

# Traditional food availability and consumption in remote Aboriginal communities in the Northern Territory, Australia

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Aboriginal and Torres Strait Islander Australians have experienced a rapid nutrition transition since colonisation by Europeans 200 years ago, similar to that experienced by other Indigenous populations globally.<sup>1</sup> The traditional food system provided a framework for society and was interwoven with culture, a framework that is now eroded by a food system with no distinct cultural ties or values.<sup>2</sup> Early reports of Aboriginal people prior to European contact indicate that they were lean and healthy, attributable to an active lifestyle and a nutrient-dense diet characterised by high protein, polyunsaturated fat, fibre and slowly digested carbohydrates.<sup>3</sup> The diet was sourced from a wide range of uncultivated plant foods and wild animals and was influenced by the seasons and geographical location; although there were differences in the food sources by location, there were similarities in the overall nutrient profile.<sup>3,4</sup> Since colonisation, this nutritious diet has been systematically replaced by high intakes of refined cereals, added sugars, fatty (domesticated) meats, salt and low intakes of fibre and several micronutrients.<sup>5-7</sup>

There is no evidence that Aboriginal people maintaining traditional diets had diabetes or cardiovascular disease.<sup>4</sup> However, the integration of non-traditional foods into the contemporary diet of Aboriginal Australians has led to an excessive burden of lifestyle-related chronic diseases.<sup>3</sup> A nutritious diet, such as that afforded by the consumption of traditional foods, plays a key role in protecting

## Abstract

**Objective:** To explore availability, variety and frequency consumption of traditional foods and their role in alleviating food insecurity in remote Aboriginal Australia.

**Methods:** Availability was assessed through repeated semi-structured interviews and consumption via a survey. Quantitative data were described and qualitative data classified.

**Results:** Aboriginal and non-Indigenous key informants (n=30 in 2013; n=19 in 2014) from 20 Northern Territory (NT) communities participated in interviews. Aboriginal primary household shoppers (n=73 in 2014) in five of these communities participated in a survey. Traditional foods were reported to be available year-round in all 20 communities. Most participants (89%) reported consuming a variety of traditional foods at least fortnightly and 71% at least weekly. Seventy-six per cent reported being food insecure, with 40% obtaining traditional food during these times.

**Conclusions:** Traditional food is consumed frequently by Aboriginal people living in remote NT.

**Implications for public health:** Quantifying dietary contribution of traditional food would complement estimated population dietary intake. It would contribute evidence of nutrition transition and differences in intakes across age groups and inform dietary, environmental and social interventions and policy. Designing and conducting assessment of traditional food intake in conjunction with Aboriginal leaders warrants consideration.

**Key words:** Indigenous peoples, remote Aboriginal Australians, traditional food, food intake

against these conditions. Short-term reversion to a traditional diet has demonstrated significant weight loss, improvement in risk factors of diabetes and cardiovascular disease and improvements in glucose tolerance and other abnormalities related to type 2 diabetes mellitus among a small group of Aboriginal Australians.<sup>8,9</sup> High levels and a wide variety of polyunsaturated fatty acids, in the context of overall lower fat content, found in native animal foods are one of the benefits of a traditional diet; reported to reduce the risk of developing obesity, type 2 diabetes mellitus and cardiovascular diseases.<sup>3,4</sup>

Traditional foods remain an integral part of the contemporary Aboriginal and Torres Strait Islander diet strongly linked to identity, culture and country. An analysis of national data collected in 2008 reported that 72% of participants aged over 15 years living in remote communities reported having harvested wild foods in the past 12 months;<sup>10</sup> and yet there is a dearth of information on the contribution of traditional foods to the contemporary diet of Aboriginal and Torres Strait Islander people.<sup>7,11</sup> Most available information is also limited to describing harvesting behaviours and preferences.<sup>11</sup>

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A recent environmental study, for example, in two Australian tropical river catchments reported more than one harvesting trip per fortnight for households in which 42 different animal and plant species were collected over a two-year period. This study also described the food-sharing networks that are likely to play a crucial role in alleviating food insecurity;<sup>12</sup> of which 31% of Aboriginal and Torres Strait Islander people living in remote communities report to experience.<sup>13</sup>

