

# **Optimising dietary intake and nutrition related health outcomes in Aboriginal women and their children**

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**A thesis submitted for the degree of PhD (Nutrition and Dietetics)**

**University of Newcastle, NSW, Australia**

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## Statement of originality

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## Thesis by publication

I hereby certify that this thesis is in the form of a series of published papers of which I am joint author. I have included as part of the thesis a written statement from each co-author, endorsed by the Faculty Assistant Dean (Research Training), attesting to my contribution to the joint publications.

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## **Conflict of interest**

Amy Ashman reports no conflict of interest.

# Publications and presentations arising from this thesis

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5. **Ashman A.M.**, Collins C.E., Brown L.J., Rae K.M., Rollo M.E. Validation of a smartphone image-based dietary assessment method for pregnant women. *Nutrients*. 2017;9(73). doi:10.3390/nu9010073.
6. **Ashman A.M.**, Brown L.J., Collins C.E., Rollo M.E., Rae K.M. Factors associated with effective nutrition interventions for pregnant Indigenous women: A systematic review. *Journal of the Academy of Nutrition and Dietetics* 2017 (epub ahead of print). doi: <http://dx.doi.org/10.1016/j.jand.2017.03.012>

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3. **Ashman A.**, Rollo M., Brown L., Rae K., Collins C. Investigating dietary intakes of Indigenous Australian women and their infants in the Gomeroi gaaynggal study. Developmental Origins of Health and Disease (DOHaD) Society of Australia and New Zealand. Melbourne, Australia, April 17<sup>th</sup>–19<sup>th</sup>, 2015 (Oral and poster presentation).
4. Rollo M.E., **Ashman A.M.**, Brown L.J., Rae K.M., Weatherall L., Skinner G., Smith R., Collins C.E. The dietary intakes of pregnant women assessed using image-based dietary records. The Australian Longitudinal Study on Women's Health Scientific Meeting. Newcastle, Australia, May 4<sup>th</sup>–5<sup>th</sup>, 2016 (Oral presentation).
5. Bohringer E., Brown L.J., **Ashman A.**, Corby C., Rae K. Engaging students in a remote community placement experience: Making tracks for the future. On Track for the Future Dietitians Association of Australia 33<sup>rd</sup> National Conference. Melbourne, Australia, May 19<sup>th</sup>–21<sup>st</sup> 2016 (Poster presentation).
6. **Ashman A.**, Collins C., Brown L., Rae K., Rollo M. Evaluation of a mobile phone tool for dietary assessment and to guide nutrition counselling among pregnant women. Nutrition Society of Australia Annual Scientific Meeting. Melbourne, Australia, November 29<sup>th</sup>–December 2<sup>nd</sup>, 2016 (Oral presentation).
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## Author note

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Throughout this document, the terms Indigenous and Aboriginal are both used. Indigenous Australians refer to both Aboriginal and Torres Strait Islander peoples, and the term Indigenous is used in this document to refer to Indigenous people throughout Australia, or Indigenous people internationally. In NSW, where the research described in this thesis takes place, the traditional custodians of the land self-identify as Aboriginal, rather than Indigenous. Therefore in this thesis 'Aboriginal' is used to describe research study participants in the Gomeroi gaaynggal and Diet Bytes and Baby Bumps studies. For publications in international journals, the term Indigenous has been used.

The PhD candidate is an Accredited Practising Dietitian (APD), and therefore the research described in this thesis is from a dietitian's perspective, with reference to how members of the dietetic profession can assist with optimising the dietary intakes and nutrition-related health outcomes of Aboriginal mothers and their infants.

## Glossary of common abbreviations

ACAES: Australian Child and Adolescent Eating Survey

AES: Australian Eating Survey

AGTHE: Australian Guide to Healthy Eating

APD: Accredited Practising Dietitian

BMI: Body Mass Index

CI: Confidence Interval

DAA: Dietitians Association of Australia

DBBB: Diet Bytes and Baby Bumps study

EAR: Estimated Average Requirement

FFQ: Food Frequency Questionnaire

IQR: Interquartile Range

kg: Kilograms

mg: Milligrams

n: Numbers (sample)

NHMRC: National Health and Medical Research Council

NRV's: Nutrient Reference Values

NSW: New South Wales

PBF: Percentage Body Fat

RDI: Recommended Dietary Intake

SD: Standard Deviation

VFA: Visceral Fat Area

WHO: World Health Organization

µg: Micrograms

24-R: 24-Hour Food Recall

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# Abstract

Aboriginal Australians have high rates of many chronic diseases, the causes of which are multi-factorial. Optimal nutrition throughout life is protective against a number of adverse health outcomes, and can begin with setting the scene for lifelong health *in utero* and in the first years of life. However, little is currently known about the dietary intakes of Aboriginal Australian women in pregnancy and in the postpartum period, and their children, particularly in early infancy. This thesis by publication is presented as a series of published research articles. Specific research aims and the results of studies arising from this thesis are summarised below.

