



Body composition of New Zealand European and Pacific women is associated with lower dietary fibre intake and gut microbiota diversity.

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Aim

- To explore the relationship between habitual dietary intake of New Zealand European (NZE) and Pacific women (who have different metabolic disease risks) and their gut microbiota and body fat content.

Methods

- Healthy Pacific and NZE women (18-45years) were recruited to the cross sectional PROMISE study [1] based on BMI kg/m² (normal versus obese) and stratified as low (<35% body fat) or high (≥35% body fat) body fat percentage (BF%).
- Dietary intake was assessed with a 5-day estimated food record and a semi-quantitative food frequency questionnaire, which were used to calculate habitual dietary intake using the National Cancer Institute (NCI) method [2].
- The DNA from faecal samples was analysed following shotgun sequencing.
- Body fat percentage was assessed with whole body dual-energy x-ray absorptiometry (DXA).
- Fasting blood samples were analysed for markers for plasma insulin and glucose concentrations.
- Adjusted multivariate linear regression models were conducted to explore the relationship between habitual diet and body fat content.

Results

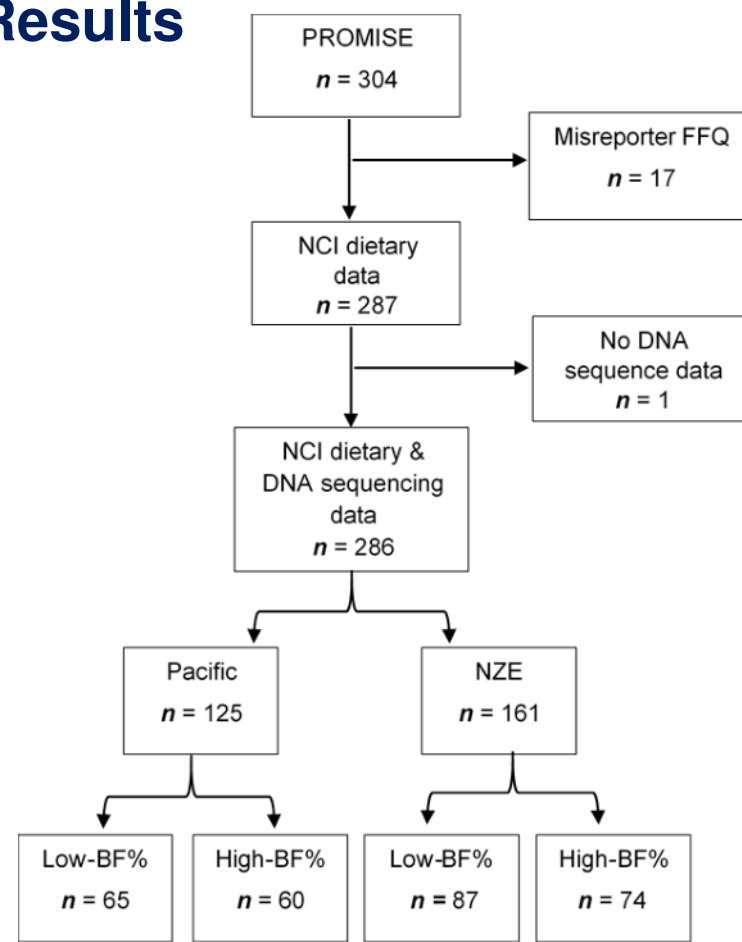


Figure 1. Overview of participants recruited.

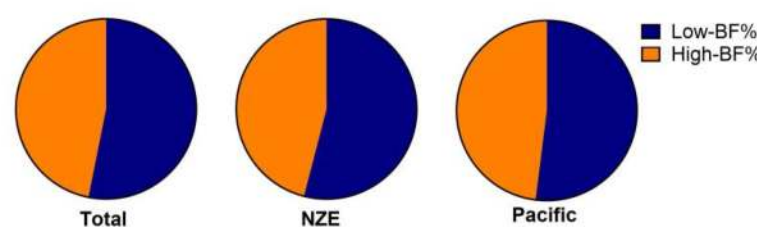


Figure 2. There was no difference in BF% between Pacific and NZE women ($p = 0.498$).

- Higher dietary fibre intake was associated with significantly lower BF% ($\beta = -0.35$, $p \leq 0.001$, adjusted for age, ethnicity, social deprivation and energy intake kJ/day).
- This relationship became stronger when adjusting for the intake of other macronutrients ($\beta = -0.47$, $p \leq 0.001$).
- Dietary fibre intake was negatively associated with homeostasis model assessment of insulin resistance (HOMA-IR) index ($r_s = -0.33$, $p \leq 0.001$).

