 | 100.00 |  |  |  |  |
| *Extraction Method: Principle Component Analysis**\*When components are correlated, sums of squared loadings cannot be added to obtain a total variance* |



Supplementary Figure 1: Scree Plot for the PCA

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| *Supplementary Table 3 Comparison of eigenvalues from PCA and criterion values from parallel analysis*  |
| Component number | Actual eigenvalue from PCA | Criterion value from parallel analysis | Decision |
| 1 | 2.67 | 1,1840  | Accept |
| 2 | 1.23 | 1,0972  | Accept |
| 3 | 0.74 | 1,0200  | Reject |
| 4 | 0.63 | 0,9645  | Reject |
| 5 | 0.46 | 0,9029  | Reject |
| 6 | 0.27 | 0,8314  | Reject |

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| *Supplementary Table 4 Component and Pattern Matrix for PCA* |
| Antioxidant biomarkers | Component Matrix | Pattern Matrix |
| Component | Component |
| 1 | 2 | 1 | 2 |
| β-cryptoxanthin  | 0.76 | -0.39 | 0.85 | 0.01 |
| β-carotene | 0.64 | -0.47 | 0.82 | -0.13 |
| Lycopene | 0.65 | -0.25 | 0.67 | 0.08 |
| Lutein-zeaxanthin | 0.79 | 0.16 | 0.49 | 0.53 |
| α-tocopherol | 0.68 | 0.52 | 0.16 | 0.80 |
| Retinol | 0.41 | 0.70 | -0.18 | 0.84 |

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| *Supplementary Table 5 Principle component analysis, the antioxidant component in remote Australian Aboriginal people (n=324)* |
| Antioxidant biomarkers | Antioxidant component |
| Component Matrix |
| β-cryptoxanthin  | 0.761 |
| β-carotene | 0.639 |
| Lycopene | 0.650 |
| Lutein-zeaxanthin | 0.793 |
| α-tocopherol | 0.681 |
| Retinol | 0.406 |
| *Kaiser-Meyer-Olkin Measure of Sampling Adeuancy: 0.666,* *Bartlett’s Test of Sphericity: Approx. Chi-Square 527.480, p < 0.001* |

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| *Supplementary Table 6 Comparison of age and sex among the study population and house to house census 2002* |
| Age | Men (%) | Women (%) |
| Study population1 *n* =147 (45.4%) | House to house census*n* = 315 (44.6%) | Study population*n* = 177 (54.6) | House to house census*n =* 391 (55.4) |
| 15 – 24 | 34.7 | 33.3 | 18.1 | 33.3 |
| 25 – 34 | 23.8 | 28.6 | 27.1 | 27.1 |
| 35 – 44 | 17.7 | 17.1 | 32.2 | 21.0 |
| 45 – 54 | 15.6 | 13.3 | 10.2 | 9.2 |
| 55 +  | 8.2 | 7.6 | 12.4 | 9.5 |
| *1Measurements of anthropometric, fasting blood samples and urine analyses* |

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| *Supplementary Table 7 Multiple linear regression antioxidant component and cardio-metabolic risk markers for participants without self-reported diabetes, heart disease, kidney disease or gestational diabetes (n=253)*  |
|  | Model 1 | Model 2 |
|  | Unstandardized Beta 95% CI | Coeff. SE | p-value | Unstandardized Beta 95% CI | Coeff. SE | p-value |
| Body Mass Index (kg/m2) | 0.04 [0.01;0.06] | 0.01 | 0.01 | 0.02 [<-0.01; 0.05] | 0.01 | 0.07 |
| Waist circumference (cm) | 0.01 [<0.01; 0.02] | 0.01 | 0.06 | 0.01 [<-0.01;0.02] | 0.01 | 0.22 |
| Waist-to-hip-ratio | 0.91 [-0.71; 2.53] | 0.82 | 0.27 | 0.39 [-1.40; 2.17] | 0.91 | 0.67 |
| Waist-to-height ratio | 1.35 [-0.20; 2.91] | 0.79 | 0.09 | 0.77 [-0.85; 2.39] | 0.82 | 0.35 |
| Fasting blood glucose (mmol/L)\* | 0.56 [-0.79; 1.92] | 0.69 | 0.41 | 0.40 [-0.88;1.68] | 0.65 | 0.54 |
| Glycated haemoglobin (%)\* | 0.17 [-2.05; 2.40] | 1.13 | 0.88 | -0.12 [-2.32; 2.08] | 1.11 | 0.91 |
| Systolic blood pressure (mmHg)\*\* | <-0.01 [-0.01; 0.01] | <0.01 | 0.60 | <0.01 [-0.01; 0.01] | <0.01 | 0.95 |
| Diastolic blood pressure (mmHg)\*\* | <-0.01 [-0.02; 0.01] | <0.01 | 0.54 | <0.01 [-0.01; 0.01] | 0.01 | 0.98 |
| Albumin/creatinine ratio\* | -1.19 [-0.42; 0.05] | 0.12 | 0.12 | -0.26 [-0.49; -0.03] | 0.12 | 0.03 |
| C-reactive protein (mg/dL)\* | -0.14 [-0.39; 0.12] | 0.13 | 0.29 | -0.25 [-0.48; -0.01] | 0.12 | 0.04 |
| *Model 1: Unadjusted Model 2: Adjusted for sex, age, total cholesterol and current smoking. \* Original variables were not normally distributed and were therefore transformed to lg10 values, in this model back transformed values. \*\*Individuals reporting to take blood pressure medication was excluded for this analysis (n=3)* |