Some researchers estimate that more than 90% of foods are purchased and traditional foods contribute less than 5% to dietary energy intake,<sup>5</sup> others argue that in some contexts the proportion of purchased foods is much lower.<sup>14</sup> This variation likely relates to the diverse study contexts, including where people live, with higher intakes of traditional foods suggested to be consumed in small outstations rather than communities and townships.<sup>14</sup> Until recently, most estimates of population level dietary intake have been limited to store-purchased food and drinks,<sup>5-7</sup> an extremely valuable source of data, though one the authors acknowledge is limited by a lack of information on traditional food intake. The 2011-13 National Aboriginal and Torres Strait Islander Nutrition and Physical Activity Survey (NATSINPAS), which included a 24-hour dietary recall, provided the first set of dietary intake data of Aboriginal and Torres Strait Islander people nationally, though it did not aim to provide an estimate of traditional food intake.<sup>13</sup>

This paper explores informant interview and self-report data relating to the: i) availability, ii) frequency and iii) variety of traditional food consumption. It also reports on the role of traditional food in alleviating food insecurity. For this study, traditional food included all native and introduced animal and plant foods procured for consumption. It was conducted as part of the SHOP@RIC study.<sup>15</sup>

## Methods

### Sample

A survey of contextual factors, defined as factors that may influence food purchases from the community store, was conducted in each of the 20 communities participating in the SHOP@RIC study, in the Northern Territory (NT), Australia.<sup>15</sup> This included a rapid appraisal of traditional food availability through an interview with two key informants who had resided in the community for the previous 12 months. The study was not designed to collect comprehensive data on seasonal availability of traditional foods.

The cohort participating in the customer survey of the SHOP@RIC study<sup>15</sup> was drawn from five very remote Aboriginal communities in the NT randomly selected from 20 study communities. All five communities had one food store, most had community-based food programs such as school nutrition and aged care meal programs and all were considered to have access to a traditional food supply from their surrounding lands. Households in each of the five communities were randomly selected and an eligible adult (i.e. community resident, plans to reside in the community for 12 months,  $\geq 18$  years, purchases food from the community store, and is the primary shopper) was invited to participate in a series of three surveys; pre-, post- and six-months post intervention. On completion of each survey, a \$20 gift of fruit, vegetables and water was provided. The study aimed to include 150 customers in the cohort.

### Data collection

The survey of contextual factors was conducted in English by a research team member, either in person or by telephone, at a time convenient to the key informant. Data were collected at two time points. As early as possible in 2014 and 2015, participants were interviewed about events in the previous year, including traditional food hunted or gathered. Initially, contact was made with the Shire/Council Services Manager of each community, who was invited to participate and recommend another suitable local person to complete the interview. The manager was selected due to their overall knowledge of a broad range of factors affecting store purchases, including population movement, community income and provision of essential services. If this manager could not be contacted, contact was made with someone in the community who was already associated with the main project to determine the most suitable people in the community to respond to these questions.

The customer survey was conducted by a research team, which included an Aboriginal community-based researcher trained in the conduct of the study. Interviews were conducted in English, with translation provided by the local researcher where necessary. The third survey (six months post intervention) was conducted from May 2014 to December 2014, in one community every two months in line with the main study design.<sup>15</sup> This survey included a measure

of frequency and variety consumption of traditional food in the preceding two weeks and questions to elicit information on the role of these foods in alleviation of food insecurity, the results of which are presented in this paper. A short script introduced the set of questions, noting that these included all hunted and gathered foods, which might be referred to by participants as traditional foods or bush foods, and included introduced species. The questions and response options were: How often do you eat traditional foods? (never, 1 day a fortnight, 1 day a week, 2-3 days a week, on most days, everyday). What type of traditional foods have you eaten? In the last 12 months, were there any times that you ran out of food, and couldn't afford to buy more? (yes, no). If yes, how often did this happen? (once per week, once every 2 weeks, once per month, don't know). Are there days when you don't have enough food and feel hungry? (yes, no). What things can you do to get food on these days? Pictorial resources, with examples of foods known to be consumed across Central Australia and the Top End of the NT, grouped into similar food types, served as prompts. This study did not aim to collect data at the species level as nutrient analysis was not planned. These measures were based on a systematic review of the literature and expert consensus, and were pilot tested in line with the development of the overall customer survey.

