



---

## **Sociocultural factors relating to Tongans' and Indigenous Fijians' patterns of eating, physical activity and body size**

AUTHOR(S)

Helen Mavoia, M McCabe

PUBLICATION DATE

01-01-2008

HANDLE

[10536/DRO/DU:30017332](https://hdl.handle.net/10536/DRO/DU:30017332)

Downloaded from Deakin University's Figshare repository

Deakin University CRICOS Provider Code: 00113B

## Review

# Sociocultural factors relating to Tongans' and Indigenous Fijians' patterns of eating, physical activity and body size

Helen M Mavoa PhD and Marita McCabe PhD

School of Psychology, Deakin University, Burwood, Australia

This paper reviews literature between 1974 and 2007 that addresses the impact of sociocultural factors on reported patterns of eating, physical activity (activity) and body size of Tongans and indigenous Fijians (Fijians) in their countries of origin. There have been changes in diet (more imported and fewer traditional foods), activity (reduced, especially in urban settings), residence (rural-urban shift) and body size (increased obesity and at a younger age). The prevalence of overweight/obesity in Tongans and Fijians has increased rapidly over the last two decades and remains among the highest in the world (>80% in Tonga; >40% in Fiji), with more females reported to be obese than males. The few studies that investigated sociocultural influences on patterns of eating, activity and/or body size in this population have examined the impact of hierarchical organisation, rank and status (sex, seniority), values (respect, care, co-operation) and/or role expectations. It is important to examine how sociocultural factors influence eating, activity and body size in order to i) establish factors that promote or protect against obesity, ii) inform culturally-appropriate interventions to promote healthy lifestyles and body size, and iii) halt the obesity epidemic, especially in cultural groups with a high prevalence of obesity. There is an urgent need for more systematic investigations of key sociocultural factors, whilst taking into account the complex interplay between sociocultural factors, behaviours and other influences (historical; socioeconomic; policy; external global influences; physical environment).

**Key Words:** food, physical activity, Tonga, indigenous Fijians, obesity

## INTRODUCTION

The prevalence of obesity is increasing in adult populations in Western Europe and the Pacific.<sup>1</sup> Increases in the prevalence of obesity over the last few decades in Fiji<sup>1</sup>, Western Samoa<sup>2</sup> and the Cook Islands<sup>3</sup> parallel trends in Australia,<sup>4</sup> New Zealand<sup>2</sup> and the USA.<sup>2,5</sup> There has also been an alarming increase in childhood obesity over the last two decades.<sup>2,4,6-8</sup>

Obesity has significant implications for the physical and social health of obese individuals, as well as for their families and wider communities. First, obesity-related non-communicable diseases and the concomitant complications place huge demands on health care services.<sup>9</sup> Second, obesity and related diseases are detrimental to national productivity. This burden is amplified in nations with small populations and limited resources, for example Tonga and Fiji.

Obesity is the outcome of an energy imbalance where energy intake (food consumed) exceeds energy expenditure (physical activity).<sup>10</sup> However, non-physical factors also contribute to body composition, with complex interactions between genetic,<sup>11</sup> historical,<sup>12-14</sup> socioeconomic,<sup>15</sup> policy<sup>13,16,17</sup> and sociocultural<sup>12,18,19</sup> factors, and patterns of eating, physical activity and preferred body size.

This paper reviews sociocultural factors in relation to the reported patterns of eating, physical activity (activity) and body size of Tongans and indigenous Fijians residing in their countries of origin. The recent histories of Tonga

and Fiji are outlined in order to contextualise time-related changes in patterns of eating, activity and body size. We briefly review studies of eating and activity; and summarise the reported prevalence of obesity in Tonga and Fiji over the last forty years before discussing sociocultural factors that underpin patterns of eating, activity and body composition. We highlight indigenous perspectives on these topics. While we focus on Tongans and indigenous Fijians, we also refer to reports from other Pacific nations.

## DEMOGRAPHICS

The Kingdom of Tonga, situated in Polynesia, has a population of 100,000, who reside on 35 of the 150 islands.<sup>20</sup> Sixty seven percent of this Polynesian population reside on the largest island of Tongatapu; 23% of Tongatapu residents live in the capital, Nuku'alofa. Tonga has a youthful population, with a median age of 20.7 years and 39% of Tongans aged <15 years. Ninety eight percent of the population is Tongan,<sup>20</sup> the vast majority (98%) of whom are practising Christians.

**Corresponding Author:** Dr. Helen M Mavoa, School of Psychology, Deakin University, 221 Burwood Highway, Burwood, Vic 3125, Australia.

Tel: 61 3 404 231 450; Fax: 61 3 9244 6858

Email: helen.mavoa@deakin.edu.au

Manuscript received 17 October 2007. Initial review completed 22 July 2008. Revision accepted 25 July 2008.

Fiji is an independent nation situated 750 kilometres northwest of Tonga in the area identified as Melanesia. The population of Fiji is 905,949, 51% of whom are indigenous Fijians<sup>21</sup> and are derived from Melanesia. IndoFijians, whose ancestors came from India around 100 years ago, comprise 44% of the population of Fiji. Fiji also has a youthful population with a median age of 24.6 years;<sup>21</sup> round 30% of the population is aged <15 years. The vast majority of indigenous Fijians are practising Christians. The major religious affiliations of IndoFijians are Hindu (77%) and Muslim (16%) and Christian (6%).<sup>22</sup>

### HISTORICAL BACKGROUND

Both Tonga and Fiji have been subject to a series of outside influences, both from within the Pacific and further afield. The first settlers in Tonga and Fiji arrived from the Asian mainland via Melanesian island chains almost 3,000 years ago, with a second wave of (Melanesian) settlement in Fiji,<sup>23</sup> but not Tonga. There have been frequent exchanges between Tonga and Fiji, especially in the Lau group, which is the eastern-most island chain. This international movement has been associated with the exchange of people and valuables, including food.<sup>24</sup>

The earliest Europeans in Tonga and Fiji were explorers, whalers and beachcombers, who started to arrive in the eighteenth century.<sup>25</sup> They were followed by missionaries, traders and potential colonisers, all of whom had a greater impact on the lifestyles of Tongans and Fijians than earlier Europeans.<sup>13</sup> The conversion of Tongans<sup>26</sup> and Fijians<sup>27</sup> to Christianity impacted on everyday eating and activity patterns, as well as on activities associated with more ritualised food exchanges.