Dietitians are well-placed to support and work alongside Aboriginal communities in developing and supporting strategies to optimise nutrition for Aboriginal woman and children. Dietitians must demonstrate cultural competency, however opportunities for practical experiences working with Aboriginal communities are limited during undergraduate nutrition degree programs. The aim of the first study was to evaluate the cultural awareness experiences of student and new-graduate dietitians working in an Aboriginal ArtsHealth setting. Six participants reported on their experiences through either written feedback (via email) or oral feedback (via semi-structured interview). A generic inductive approach was used for qualitative data analysis. Key themes emerged around 'building rapport' and 'developing cultural understanding'. Some participants reported an increased understanding of the context around health disparity for Aboriginal Australians, and the experiences of the student and new-graduate dietitians were overwhelmingly positive.

To optimise nutrition, current nutrition practices and dietary intakes need to be quantified. The second study of this thesis reports on the dietary intakes and anthropometric and body composition measures of a sample of women and their infants from the Gomeroi gaaynggal study, a prospective longitudinal cohort of Aboriginal women and their children in regional NSW from pregnancy to five years postpartum. A cross-sectional analysis of n=73 mother-child dyads from three months to five years postpartum found a breastfeeding initiation rate of 85.9%, with



a median (interquartile range [IQR]) duration of 1.4 months (0.5 – 4.0). Introduction of infants to solid foods and cow's milk were at 5.0 months (4.0–6.0) and 12.0 months (10.0–13.0) respectively. At one year postpartum 66.7% of women were overweight or obese, and 63.7% were overweight or obese at 2 years postpartum. Results from the Gomeroi gaaynggal cohort were preliminary, but suggest that women in this cohort may benefit from further support to optimise nutrition for themselves and their children.

Providing women with tailored nutrition advice requires appropriate tools for dietary assessment. Image-based dietary records are emerging as a novel method for dietary assessment that limits some of the participant burden associated with traditional methods of dietary assessment. The Diet Bytes and Baby Bumps study used image-based dietary records captured via smartphones and a purpose-built brief tool (the Selected Nutrient and Diet Quality [SNaQ] tool) to assess nutrient and food group intakes of pregnant women and to inform the delivery of tailored nutrition advice to participants during their pregnancy. Twenty-five women (27 recruited, including 8 Aboriginal Australians, one withdrawn, one incomplete), had image-based records appropriate for analysis. Median intakes of core food groups of grains and cereals, vegetables, fruit, meat and dairy were reported as being below recommendations, but intakes of energy-dense, nutrient-poor foods exceeded recommendations. Cohen kappa showed moderate to substantial agreement between the SNaQ tool and the nutrient analysis software when assessing adequacy of micronutrient intakes. Relative validity was established by comparison of the image-based dietary records and 24-hour food recalls. There were significant correlations between the two methods of dietary assessment for energy, macronutrients and micronutrient intakes ( $r=.40-.94$ , all  $P<.05$ ), with acceptable agreement between methods. Seventeen women reported changing their diets as a result of receiving personalised nutrition advice. The DietBytes method of image-based dietary assessment was well-received, with 88% of participants stating they would use the method again, including all Aboriginal participants.

A systematic review was conducted to identify existing programs that have aimed to improve nutrition-related outcomes in Indigenous pregnant women worldwide, and to identify positive factors contributing to successful programs. This review consisted of 27 studies (20 programs) from Australia, Canada, and the United States of America; the most prevalent outcome measures were breastfeeding initiation/duration (n=11 programs) and birth weight (n=9 programs). Activities employed within programs that resulted in statistically significant improvements in health and/or nutrition outcomes included individual counselling and education, and involvement of peer counsellors or other Indigenous program staff. In successful programs, emphasis was placed on designing nutrition interventions in collaboration with Indigenous communities.

This research thesis has highlighted key areas for improving dietary intake and nutrition-related health of Aboriginal Australian women and their children, including breastfeeding duration, appropriate timing of introduction to solid food and cow's milk, nutrient and food group intake of pregnant and postpartum women, and improving rates of overweight and obesity in women postpartum. An image-based dietary record method of dietary assessment has demonstrated relative validity and acceptability for dietary assessment of Aboriginal pregnant women and acceptability to guide nutrition counselling. Dietitians can best support Aboriginal women and children by working in collaboration with communities to optimise nutrition, and support practice-based student experiences during university training where possible to assist in development of cultural competency skills.