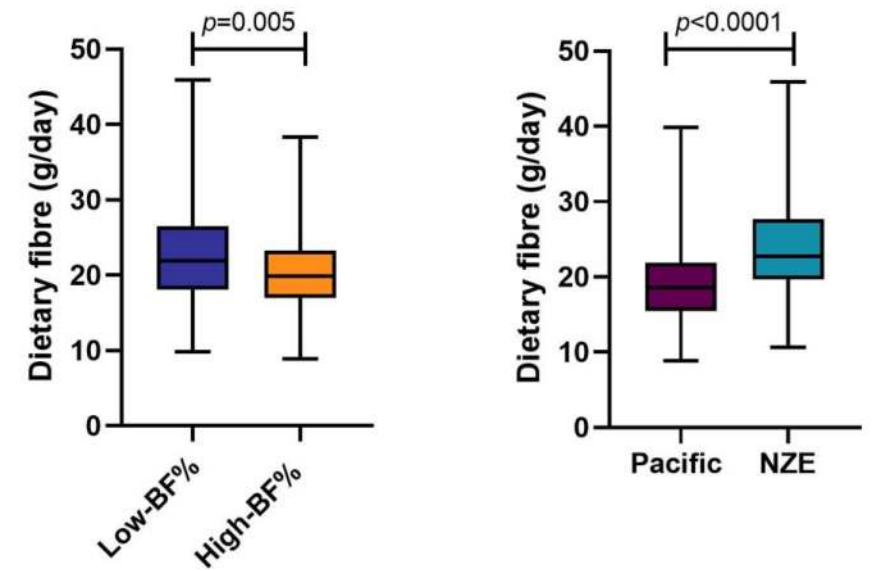


Figure 3. Women with a low-BF% had a higher habitual fibre intake, and NZE women had a higher fibre intake in comparison to Pacific women.

Lower total body fat percentage is associated with higher microbiota diversity, and higher habitual dietary fibre intake.

Alpha diversity

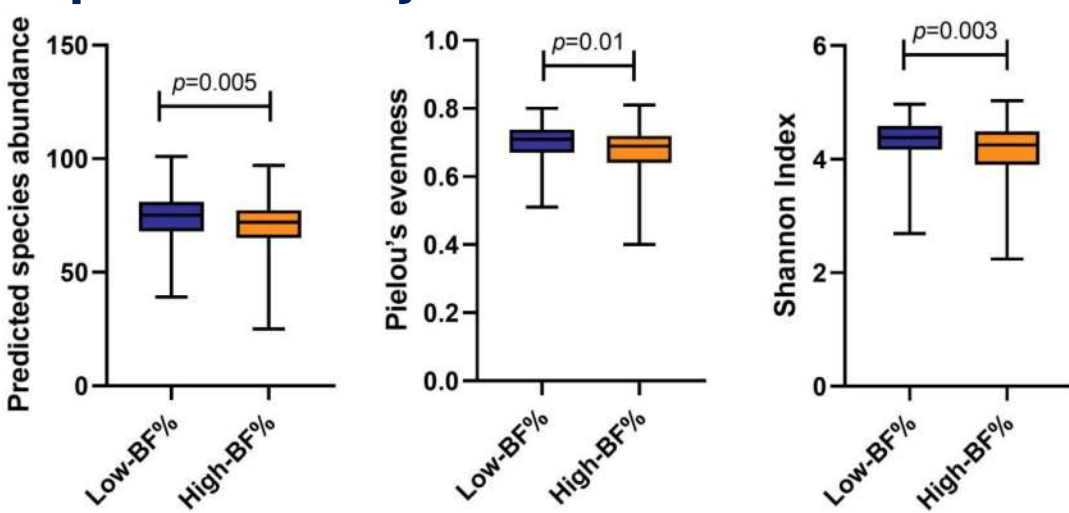


Figure 4. Women with a low-BF% had higher alpha diversity (predicted species abundance, evenness and Shannon Index) in comparison to the high-BF% group.