European colonisation impacted differently on Tonga and Fiji. Tonga avoided formal colonisation by becoming a Kingdom (see Rutherford 1996<sup>28</sup>). The 1875 Constitution cemented a more rigid social hierarchy than previously when high-ranking chiefs vied for land and resources. The 1875 Constitution secured ongoing monarchy for Tafa'ahou Tupou I, the first king, and his descendants. Together, the expectations of State and Church defined the roles of *tu'a* (commoners), who continue to have obligations to their monarch and a resident noble, as well as to their families, church groups and wider communities.<sup>29</sup> These political, religious and familial institutions continue to have a major impact on the production and distribution of food in contemporary Tonga, as well as influencing patterns of work-related activity and body composition.<sup>19</sup>

Fiji was formally colonised when it was ceded to Britain in 1845. Many of the colonial administration's regulations impacted on food production, gathering, preparation and consumption, thus influencing both eating and activity patterns.<sup>27</sup>

Fiji has been subject to more Asian influences than Tonga, and for a longer period. Sixty thousand Indians arrived in Fiji between 1897 and 1916 to work on the sugar plantations.<sup>30</sup> While the majority of the descendants of these indentured labourers remained in Fiji, successive coups since 1987 have seen the emigration of many IndoFijians.<sup>31</sup> Chinese settlement began in the early 1870s<sup>32</sup> and Chinese now comprise 0.5% of the Fiji population.

Since the 1960s, both Tonga<sup>16</sup> and Fiji<sup>1</sup> have been exposed to increasing international movement of people, ideas and goods. Globalisation has been associated with more waged employment and, in the case of Tonga, increasing remittances from relatives living overseas.<sup>33</sup> Hughes and Lawrence<sup>17</sup> suggest that colonisation is ongoing, with the European domination of trade resulting in less developed countries becoming more economically- and food-dependent. There has been a concurrent rural-urban shift of people in both Tonga and Fiji. Together, globalisation and urbanisation have resulted in greater access to cash, increased consumption of imported foods and a concomitant reduction in the consumption of traditional foodstuffs in both Tonga<sup>34</sup> and Fiji.<sup>17,35,36</sup>

Recent economic and political changes in Tonga include the introduction of a consumption tax in April 2005, the death of Tafa'ahau Tupou IV in 2006 and challenges to the monarchy. Fiji has also experienced a series of political changes since gaining independence from Britain in 1971, including four coups between 1987 and 2006. The recent non-renewal of land leases for many IndoFijian sugar cane farmers has accelerated the rural-urban movement (Hassan, unpublished conference paper, 1995). It is not yet clear how the more recent changes have impacted on patterns of eating, physical activity and obesity in either Tonga or Fiji.

In summary, a range of national and international influences have impacted on eating and activity patterns in Tonga and Fiji, with the resulting energy imbalance being evident in the increased prevalence of obesity in both countries.

### PATTERNS OF EATING, PHYSICAL ACTIVITY AND BODY SIZE IN TONGA AND FIJI

In this section, we review everyday eating and physical activity patterns, then the prevalence of obesity. We draw on reports published since the 1970s to discuss similarities and differences in the ways that eating and activity patterns have been mediated in each nation, according to life-stage and location (urban versus rural).

#### Food

The everyday eating patterns of Tongans and Fijians are similar. Recent studies conducted in Tonga<sup>16,19,37</sup> reported that the most frequently consumed foods were root crops, imported protein (chicken parts, fish, mutton flaps), green vegetables and bread. Water was the most common drink reported by adolescents.<sup>37</sup> Two reports indicate that Tongans had an inadequate intake of fruit and green vegetables in the 1980s.<sup>38,39</sup>

While Fijians purchased 79.9% of their daily food in 1993, they still grew their own root crops, green vegetables and fruit.<sup>36</sup> There have been marked changes in Fijians' diets over the last two to three decades, with a shift from a traditional diet high in complex carbohydrates and low in fat to a more westernised and less nutritious diet derived from refined sugars and fats;<sup>36</sup> there was a 62% increase in fat intake between 1963 and 2000.<sup>17</sup> For example, fat comprised >30% of the dietary intake for Fijian women aged 30-39 years.<sup>40</sup> The dramatic increase in the proportion of total energy derived from cereals and sugars between 1980 and 1993 was accompanied by a concomi-

tant reduction in the consumption of traditional foods, especially root crops and fresh green vegetables.<sup>35</sup> The decreased consumption of traditional root crops in Fiji has been attributed to 1) urbanisation, 2) the 1962 abolition of a regulation requiring Fijian males to produce sufficient crops for their families,<sup>41</sup> 3) increased exports of *dalo* (taro), and 4) the substitution of root crops with cereals. The decreased consumption of fruit and green vegetables in Fiji may be due in part to the rural-urban shift, especially in the case of Fijians moving to squatter settlements where they have minimal space for gardening.