### Data analysis

The data from the contextual factor survey was entered into an Access database and exported to Excel for analysis. One author (CG) collated the data and verified with MF. Traditional food sources recalled being available over the calendar year and/or at different seasonal periods were described. The quantitative data from the customer survey were described, using Stata Version 14.0 (Stata, College Station, Texas, USA). The qualitative data from the customer survey were managed in an Access database and exported to Excel. One author (CB) allocated each individual food to one of eight categories,<sup>16</sup> clarifying any difficult classification of foods with JB and MF.

### Ethics

The study was approved by the Human Research Ethics Committee of the NT Department of Health and Menzies School of Health Research, the Central Australian Human Research Ethics Committee and

Deakin University Human Research Ethics Committee. Written informed consent was obtained from all participants.

## Results

### Participants

At least one interview was conducted in each of the 20 study communities for the years 2013 or 2014. In 2013, 30 participants across 19 of the 20 study communities contributed to the contextual data; the participants held roles in the local council, government welfare agency, store, health centre, aged care facility, school and training and employment program. In 2014, 19 participants across 15 of the 20 study communities contributed to the repeat survey, holding roles in the local council, government welfare agency, store, health centre, community men's program, research institute and training and employment program or were a community resident not in paid employment. In some cases, mobility from employed roles and from the community prevented repeat interview with the same informants each year.

Seventy-three participants aged 18 years or over, most of whom were female (97%), over the age of 35 years (69%) and not in paid employment (56%) contributed to the third customer survey. The participants differed marginally from the original cohort (92% female, 64% >35 years of age, 62% not in paid employment).

### Annual availability of traditional food

Traditional foods were consistently reported for all 20 communities to be available year round. Informants reported hunting activity,

with someone from all communities recalling a variety of animal foods that were available over the year or that hunting and fishing occurred. Informants from 15 communities across the Top End and Central Australia reported a variety of plant foods available in the previous 12 months. In four of the five communities where no plant foods were reported, it should be noted that data were only able to be collected for one of the two time points.

The survey did not intend to collect data on environmental or other impacts on the availability of the traditional food supply. It is worth noting that informants from three Top End communities and one customer survey participant from a fourth Top End community reported that goanna were in limited numbers or no longer available due to the impact of cane toads. In two Top End communities it was said that turkey were scarce or no longer available and in one of these communities, that the availability of yams had reduced due to environmental damage caused by introduced animals.

### Frequency of traditional food consumption

Most (89%) participants reported consuming traditional foods on at least a fortnightly basis, in the two weeks preceding the survey. Seventy-one per cent of participants reported consuming traditional foods at least weekly.

### Variety of traditional foods consumed

The variety of traditional foods reported to be available across 20 communities and consumed by participants in the five communities is reported in Table 1. There

were a range of different native animal and plant foods and a smaller number of introduced animal foods recalled.

### The role of traditional food consumption in alleviating food insecurity

Most participants (76%) reported experiencing food insecurity. Of the coping strategies identified, 40% related to obtaining traditional food during times they went without food and 53% were borrowing food or money during these times.

## Discussion

This exploratory study demonstrates that traditional food makes an important contribution to the contemporary diet of Aboriginal people living in remote NT communities. In 20 remote communities, traditional foods were reported to be available year round. A high frequency and wide variety of traditional foods were reported to be consumed by participants across five remote communities. In this exploratory study, more animal foods than plant foods were recalled to have been consumed and commonly a few animal foods predominated. Accessing traditional foods was reported to be a means of alleviating food insecurity for almost half the people who experienced food insecurity.

There are limited records of the traditional diet of Aboriginal and Torres Strait Islander people prior to European colonisation. Available reports describe gender roles, with women providing daily sustenance through collecting plant foods and small animals and men hunting large animals on a less

**Table 1: List of the variety<sup>a</sup> of traditional foods reported to be available in communities and to be consumed in the preceding two weeks by a customer cohort.**