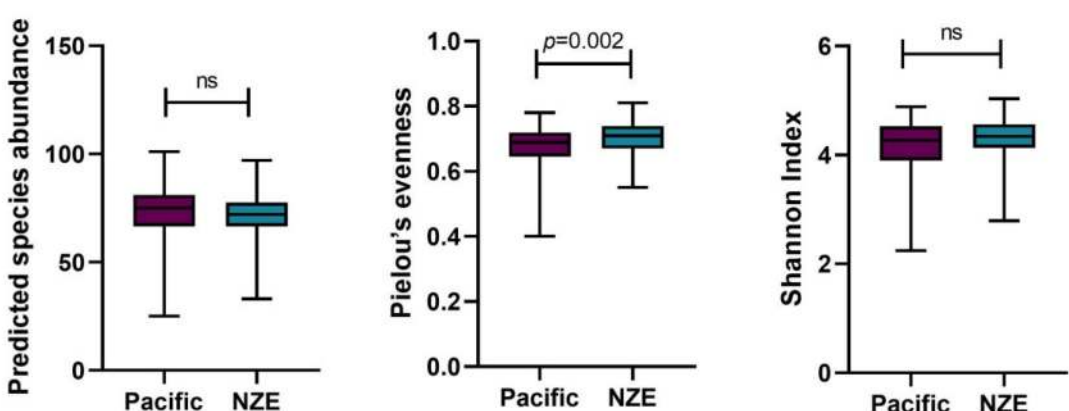


Figure 5. NZE had higher evenness in comparison to Pacific women. There was no difference in predicted species abundance and Shannon Index between Pacific and NZE women.

Firmicutes/Bacteroidetes ratio

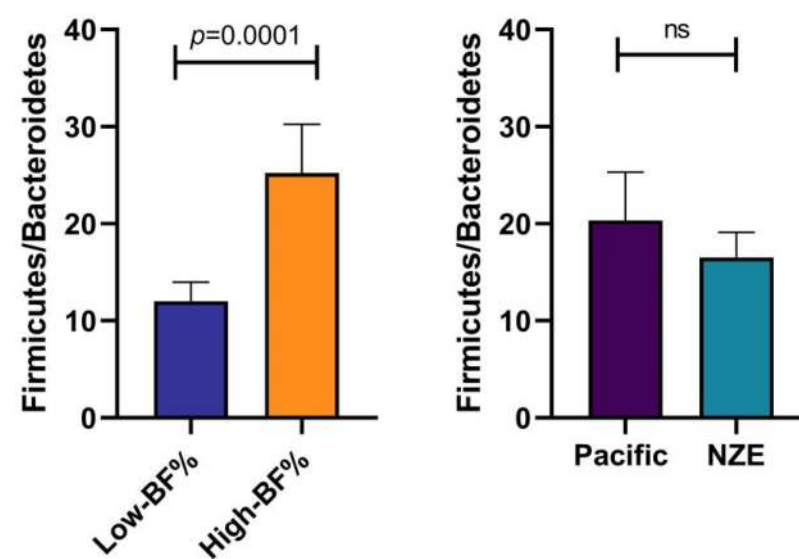


Figure 6. Women with a low-BF% had lower Firmicutes/Bacteroidetes ratio compared to the high-BF% group. There was no difference between NZE and Pacific women.

Summary

- In this study we observed that lower BF% was associated with higher microbiota diversity (predicted species abundance and Shannon Index), and higher Firmicutes/Bacteroidetes ratio, while there was no difference between Pacific and NZE women.
- In our population of women who have different metabolic disease risk. Higher total dietary fibre intake was associated with lower BF% and lower HOMA-IR. Suggesting a protective metabolic effect through reduction of hyperinsulinemia.

Conclusion

- Higher habitual dietary fibre intake is associated with lower BF% and lower HOMA-IR.
- Lower BF% is associated with higher microbiota diversity and lower Firmicutes/Bacteroidetes ratio.
- The beneficial effects of higher habitual dietary fibre intake may be associated with microbiota diversity in Pacific and NZE women.

References

[1] Kindleysides S, Kruger R, Douwes J, Tannock GW, Renall N, Slater J, Lawley B, McGill AT, Brennan N, Manukia M, Richter M. Predictors Linking Obesity and the Gut Microbiome (the PROMISE Study): Protocol and Recruitment Strategy for a Cross-Sectional Study on Pathways That Affect the Gut Microbiome and Its Impact on Obesity. JMIR research protocols. 2019;8(8):e14529.
 [2] National Cancer Institute. Usual Dietary Intakes. 2018 [cited 2018 May 6]. Available from: <https://epi.grants.cancer.gov/diet/usualintakes.html>