There also appear to be age-related differences in the eating patterns of Tongans. Younger Tongans are reported to eat more frequently and have a more varied (and less healthy) diet compared to older Tongans.<sup>34</sup> It is not clear whether this age difference exists in terms of either total energy intake or food quantity.

Life stage also influences eating patterns in both Tonga and Fiji. Tongan<sup>42,43</sup> and Fijian females are reported to eat more food during critical reproductive phases of pregnancy and breastfeeding compared to other life-stages.

Current evidence suggests that breastfeeding protects infants against subsequent obesity.<sup>44,45</sup> Rush and colleagues report that Pacific infants in New Zealand who were breastfed for six weeks or more weighed less at four years compared to children who were not breastfed.<sup>45</sup> More Tongan infants are breastfed than is the case with Fijian infants. In the 1980s, 98% and 94% of Tongan infants were exclusively breastfed at 6 months and 8 months, respectively.<sup>29,43</sup> The prevalence of breastfeeding had declined to 62% of Tongan infants being exclusively breastfed up to the age of four months in 1999. The mean duration of breastfeeding was 8-10 months by the 1990s<sup>29</sup> and 48% of Tongan infants were breastfed from 4-12 months in 2003 (Report of the Minister of Health for 2003).

In 1993, 95% of Fijian infants were breastfed from birth,<sup>36</sup> while <50% of Fijian infants were exclusively breastfed after three months.<sup>9</sup> Poor weaning of Fijian infants has been proposed as an explanation for poor growth in the post-breastfeeding period.<sup>9</sup>

However, studies suggest that early weaning leads to rapid weight gain.<sup>44,46</sup> There is a need for studies that i) identify the duration and nature of breastfeeding, and ii) investigate relationships between breastfeeding and subsequent body composition in Tongan and Fijian children.

The school food available to children appears to be nutritionally poor in both Tonga and Fiji. Halavatau (unpublished report, 1999) reported that the food available in 46 Tongan primary schools in 1999 comprised primarily of white flour, fat and sugary drinks, while the fat intake of children in Fiji was higher than that of adults.<sup>36</sup>

There are clear differences in the diets of urban- and rural-dwellers in both nations. The diets of urban-dwellers in both Tonga<sup>34</sup> and Fiji<sup>36,47</sup> comprised more imported food high in sugar and fat compared to the more traditional diet of rural dwellers. Rural-based Tongans and Fijians<sup>36</sup> consumed more taro, fresh fruit and vegetables than did urban dwellers. While both urban- and rural-dwelling Fijians purchased the majority of their food (90.4% and 73.1%, respectively) in 1991, almost twice as many rural (88%) versus urban (48%) Fijian households

reported growing some of the food that they had consumed in the previous 24 hours.<sup>36</sup> It is not clear whether the quantity of food consumed by urban-dwellers was greater than that of rural cohorts.

There also appears to be an interaction between age and locality; Saito also reported that young rural-dwelling Fijian children had a low protein intake with a concomitant stunting of growth.<sup>36</sup> It is not clear whether these age-related differences in eating are due to age per se or life-stage.

#### *Patterns of physical activity*

It is difficult to establish a clear pattern of physical activity (activity) in either Tonga or Fiji, given the sparse literature and the range of measures employed. Twenty eight percent of Tongan adolescents participating in the 2001 Lifestyle Survey reported that they exercised daily, while almost 19% of respondents did not engage in any physical activity.<sup>48</sup> In 1993, 52.7% and 26.8% of Fijian males and females, respectively reported that they engaged in activities for the specific purpose of getting fit at least once a week.<sup>36</sup> Fijian adolescents appear to be more active than their Tongan counterparts, although there are no comparative studies. A 2004 pilot study of physical activities conducted with adolescents in three Fiji secondary schools indicated that 98% of students had one or more 35-minute periods of physical education each week, and that 60% of students engaged in some form of vigorous activity.<sup>49</sup> Physical activities included formal (organised) and informal sports, as well as chores. Team sports were the most popular physical activity, especially for younger Fijians.<sup>49</sup>

Physical activity patterns in Fiji appear to be age-related. Saito<sup>36</sup> reported that the frequency of physical activities dropped sharply after 18 years of age and stabilised in the 45-54-year age group. It is not clear whether there are age-related decreases in the *duration* of physical activities.

The reported decline in physical activity across the lifespan may also be due to the change in roles during various life-stages rather than age per se. Tongan mothers of infants reported doing less recreational physical activity during pregnancy (70%) and following childbirth (57.5%) than they did prior to having children (84%).<sup>42</sup> Specifically, 33% of mothers exercised regularly prior to becoming pregnant, 13% exercised during pregnancy, yet only 9.4% continued exercising following childbirth.<sup>42</sup> These reported reductions in regular leisure-related activities following childbirth may have been offset in part by increasing engagement in active household and childcare tasks. Given that many Tongan<sup>43</sup> and Fijian mothers receive substantive support from their natal and affinal families for one to three months postpartum, it is unlikely that energy expended in domestic work following childbirth equated to pre-pregnancy leisure-related activities.

Locality also appears to influence the type and frequency of Fijians' physical activities. Urban-dwelling Fijian adults engaged in less frequent and less strenuous activities than did rural dwellers.<sup>36,50</sup> However, more urban-dwelling adult males (43.9%) did regular "exercise" for fitness and health than did rural-dwellers (36.4%).<sup>36</sup>

### Body size

The majority of obesity studies have drawn on the World Health Organisation's (WHO) 1946 definitions of obesity and overweight, namely a BMI of  $\geq 30 \text{ kg/m}^2$  and  $25\text{--}29.99 \text{ kg/m}^2$ , respectively.<sup>51</sup> The studies cited below use these international cut-offs, unless stated otherwise. The prevalence of obesity of Tongans and Fijians is among the highest in the world. In 2003, 84% of adult Tongan males and 93% of females were reported to be obese.<sup>11</sup> Forty two percent of Fijian males have been reported to have a BMI of  $>25 \text{ kg/m}^2$ ,<sup>40,52</sup> while the reported prevalence of overweight/obesity in adult Fijian females ranges from 47%–84%.<sup>1,35,40,52</sup> All four studies were conducted within a similar (7-year) time frame and used the same BMI cut-offs. The differences in obesity prevalence may be due to the different study localities; two surveys were conducted nationally,<sup>36,52</sup> while Becker *et al.* and Tomisaka *et al.* surveyed females in Sigatoka and peri-urban Suva, respectively.

