Development of a short-item diet quality questionnaire for Indigenous mothers and their young children: the Menzies remote short-item dietary assessment tool (MRSDAT)

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AR, JB and LMB contributed to the design of the study; AR and LM collected and analysed data; AR, JB and KOD developed the tool; AR and ET drafted the manuscript; all authors approve of the final manuscript and accept responsibility for its content.

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Conflict of interest

The authors declare no conflicts of interest

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Introduction

The importance of a healthy diet in facilitating optimal childhood development and preventing chronic disease cannot be overstated. Despite this, unhealthy food patterns frequently occur as early as 9 months of age and continue through childhood. Australian Bureau of Statistics data indicate Indigenous Australian children to have particularly concerning dietary patterns, with children aged 2-3 years three times more likely to consume carbonated sugary drinks than their non-Indigenous counterparts (18% versus 5.8%).¹ Early intervention to prevent or improve obesity related behaviours can have a positive impact. The ability to improve dietary outcomes depends primarily on an accurate assessment of dietary intake. Data reliability and compliance issues common in dietary assessment are exacerbated when working with Indigenous Australians living remotely due to existing tools using inappropriate language, being resource intensive, and not incorporating culturally diverse foods and serving methods. The aim of this research was to develop a short-item questionnaire to assess the dietary quality of mothers and their young children (2-4 years) in the remote Indigenous community (RIC) setting for the Pregnancy and Adverse Neonatal Diabetes Outcomes in Remote Australia (PANDORA) longitudinal birth cohort study.² PANDORA participants are Northern Territory women (both Indigenous and non-Indigenous) with and without diabetes in pregnancy and their babies.

Participants, methods and results

Questionnaire development

The 14-item Mediterranean Diet Adherence Score³ (MDAS) was used as a base for the short-item diet quality questionnaire (henceforth the 'Menzies remote short-item dietary assessment tool' [MRSDAT]). The MDAS was chosen as a base as it has been validated against health outcomes (including and especially relevant to Indigenous Australians, the development of type 2 diabetes) and found to be significantly more useful than a 137-item food frequency questionnaire in adult populations. The MDAS was modified through the omission and reformulation of questions and responses, and the addition of questions and responses from the National Nutrition and Physical Activity Survey, the Short Food Frequency Questionnaire⁴ and the Australian Recommended Food Score⁵. A table documenting all modifications with justifications is available from the authors upon request. Modifications were necessary to capture key aspects of the Australian dietary guidelines and consumption of wild harvested and procured foods and energy-dense, nutrient-poor foods to enhance relevance to the RIC setting. Briefly, questions assessing consumption of traditional food, offal, dairy food, confectionery and take-away meals were added. Illustrative food serving images were also collated into a booklet (the 'supporting images', available upon request) to assist with respondent estimation of serving size and consumption frequency.

Preliminary testing and test-retest methods

An early version of the MRSDAT was administered to 20 mothers by PANDORA researchers who provided feedback on ease of use. The questionnaire was then revised with the help of a senior Indigenous leader and other experts with extensive experience in nutrition research in RICs, and tested for face validity and reliability. Face validity and test-retest reliability testing involved administering the MRSDAT with the supporting images to 10 Indigenous women originally from RICs but temporarily residing in the Darwin region. A researcher (AR) and a senior Indigenous leader (LM) attended the participants' home or location of choice to administer the MRSDAT. This procedure was repeated after a two week interval by the same researcher(s). The test-retest reliability was analysed (Kappa). Questions 1 and 2 (Table 1) were not assessed due to a lack of responses. Similarly, questions 14, 20, 28 and 29 were added to the tool after the test-retest was conducted after advice from dietary assessment experts that the inclusion of these questions would enable a full assessment of the diet against the Australian Dietary Guidelines.

Preliminary testing results

All twenty mothers reported their child's intake (aged 18 to 54 months) and the early version MRSDAT took an average time of 12.05±2.5 minutes to complete when administered by staff.

PANDORA staff reported that the early version took more time than anticipated and conveying concepts such as serve sizes and frequency of consumption was problematic among remote Indigenous participants (n=7). All participants found the supporting images useful. The questionnaire was revised, a standard protocol and script were made available and training sessions were conducted to assist staff with administering the MRSDAT.

Test-retest results

The readability and clarity of the items were well accepted by Indigenous mothers, and the test-retest analysis showed good to very good agreement between participant responses for 20 of the 24 items tested (0.63-0.88). The 4 items that showed weak agreement (0.13-0.50) were for questions regarding homemade freshly squeezed juice, red meat serve size, offal consumption and the frequency of consuming confectionery (chips, chocolates and ice-creams). The MRSDAT was then modified to address these issues. Additionally, as all participants responded 'yes' to consuming sugary drinks on a daily basis, a question to estimate frequency and amount of sugary drinks consumed was added. Likewise, a sub-question regarding whether sweetened or unsweetened yoghurt was consumed was also added for prompting diet quality. The final version of the MRSDAT can be found in Table 1.

Comment

The 30-item MRSDAT can be used as an acceptable alternative for complex dietary tools when working with Indigenous and non-Indigenous Australians in remote settings. The MRSDAT comprises 12 Mediterranean Diet Adherence Score questions and 18 additional questions that capture consumption of discretionary foods, breads and cereals, wild hunted and harvested foods and dairy foods. Testing indicated that questions and response categories were acceptable and 83% of questions and responses tested were reliable. A validation study is needed to establish construct and content validity with Indigenous mothers and their children, and one is being planned for children aged <2 years living in East Arnhem Land. While the MRSDAT was developed for the purpose of the PANDORA study, it can be applied efficiently across a large sample to provide an assessment of dietary quality and identify dietary patterns in RIC populations ranging in age from young children to adult, with future validations in a variety of genders and ages necessary.