	Community data set (n=20)	Participant data set (n=73)
<b>Animals</b>		
Native land animals	Bandicoot, carpet snake, duck (diving duck), echidna, <sup>b</sup> emu, goanna (perentie), goose (magpie goose), honey, honey ant, kangaroo, lizard, possum, turkey, wallaby	Black-headed snake, duck, echidna, <sup>b</sup> emu, goanna, goose, kangaroo, turkey
Introduced land animals	Buffalo, <sup>b</sup> cow, <sup>b</sup> pig	Buffalo, <sup>b</sup> cow, <sup>b</sup> pig
Fish or seafood	Crab (mud crab), crocodile, crocodile egg, dugong, fish (barramundi, black bream, bream, catfish, fresh- and saltwater fish), shellfish (large creek mussel, long bum, mud mussel, mussel, oyster), prawn, stingray, turtle (long-neck turtle, sea turtle, short-neck turtle), turtle egg, water goanna	Crab (mud crab), fish (barramundi, black bream, catfish, red snapper), mangrove worm, shellfish <sup>c</sup> (cone shell, long bum, mud mussel, oyster, periwinkle), stingray, turtle (long-neck turtle, sea turtle, short-neck turtle), turtle egg, water goanna
Witchetty grub	Witchetty grubs	Witchetty grub
Sugar bag		Sugar bag
<b>Plants</b>		
Fruit or berry	Apple, banana, berry (blackcurrant, conga berry), cashew tree fruit, fruit (not specified), plum (black plum, green plum and sugar plum), sultana	Apple, banana, berry, plum (black plum, green plum), raisin, sultana, tomato
Yam or root vegetables	Potato, yam	Potato, yam (budgu)
Other plants	Bean, onion, tomato	Bulb (sandy beach bulb), onion
Seed or nut	Cashew tree nut	Kora (seed)

*a: Foods listed as per participant response to an open-ended question which did not specify how to identify foods (e.g. as food category [e.g. seafood], food [e.g. fish] or species [e.g. barramundi]). The adjective 'bush' and 'wild' was provided at times with some foods (e.g. bush turkey and turkey). Occasionally participants used both local and English language; only the English language name is reported here.*

*b: Echidna was often referred to as porcupine; buffalo as bullocky; cow as beef, cattle or killer.*

*c: The term shellfish was not used by participants in the customer cohort.*

regular basis, with the balance of plant and animal foods determined by factors including location and season.<sup>3</sup> Studies of Canadian Aboriginal people suggest a high intake of traditional animal foods as part of the contemporary diet.<sup>17,18</sup> This study suggests that an understanding of the contribution that animal (native and introduced) and plant foods make to the contemporary diet among Aboriginal and Torres Strait Islander people of Australia is warranted.

The frequent self-reported consumption of animal sources of traditional foods, suggests that contemporary population-level dietary assessment using store purchasing data has the potential to over-estimate nutrient deficiencies, particularly of protein, a concern we have previously raised.<sup>7,19</sup> In Aboriginal populations elsewhere, it is estimated that traditional foods might contribute anywhere from 10% to 36% of energy and disproportionately to protein and other micronutrients,<sup>17,20-23</sup> representing an important dietary contribution. Even weekly or fortnightly consumption of a nutrient-dense food, such as that reported to be consumed in this study, is likely to make an important contribution to the diet.<sup>11</sup> Introduced land animal foods, such as buffalos, cattle and pigs, were reported to be hunted and consumed by participants. The contribution of introduced land animals may be influenced by availability and in some areas may be well integrated into the traditional food system.<sup>5</sup> In the absence of volume consumption data, it is not possible to draw conclusions on the dietary contribution of introduced land animals. Although these foods contribute to dietary protein intake, the higher quantity of fat and poorer fatty acid profile, compared with native animal foods, is worth noting.<sup>3</sup>

We have demonstrated that it is possible to measure frequency consumption and to some extent variety of traditional foods consumed – in fact, our impression was that people enjoyed talking about these foods. We acknowledge the limitations of traditional dietary assessment methods, including additional challenges in remote contexts such as the practice of sharing community meals,<sup>12,24-27</sup> though also consider that attributes such as the high regard given to traditional food, may aid assessment.<sup>24,27,28</sup> Studies have demonstrated how standard tools can be modified to assess individual dietary intake with Aboriginal populations<sup>29</sup> and lessons can be learnt from previous

dietary survey work in remote Australian Aboriginal communities.<sup>15,26</sup>

Comprehensive assessment of traditional food consumption would serve a number of purposes. These data would provide an understanding of the different types of traditional foods consumed and the contribution they make to the contemporary diet of Aboriginal people across Australia. This information would assist in developing targeted strategies to ensure sustainable access and increased consumption of traditional foods. This study was not designed to examine differences in consumption of traditional foods across age, gender and other population groups. International studies in Aboriginal populations have found higher intakes of nutrient-poor store foods in young people and higher intakes of traditional foods in older people.<sup>17,22,23,30,31</sup> In addition to contributing to improved health through dietary intake, the socio-cultural contribution and opportunity for physical activity that traditional foods provide is important to recognise.<sup>21,32,33</sup> The impact that climate change, changes in the natural environment and development policies regarding land and sea use may have on traditional food use and thus health and wellbeing is critical to understand.<sup>12,32,34</sup> Although not designed to collect information on environmental and other impacts on traditional food, this study suggests that introduced animals are affecting the availability of small animal and plant foods, at least in the Top End of the NT.