There also appears to be a high prevalence of overweight or obesity in Fijian children. A survey conducted in 1999 reported that 24.2% of urban-dwelling children and 8.7% of rural children were either overweight or obese.<sup>53</sup> It is not clear what cut-offs were used to define obesity in this study.

The prevalence of obesity in Tonga appears to have increased markedly since the 1970s. Duarte *et al.* reported a significant increase in the body mass index of Tongan adults between 1973 and 1998, with mean BMI  $\pm$  SD increases in both males ( $30.2 \pm 5.4 \text{ kg/m}^2$ ) and females ( $33.8 \pm 6.2 \text{ kg/m}^2$ ), representing increases of 11.9% and 19.4%, respectively.<sup>54</sup> The 1986 National Nutrition Survey reported that 10% of males and 31.9% of females were obese (BMI  $>30$ ).<sup>55</sup> The 1992 National Noncommunicable Diseases and Nutrition Survey reported obesity in 29.8% and 39.1% of males and females, respectively,<sup>56</sup> while a 1999 survey showed that 56% of adults  $>15$  years (males and females) were obese (BMI  $\geq 30$ ) (unpublished report for the Tongan Ministry of Health, 2003).

It is not clear whether there has been a similar increase in the prevalence of obesity among Fijians. While Saito<sup>36</sup> suggested that the prevalence of obesity had been "consistently high" among Fijians for 40 years, Becker *et al.* reported a significant (24%) increase in overweight and obesity in Fijian females in the Sigatoka region between 1989 (60%) and 1998 (84%).<sup>1</sup>

There is a higher prevalence of obesity among Tongan<sup>57–59</sup> and Fijian<sup>36,52</sup> females compared to males. This gendered pattern of obesity is evident at a young age in both groups; at least three studies report on gender differences in the prevalence of obesity in Tongan children and adolescents and at all ages (5–11 years; 10–18 years; 12–19 years; 14–15 years).<sup>58</sup> Obesity was calculated using the reference data of the International Obesity Task Force (IOTF) and the Centers for Disease Control and Prevention (CDC). Smith *et al.*<sup>59</sup> reported that more female than male adolescents were overweight or obese (53.8% and 36% for international cut-offs and 37.6% and 25% according to Pacific cut-offs) and noted that this was among the highest reported for adolescents anywhere. Similarly, more Fijian females aged 10–17 years were obese (13.4%) compared to males (7.3%).<sup>36</sup>

The prevalence of obesity appears to be positively associated with age in both Tonga and Fiji. The 2002 Steps survey<sup>52</sup> suggested that there was a rapid increase in the prevalence of overweight and obesity prior to the age of 30. Two studies have reported age-related increases in obesity in Tongan children and adolescents. Smith *et al.* noted a marked increase during adolescence, particularly in the case of females between 11–12 years and 13–14 years.<sup>59</sup> Fukuyama *et al.* demonstrated that the prevalence of obesity in Tongan females residing in Tongatapu, and who were aged 12–19 years was higher than that of 6–11 year-old females (19.4% vs 7.1%).<sup>58</sup>

Similarly, more Fijian children aged 5–9 years (7.2%) were obese than were children aged four years and under (5.8%).<sup>36</sup> It is not clear if this reported difference is statistically significant.

There may be urban-rural differences in the prevalence of obesity in Tonga. While Koike *et al.* reported that more urban-dwelling Tongan adults were obese compared to rural dwellers,<sup>60</sup> these urban-rural differences may be explained by the urban and rural data being collected at different times (1980s and 1970s, respectively), especially given the reported increase in obesity prevalence for Fijian females over this time frame.<sup>1</sup> Fukuyama *et al.* also reported a significantly higher prevalence of obesity in 12–19 year-old females residing in urban (Tongatapu) versus rural (Niuatoputapu) areas of Tonga.<sup>58</sup> However, Smith *et al.* did not find a significant difference in the BMIs of urban-dwelling adolescents compared to peers residing in the more rural islands of Vava'u or Ha'apai.<sup>59</sup>

Urban-dwelling Fijians have also been reported to have a higher prevalence of obesity than rural-dwellers.<sup>9,36,47,50</sup> The 1993 National Nutrition survey reported that 34.5% of urban Fijian males were obese compared to 23% of rural dwellers;<sup>36</sup> it is not clear if this difference is statistically significant.

### INTERRELATIONSHIPS BETWEEN EATING, PHYSICAL ACTIVITY AND BODY SIZE

It is clear that there have been marked changes in food choices, reductions in physical activity and the increase in body size over the last four decades. There have been a number of behaviour-related explanations for patterns of obesity in Tonga. Both Fukuyama *et al.*<sup>58</sup> and Smith *et al.*<sup>59</sup> attributed the higher prevalence of obesity among young Tongan females versus males to gender differences in physical activity. Halavatau *et al.*<sup>42</sup> explained the increased prevalence of obesity in Tongan females following childbirth in terms of concomitant increased food consumption and reduced physical activity.