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Table 1. The Menzies remote short-item dietary assessment tool (MRSDAT)

Questions	Responses
1. Is your child still being breastfed? ^a	☐ Yes ☐ No
2. What do you usually use as your main cooking fat/oil? ^a	
3. Which of these vegetables does your child usually eat?	☐ Potato ☐ Sweet corn/yam ☐ Green coloured vegetables ☐ Orange/yellow/red coloured vegetables ☐ Other coloured vegetables
4. How often does your child eat vegetables?	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't eat vegetables
5. When your child eats vegetable, how much does your child usually eat in a day?	☐ 1 serve or less ☐ 2 serves ☐ 3 serves ☐ 4 serves ☐ 5 serves or more ☐ My child doesn't eat vegetables
6. How often does your child eat fruit?	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't eat fruit
7. When your child eats fruit, how much does your child usually eat?	☐ 1 serve or less ☐ 2 serves ☐ 3 serves

	☐ 4 serves ☐ 5 serves or more ☐ My child doesn't eat fruit
8. How often does your child usually drink sugar sweetened drinks like soft drink, fruit drinks, added sugar fruit juice, cordials or sports drinks?	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't drink sugar sweetened drinks
(8.b) How much does your child usually drink?	
9. How often does your child usually drink flavoured milk?	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't drink flavoured milk
10. How often does your child usually have cheese or yoghurt?	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't eat cheese ☐ My child doesn't eat yoghurt
(10.b) If your child has yoghurt, is it usually sweetened or unsweetened?	☐ Sweetened/flavoured (vanilla flavoured) ☐ Unsweetened/plain
11. Does your child drink plain milk <u>nearly every day?</u> (includes milk added with cereal)	☐ Yes ☐ No
12. How many serves of red meat (steak, kangaroo, lamb, sausages or ham) does your child usually eat <u>per day?</u>	☐ less than 1 serve ☐ 1 serve or more ☐ My child doesn't eat meat

13. When your child eats red meat, do you usually cut the fat off?	☐ Yes ☐ No ☐ My child doesn't eat meat
14. How many serves of white meats (chicken, pork, turkey) does your child usually eat per day? ^a	☐ Less than 1 serve ☐ 1 serve or more ☐ My child doesn't eat meat
15. When your child eats chicken do you usually take the skin off?	☐ Yes ☐ No ☐ My child doesn't eat meat
16. What does your child eat more often; white meats like chicken, turkey OR red meats like steak, lamb, pork, hamburgers, hamper or sausages?	☐ White meat ☐ Red meat ☐ My child doesn't eat meat
17. Does your child usually eat offal meat (such as kidney, liver, heart, brain etc.)?	☐ Yes ☐ No ☐ My child doesn't eat meat
18. How much butter, margarine or cream does your child usually eat per day?	☐ None ☐ less than 1 serve ☐ 1 serve or more
19. How much baked beans, three beans mix, cooked lentils, split peas or dried beans does your child usually eat <u>per week</u> ?	☐ None ☐ less than 1 serve ☐ 1- 2 serves ☐ 3 or more serves
20. How many eggs does your child usually eat per week? ^a	☐ None ☐ Less than 2 eggs ☐ 2-4 eggs ☐ 6 or more eggs
21. How much fish including wild caught fish and seafood including turtle, oysters, crab etc. ^b does your child usually eat <u>per week</u> ? (excluding fish fingers or fish patties)	☐ None ☐ less than 1 serve ☐ 1- 2 serves ☐ 3 or more serves
22. How many times <u>per week</u> does your child usually eat traditional food (native fruits, berries, nuts, other wild plants, meats (like fish, kangaroo, goose, goanna etc. ^b)?	☐ None ☐ less than 1 time ☐ 1- 2 times ☐ 3 or more times

23. How many times <u>per week</u> does your child usually eat unsalted nuts?	☐ None ☐ less than 1 time ☐ 1- 2 times ☐ 3 or more times
24. How many times <u>per week</u> does your child usually eat pastries such as cookies/biscuits or cake?	☐ None ☐ less than 1 time ☐ 1- 2 times ☐ 3 or more times
25. How many times <u>per week</u> does your child usually eat chips, pretzels, lollies, chocolates or ice creams?	☐ None ☐ less than 1 time ☐ 1- 2 times ☐ 3 or more times
26. How many times <u>per week</u> does your child usually eat meals or snacks from take-away such as pizza, burgers, fries, pies etc.?	☐ None ☐ less than 1 time ☐ 1- 2 times ☐ 3 or more times
27. How many times <u>per week</u> does your child usually use a tomato based sauce as a seasoning for vegetables, pasta, rice, or other dishes?	☐ None ☐ less than 1 time ☐ 1 time ☐ 2 or more times
(27.b) Is the sauce homemade or bought from shop?	☐ Home made ☐ Bought from shop ☐ I do not use a tomato based sauce
28. How often does your child eat bread and cereals (breakfast cereals, bread, damper, rice, pasta, other grains)? ^a	☐ Every day or nearly every day ☐ A few times a week ☐ Once a week ☐ Once a fortnight ☐ Once a month ☐ My child doesn't eat bread and cereals
29. When your child eats bread and cereals, how much do they usually eat <u>per day</u> ? ^a	☐ 1 serve or less ☐ 2-3 serves ☐ 4-5 serves

	☐ 6-7 serves
	☐ 7 serves or more
	☐ My child doesn't eat bread and cereals
30. What type of bread do you usually eat?	☐ None
	☐ White
	☐ Multigrain/rye/wholemeal

^a Questions not included in the test-retest analysis

^b Please note that the specific traditional food examples provided here should be substituted for regionally appropriate examples when used in the remote Indigenous context.

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