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Development and Validation of a Semi-quantitative Food Frequency Questionnaire to Assess Dietary Intake of Adult Women Living in New Zealand

A thesis presented in partial fulfillment of the requirements for the degree of Masters of Science

In Nutrition and Dietetics

Massey University, Albany
New Zealand

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2014
Abstract

Background: There has been an increase in diet-related disease over the last decade (University of Otago & Ministry of Health, 2011). Food frequency questionnaires (FFQ) are commonly used to investigate the dietary intake of large populations, due to ease of administration and cost effectiveness. At present in New Zealand (NZ), an up-to-date, culturally appropriate food frequency questionnaire (FFQ) for assessing dietary intake is lacking.

Objectives: To develop and validate a culturally appropriate, computerised, semi-quantitative food frequency questionnaire to assess the dietary intake of young adult women living in New Zealand; to assess the dietary intake of this population using the questionnaire.

Methods: Participants (n = 110) were women (16 - 45 years) of Māori, Pacific or European ethnicity. They completed the New Zealand Women’s Food Frequency Questionnaire (NZWFFQ) assessing dietary intake over the previous month, and a four-day weighed food record. Validity was evaluated by comparing nutrient intakes from the FFQ with the food record using paired t-tests, Pearson’s correlation coefficients, cross-classification, weighted kappa and Bland-Altman analysis. Validity was assessed for raw data, and data adjusted to account for fruit and vegetable intakes.

Results: Nutrient intakes were significantly higher from the NZWFFQ data compared with the food record for all nutrients except monounsaturated fat, polyunsaturated fat and alcohol (p < 0.05). Pearson’s correlation coefficients ranged from 0.10 (iron) to 0.80 (vitamin A) with an average of 0.39 ± 0.14. Correct quartile classification ranged from 22% (phosphorus) to 47% (saturated fat). Correct classification into same and adjacent quartiles ranged from 62% (iron) to 86% (saturated fat). Gross misclassification into opposite quartile ranged from 3% (saturated fat) to 10% (iron). For weighted Kappa, saturated fat had moderate agreement (κ = 0.41 - 0.6), and other nutrients had fair agreement (κ = 0.21 - 0.4). These findings only differed marginally following fruit and vegetable adjustment, with the exception of vitamin A in which validity measures decreased.
Conclusion: The NZWFFQ had good relative validity for ranking individuals by dietary intake, and was able to categorise participants with higher or lower intake than reference ranges. Similarly to previous literature, The NZWFFQ overestimated dietary intake. Therefore, it is not suitable for assessing absolute dietary intakes.
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## Abbreviation List

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>4DFR</td>
<td>Four-day Food Record</td>
</tr>
<tr>
<td>AARP</td>
<td>American Association of Retired Persons (Cohort)</td>
</tr>
<tr>
<td>AI</td>
<td>Adequate Intake</td>
</tr>
<tr>
<td>AMDR</td>
<td>Acceptable Macronutrient Distribution Range</td>
</tr>
<tr>
<td>BF%</td>
<td>Body Fat Percentage</td>
</tr>
<tr>
<td>BIA¹</td>
<td>Bioelectrical Impedance Analysis</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>BMR</td>
<td>Basal Metabolic Rate</td>
</tr>
<tr>
<td>BOD POD¹</td>
<td>Air Displacement Plethysmography</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
</tr>
<tr>
<td>DEXA¹</td>
<td>Dual Energy X-ray Absorptiometry</td>
</tr>
<tr>
<td>EAR</td>
<td>Estimated Average Requirement</td>
</tr>
<tr>
<td>EXPLORE study</td>
<td>Examining Predictors Linking Obesity Related Elements</td>
</tr>
<tr>
<td>FFQ</td>
<td>Food Frequency Questionnaire</td>
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κ  Kappa statistic

LER  Low Energy Reporter (of dietary intake)

LOA  Limits of Agreement

NHMRC  National Health and Medical Research Council

NRV  Nutrient Reference Value

NZ  New Zealand

NZANS  New Zealand Adult Nutrition Survey

NZEU  New Zealand European

NZRD  New Zealand Registered Dietitian

NZWFFQ  New Zealand Women’s Food Frequency Questionnaire

p  p-value (statistical analysis)

PAL  Physical Activity Level

Pr(a)^2  Relative observed agreement

Pr(e)^2  Hypothetical probability of chance agreement

r  Correlation coefficient (statistical analysis)

RDI  Recommended Daily Intake
RMR  Resting Metabolic Rate

SD   Standard Deviation

SOP  Standard Operating Procedure

Note. ¹Are methods of measuring body composition (BIA, BOD POD and DEXA); ²Are components of Goldberg’s cut-off method measuring under-reporters of dietary intake.