Studies that have reported urban-rural differences in obesity in Tonga and Fiji have explained the greater prevalence of obesity in urban areas in terms of changes in diet and/or physical activity.<sup>36,58,59</sup> Dietary changes have been attributed to more ready access to a variety of processed foods in urban regions of Tonga<sup>15,34</sup> and Fiji.<sup>36,41</sup> Evans *et al.* also explained the higher prevalence of obesity among urban- versus rural-dwelling Tongans in terms of their higher socioeconomic status and more ready access to expendable income.<sup>34</sup> There is a need for more studies that compare patterns of eating, physical activity and body size in different localities within a coun-

try, for example, rural and urban populations, across both sexes and all age groups and life-stages, and within a similar time frame, in order to evaluate the obesogenic nature of both rural and urban environments.

Reports of eating, physical activity and body size provide fragmented pictures of these patterns in both Tonga and Fiji. Crawford and Ball<sup>61</sup> have highlighted the need to examine relationships between body size and specific eating and physical activity behaviours. However, there are complex pathways between i) patterns of eating, physical activity and body size, and ii) factors that underpin these patterns. A number of studies have addressed the broader influences of Westernisation,<sup>1,11,15,18,19,34,62</sup> globalisation<sup>16</sup> and urbanisation<sup>1,9,13,18,41,50,63,64</sup> and economic<sup>13,15,16</sup> factors on patterns of eating, physical activity and body size in Tonga and/or Fiji. Remarkably few studies have explored sociocultural factors that influence patterns of eating, physical activity and body size. In the next section, we review sociocultural factors that underpin the eating, activity and body-size patterns of Tongans and Fijians.

#### SOCIOCULTURAL FACTORS UNDERPINNING PATTERNS OF EATING, PHYSICAL ACTIVITY AND BODY SIZE IN TONGA AND FIJI

Sociocultural factors include the way a cultural group (group) is organised, the dominant ethos or world view, and the key values, ideas and expectations of group members. Together, group structures, and a group's dominant world views, values, ideas and expectations about food, eating, physical activity and preferred body size create a social and cultural environment that has the potential to either promote or protect against obesity. The sociocultural environment may impact differently on group members according to status variables such as sex, seniority and life-stage. We draw on literature relating to social structure, values and role expectations to discuss how these sociocultural factors have influenced the eating, activity and body size patterns of Tongans and indigenous Fijians residing in their countries of origin.

##### *Social structure, rank and status*

The way that a cultural group is structured both reflects and perpetuates the relative rank and status of individuals within that group. Together and separately, rank and status influence expected and actual patterns of eating, physical activity and body size. Rank is fixed at birth.<sup>65</sup> However, status is context-dependent and is determined by a number of intersecting variables in both Tonga<sup>43</sup> and Fiji,<sup>66</sup> including seniority, sex, kinship, birth order and individual achievements. While differential rank and status are evident in both societies, Tonga appears to be more hierarchically structured than Fiji. This hierarchical social organisation is reflected in within-group differences in Tonga, in terms of food, eating, activity and body size.

As in any society, food types are accorded different status in both Tonga and Fiji. Root crops are highly valued throughout the Pacific, as is protein, which is produced in large quantities for ceremonial occasions.<sup>62</sup> This is the case in both Tonga and Fiji. Prestigious or high-status foods in Tonga include yams<sup>62</sup> and pork. In Fiji, root crops and protein are also highly valued.<sup>18,66</sup> How-

ever, the specific type of food that is most highly valued may reflect its availability; for example pork will be valued more than fish for coastal-dwellers.<sup>66</sup> Imported food items have also become highly valued in both Tonga<sup>19</sup> and Fiji.<sup>36</sup> Highly-valued foods appear to retain this high status, even once they have become more economically and physically accessible.<sup>12</sup> This appears to be the case in Tonga and Fiji.

Food is distributed on the basis of the relative rank and status of both donor and recipient in both Tonga<sup>19</sup> and Fiji.<sup>35,66</sup> However, the distribution of food varies within each cultural group, in line with the relative priority given to different status variables for food and people. In terms of the gendered distribution of food, Tongan females consume more high-status food than males,<sup>19,37</sup> including Western foods such as *sipi* (mutton flaps), tinned corned beef, sweets and soft drinks.<sup>59</sup> However, in many Fijian families, males receive more high-status food and greater quantities compared to females.<sup>66</sup>

Seniority and sex often intersect to determine status, which is reflected in eating patterns. For example, older Fijian men often receive the most prestigious food and in greater quantities than is the case for younger males, females and children.<sup>66</sup> Saito (1995) reported that almost 9% of elderly Fijians missed their evening meal.<sup>36</sup>

Rank and status also impact on patterns of physical activity in both Tonga and Fiji. Low-ranking Tongans are expected to approach people of higher rank.<sup>43</sup> There is a clear gender division in the chores performed by Tongans and Fijians. For example, young males cultivate food and prepare underground ovens that are used on special occasions, while females prepare and cook more routine meals. Tongan males of all ages regularly tend the family *uta* or plantation, while females are expected to perform chores in and around the house.<sup>19,58</sup> A pilot study of physical activity patterns of adolescent females reported that 69% of females indicated that school duties and household chores were their most common form of regular physical activity.<sup>49</sup>

There are gender differences in the type and frequency of recreational physical activities (recreational activities) reported by both Tongan and Fijian adolescents. Twice as many males in Tonga<sup>37,59</sup> and Fiji<sup>49</sup> reported engaging in regular recreational activities than did females. Touch rugby was the most common regular, informal sport for 59% of secondary school males, while walking was the most common exercise for females. Young females are discouraged from engaging in unsupervised recreational physical activities away from their homes.<sup>19,43</sup> The underlying reasons for more Tongan and Fijian males engaging in physical activities during recreation time than females require further study.