In addition to being nutritionally superior, traditional foods are considered to be a low-monetary form of sustenance, important in a context where people generally have low incomes and where the cost of food is high.<sup>12,18,20,35</sup> Similar to our findings, 40% of coastal urban-dwelling Aboriginal people reported increased access of wild resources at times of financial hardship.<sup>32</sup> In a small Western Australian outstation, hunting for various types of wild foods has been shown to respond differently to market and economic scarcity.<sup>33</sup> The harvest of traditional foods and food sharing networks reduce the reliance on the market economy,<sup>10,12</sup> important in a context where high numbers of people report to be food insecure. Others share our opinion that further understanding the role of traditional foods in the diet and in alleviating food insecurity<sup>36</sup> is crucial in an environment where few, if any, significant changes are occurring in terms of the high cost of food and prevailing low-income levels.

Data regarding the contribution of traditional foods in the diet and role in livelihoods of Aboriginal people living in remote communities will be important in relation to broader environmental and social policy making. Evidence of the contribution of traditional foods to the contemporary diet of remote Aboriginal people is crucial to informing broader government policy that affects where people live, how they are educated, employment and other livelihood opportunities.<sup>10</sup> It has been suggested that the use of traditional foods may be gaining interest nationally and internationally, and in addition to being good for human and environmental health, could provide economic and employment opportunities for Aboriginal and Torres Strait Islander Australians.<sup>37</sup> There is a developing interest in sustainability of traditional foods in environmental protection efforts,<sup>12</sup> such as working with Aboriginal people to develop adaptation strategies to mitigate the impact of climate change on the environment and traditional food supply.<sup>32,34</sup> Similarly, traditional food data are used internationally to maintain and improve availability and access to traditional foods as a result of global warming and environmental insults, such as contamination.<sup>17,18,21</sup>

There are three limitations related to our survey methodology. First, this study relies on self-report data, which is considered to be biased by recall and reporting. To address this, the data were collected through a facilitated recall methodology,<sup>38</sup> which improves recall through the use of locally relevant prompts and questions.<sup>39</sup> While respondents were asked to recall intake in the preceding two weeks only, it is possible that foods consumed beyond this timeframe were recalled. Second, the individual dietary data was collected from participants in only five remote NT communities; however, these were randomly selected from a larger sample of 20 communities and were spread across the NT. Third, the data were collected based on recall of a two-week period from participants in each community. Normally, frequency consumption data would be collected over a longer period to account for factors such as seasonality, although it has been collected in some studies for shorter periods.<sup>17</sup> It was not within the scope of this study to collect longer-term data. The data were, however, collected over a 10-month period from the five communities, two months apart and have been supported by annual availability of traditional foods data from key

informants across 20 communities. The key limitation in relation to the semi-structured interviews was that the key informants did not always include an Aboriginal person from each community and so reports of annual availability of traditional foods are likely to be conservative.

## Implications

Although focused on availability, frequency and variety, this study provides an important step in improving non-Aboriginal knowledge of the contribution of traditional food in the contemporary diet of Aboriginal Australians living in remote Australia. This study suggests that it is possible to collect data regarding the contribution of traditional foods to diet. These data would complement population-level data collected through community store sales. Data of the nutrient profiles of many traditional foods exists and continues to be built on in Australia. Through a strong collaboration with Aboriginal people, methods for conducting individual dietary assessment of traditional food intake could be developed, which could include methodologies such as repeated 24-hour recall, visual recall<sup>40</sup> and food frequency questionnaires, resulting in validated tools for ongoing use in this context. Our limited data, combined with national and international evidence suggest that priorities should include understanding differences across ages, gender, education and employment status and across remote, regional and urban areas in Australia. It is crucial that these processes align with developments in the broader environmental and societal work in this area.

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