Sex and age also appear to interact in terms of physical activity patterns; Tongan adolescent males increased their reported activity with age, while the reverse was true for females.<sup>37</sup> While walking was the most common physical activity for Fijian females aged 25 and more, it was only the most common exercise for males after the age of 45 years.<sup>36</sup> This gendered pattern of physical activity may be explained by the different roles expected of males and females in Tonga and Fiji.

Relative rank and status are also reflected in body size. Tongans of chiefly rank are expected to be larger than *tua* (commoners), demonstrating their more ready access to high-status foods and less physically active lifestyles.<sup>19</sup> Robust body size was, and may still be, a sign of wealth and social status for both males and females in some areas of Fiji.<sup>36</sup> However, the association of large stature with high rank may be changing. For example, while the late King of Tonga had a stature befitting his rank, the King initiated and participated in programmes to promote a healthy weight for himself and for all Tongans, irrespective of status.<sup>67,68</sup>

The gender differences in obesity appear to reflect the relative status of males and females in Tonga and Fiji, with an energy imbalance being created by differential patterns of eating and household and recreational activities. The impact of hierarchical structures and status variables on patterns of eating, physical activity and body size for Tongans and Fijians remains an important consideration for future studies, both at the level of individuals and especially at the level of family, church, schools and wider social group settings.

#### **World view**

In any cultural group, the fundamental values of the group are integrally linked to the dominant ethos or world view. Becker<sup>18</sup> describes this collective ethos in terms of the "enmeshment" of Fijian individuals within family, kin and community. In terms of eating patterns and body size, Becker suggests that both the provision of food and the cultivation of the ideal body size are collective enterprises rather than individual pursuits. Cooperation is closely linked to notions of collectivity in both Tonga and Fiji. Collectivity is also evident in the choice of recreational activities; Saito reported that group activities in Fiji were more common than individual pursuits, as evidenced by group endeavours relating to the production, harvesting, preparation, presentation and consumption of food.<sup>36</sup> Group activities are also preferred during recreation time.<sup>49</sup>

#### **Values**

Values of respect, love and cooperation are central to the ethos of both Tongans<sup>19,43</sup> and Fijians.<sup>18,66</sup> Values are reflected in patterns of eating, physical activity and body size. For example, respect is evidenced in part by the provision of goods and services befitting the relative status of both donor and recipient.<sup>18</sup>

Central values of love and cooperation are exemplified in caregiving. The provision of food is a fundamental component of care. In Fiji, food conveys messages about respect and care, not only in formal exchanges of food, but also through the more routine sharing of food.<sup>18</sup> Becker suggested that a well-nourished body is a visible expression of the level of care provided by kin.<sup>18</sup> It is likely that the physical activities permitted young females also reflect the level of care and protection provided by families, although this has not yet been fully evaluated in the literature.

Food is also fundamental to establishing and sustaining social relationships in many Pacific societies.<sup>13,18,19,62,66,69</sup> Some authors have discussed how food events in both

Tonga<sup>19,29</sup> and Fiji<sup>18,66</sup> build and nurture relationships between families, wider kin groups and/or communities. Food continues to be important in this relational context in ceremonial events in Tonga<sup>19,29</sup> and Fiji,<sup>66</sup> as well as in more informal social exchanges.

A well-nourished body exemplifies good care and good social relationships, both of which are fundamentally important in Tonga<sup>19</sup> and Fiji.<sup>18</sup> For example, Becker<sup>18</sup> discussed how, in Sigatoka (Fiji), a robust body size was perceived as a visible display of care, while a thin body signified inadequate care, and implied poor social relationships.

Khaleghian<sup>70</sup> suggested that food has a "social insurance" function for Pacific peoples, in that urban dwellers on low incomes relied on food from their families and wider kin groups. Given the rural-urban shift in both Tonga<sup>15,29</sup> and Fiji<sup>9,36</sup> over the last two decades, this insurance function of food exchanges is likely to be increasingly important. Further, the expectation that kin will provide food is likely to remain high.

A well-nourished female is likely to have higher reproductive potential than a female who is poorly nourished.<sup>14</sup> This physical sign of potential reproductive success brings prestige to the kin group.<sup>14</sup> It is also likely that weight gain following marriage and childbirth is closely associated with ideas about a healthy body size for women during their reproductive phase.<sup>14</sup> For example, Tongan women have described how the lactating mother is beautiful during the period of postpartum seclusion.<sup>43</sup> Morton interprets this idea of beauty as a woman being fair, plump and rested.

Values also influence patterns of physical activity. For example, in Tonga expectations of *lehilei'i* (restraint), *molumalu* (dignity) and *nofolelei* (virginity) determine physical activities that are seen as acceptable for young females.<sup>19</sup> These values are evident in the traditional dance movements of Tongan<sup>71</sup> and Fijian females, who use slower, more graceful and more dignified movements than do male dancers.

#### **Role expectations**

Few studies of eating, physical activity and/or preferred body size in Tonga and Fiji have addressed role expectations, or expected behaviours. In both cultural groups, there are clear norms or expectations about patterns of eating, physical activity, and ideal body size. There are expectations about the type, quality and quantity of food that is appropriate for ceremonies or communal feasts. For example, Tongans<sup>19</sup> and Fijians<sup>66</sup> are expected to prepare more food than required for members of their household in order to accommodate guests, both expected and unexpected. This is the case with everyday meals as well as for more formal occasions.

There are also clear expectations about caregiving roles, especially in terms of food provision. For example, Fijian mothers in peri-urban Suva believed that their primary maternal roles were to prepare nutritious food for their young children and to ensure their children's health, while they expected fathers to provide either food in kind or money for food.<sup>72</sup> Cultural norms or expectations also influence body size ideals and the eating patterns required to attain these ideals, especially in the case of females

during their childbearing years. For example, Fijian families are expected to provide a nutritious diet for their son's wives<sup>18,62</sup> and young wives are expected to have a healthy (robust) body.<sup>18</sup>

Expectations also influence patterns of physical activity. For example, the expectation that low-status Tongans produce and prepare food for Tongans of higher rank<sup>65</sup> translates into food-producers expending more energy than recipients. Young Tongan females are expected to be dignified and restrained in their recreational activities.<sup>19</sup> Food-related energy expenditure does not appear to be as hierarchical in Fiji; differences in physical activity have been attributed to locality (rural versus urban),<sup>36</sup> rather than rank and status *per se*.

Expectations appear to be more imperative in cultural groups like Tongans and Fijians that have a collective ethos than they do in groups with a more individualistic ethos. Indeed, the strong solidarity in Tonga's traditional and highly religious society acts as an informal control on behaviours that conform to community expectations.<sup>29</sup> This is especially the case in more remote areas of Tonga.<sup>29</sup>

The social sanctioning of behaviour includes public commentary about culturally-specific norms or expectations, as well as the behaviours that contravene these expectations. The anticipation of social commentary appears to be a powerful mediator of practices and behaviours in both Tonga<sup>19,43</sup> and Fiji.<sup>18</sup> For example, ongoing commentary about the production, distribution and preparation of food plays a powerful role in shaping food events. Feasts are embellished by ongoing commentary about the presentation, variety, size, amount and prestigious nature of the food.<sup>18</sup> The anticipation of discourse about the adequacy of care, via the provision of sufficient quantities of prestigious food, is a strong incentive to feed a guest well.<sup>18</sup> Similarly, the anticipation of social discourse acts as an incentive for caregivers to provide nutritious food for their children, thus avoiding social commentary about the inadequacy of care provided for a child who is seen as undernourished.<sup>18,72</sup>

There is a clear need to consider the nature and currency of behavioural expectations and to determine the effect of social commentary in conveying messages about food, eating, physical activity and optimal body size. It is also important to consider how the most effective means of conveying messages about healthy lifestyles differs across settings, both within and between cultural groups.

#### **Summary of Sociocultural Factors**

The few studies that have explored sociocultural factors underlying patterns of eating, physical activity and body size in Tonga and Fiji highlight the importance of food exchanges in cementing and sustaining social relationships. This is not surprising, given the high value placed on respect, love, care and cooperation in both cultural groups.

Tonga appears to be more hierarchically organised than Fiji. Given that culturally-specific values and social structures influence behaviours, it is likely that Tongans' patterns of eating, physical activity and body size are strongly influenced by the hierarchical structures within their society. These cultural factors may be modified with

increasing exposure to Western influences in both nations. Further studies are necessary to determine the relative impact of local and Western sociocultural influences within each cultural group.

Several studies have highlighted the potential influence of sociocultural factors on body size, including culturally-specific values and expectations. There is a clear need for more indigenous perspectives, especially when studying the nuances of sociocultural factors that underpin obesogenic behaviours. Further, an evaluation of the sociocultural basis for obesogenic behaviours is imperative given the extremely high prevalence of obesity in both Tongan and Fijian populations.

#### **CONCLUSION**

The high prevalence of obesity in Tonga and Fiji appears to be increasing, and occurring at a younger age. There appears to be a sharp increase in the prevalence of obesity in Tongans and Fijians during adolescence, especially in the case of females. Given the trend for increasing obesity in younger age groups, and that patterns of eating, physical activity and body size during infancy and childhood predict adult patterns,<sup>65,73</sup> it is imperative to halt the obesity epidemic. It is very important to explore relationships between life-stage and obesity, especially given the high prevalence of obesity during females' reproductive years.

It is clear that body size is determined in part by the balance or imbalance between energy intake and energy expenditure. Yet, the data on eating and physical activity patterns in cultural groups with a high prevalence of obesity, such as Tonga and Fiji, are incomplete. There is a clear need for more studies to examine the patterns of eating, physical activity and body size preference, as well as their separate and combined impact on body mass index.

It is also very important to identify sociocultural factors that underpin patterns of eating, physical activity and body size if we are to positively influence behavioural changes. The sparse literature on sociocultural environments of Tongans and Fijians suggest that hierarchical organisation in Tonga, and to a lesser extent Fiji, continue to have a strong influence on eating and physical activity patterns, as well as body size preferences. Social organisation in both Tonga and Fiji favours collective versus individual pursuits, and this is reflected in expected and actual behaviours related to eating, physical activities and thus body size. This collective focus is an important consideration in future studies of eating, physical activity and body size. The dominant ethos or world views of Tongans and Fijians are similar in that values of love, respect and cooperation underpin food events and physical activities. Further, there are strong role expectations of various members of each cultural group that reflect the relative status of individuals in terms of sex, seniority and life-stage. In this way, behaviours related to food events and physical activities and body size preferences are strongly influenced by community expectations. Very few studies have addressed how any of these sociocultural factors impact on obesity and obesogenic behaviours. There is a clear need to explore systematically and in more depth the various sociocultural components that may underpin obesogenic food and activity practices. However, sociocul-



tural factors are not the only determinants of body size; it is critical that sociocultural components are considered alongside other environmental factors, including historic, socioeconomic and policy factors, as well as the physical environment. This is especially important in Pacific countries like Tonga and Fiji where there is an extremely high prevalence of obesity, and where there is a complex interplay between various sociocultural, historical, socioeconomic and policy factors, the physical environment and patterns of eating, physical activity and body size.

#### ACKNOWLEDGEMENT

Dr Helen Mavoa is a Research Fellow with the Obesity Prevention in Communities (OPIC) project that is funded by the National Health and Medical Research Council in Australia and by the Wellcome Trust in Tonga and Fiji.

#### AUTHOR DISCLOSURES

Helen Mavoa and Marita McCabe have no conflicts of interest to declare.

#### REFERENCES

1. Becker AE, Gilman SE, Burwell, RA. Changes in prevalence of overweight and in body image among Fijian women between 1989 and 1998. *Obes Res.* 2005; 13(1): 110-117.
2. Flegal, KM. The obesity epidemic in children and adults: current evidence and research issues. *Med Sci Sports Exerc.* 1999; 31(11 Suppl): S509-514.
3. Ulijaszek SJ. Increasing body size among adult Cook Islanders between 1966 and 1996. *Ann Hum Biol.* 2001; 28(4): 363-373.
4. Booth ML, Chey T, Wake M, Norton K, Hesketh K, Dollman J, Robertson I. Change in the prevalence of overweight and obesity among young Australians, 1969-97. *Am J Clin Nutr.* 2003; 77(1): 29-36.
5. Hedley AA, Ogden AA, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA.* 2004; 291(23): 2847-2850.
6. Gordon FK, Ferguson EL, Toafa V, Henry TE, Goulding A, Grant AM, Guthrie BE. High levels of childhood obesity observed among 3- to 7-year-old New Zealand Pacific children is a public health concern. *J Nutr.* 2003; 133(11): 3456-3460.
7. Lissau I, Overpeck MD, Ruan WJ, Due P, Holstein BE, Hediger ML. Body mass index and overweight in adolescents in 13 European countries, Israel and the United States. *Arch Pediatr Adolesc Med.* 2004; 158(1): 27-33.
8. Strauss RS, Pollack H. Epidemic increase in childhood overweight. *JAMA.* 2001; 286: 2845-2848.
9. The Government of Fiji. A Situational analysis of Children and women in Fiji 1996. Suva: The Government of Fiji and UNICEF, 1996.
10. Swinburn BA, Caterson I, Seidell JC, James WP. Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutr.* 2004; 7(1A): 123-146.
11. Duarte NL, Colagiuri S, Palu T, Wang XL, Wilcken DE. Obesity, Type II diabetes and the beta 2 adrenoceptor gene Gln27Glu polymorphism in the Tongan population. *Clin Sci. (Lond)* 2003; 104(3): 211-215.
12. Kumanyika S. Environmental influences on childhood obesity: Ethnic and cultural influences in context. *Physiol Behav.* 2008; 94(1): 61-70.
13. Pollock N. Establishing the Foundations of Poverty in the Pacific. 2004.
14. Ulijaszek S. Social aspects of obesity and fatness: A critique. In: de Garine I, Pollock N, editors. *Social Aspects of Obesity.* Amsterdam BV: Overseas Publishers Association, 1995: p.291-299.
15. Evans M, Sinclair R, Fusimalohi C, Liava'a V. Diet, health and the nutrition transition: some impacts of economic and socio-economic factors on food consumption patterns in the Kingdom of Tonga. *Pac Health Dialog.* 2002; 9(2): 309-315.
16. Evans M, Sinclair R, Fusimalohi C, Liava'a V. Globalization, diet, and health: An example from Tonga. (nutritional evaluation). *Bull World Health Organ* 2001; 79(9): 856-862.
17. Hughes R, Lawrence M. Globalisation, food and health in Pacific Island countries. *Asia Pac J Clin Nutr.* 2005; 14(4): 298-306.
18. Becker AE. *Body, Self and Society. The View from Fiji.* Philadelphia: University of Pennsylvania Press, 1995.
19. Tupoulahi C. The socio-cultural antecedents of obesity in Tonga. Doctoral Dissertation. Flinders University, 1997.
20. Central Intelligence Agency. *The World Fact Book.* Tonga. Washington DC: Central Intelligence Agency. (<https://www.cia.gov/library/publications/the-world-factbook/geos/tn.html>). (Accessed September 05, 2007)
21. Central Intelligence Agency. *The World Fact Book.* Fiji. Washington DC: Central Intelligence Agency. (<https://www.cia.gov/library/publications/the-world-factbook/geos/fj.html>). (Accessed September 05, 2007)..
22. Fiji Islands Bureau of Statistics, Fiji Government. Suva. (<http://www.statsfiji.gov.fj/factsandfigures.pdf>) (Accessed August 08, 2008).
23. Campbell I. *Island Kingdom. Tonga Ancient and Modern.* 2nd revised ed. Christchurch: Christchurch University Press, 2001.
24. Kaepler A. Exchange patterns in goods and spouses: Fiji, Tonga, and Samoa. *Mankind.* 1978; 11(3): 246-252.
25. Howe K. *Where the Waves Fall. A New South Seas Islands History From First Settlement to Colonial Rule.* Sydney: George Hawkins Unwin, 1984.
26. Latukefu S. *Church and State in Tonga: The Wesleyan Methodist Missionaries and Political Development, 1822-1875.* Honolulu: University of Hawaii Press, 1974.
27. Thomas N. Sanitation and seeing: The creation of state power in early colonial Fiji. *Ecol Food Nutr.* 1990; 32(1): 149-170.
28. Rutherford N. Shirley Baker and the King of Tonga. In: Lal B, Kiste, R, Meleisea M. editors. *The Pasifika Library.* Auckland: Pasifika Press, 1996.
29. The Government of Tonga. *A Situational Analysis of Children and Women in Tonga 1996. A Report to UNICEF.* Suva: UNICEF, 1996.
30. Naidu V. *The violence of indenture in Fiji.* Lautoka, Fiji: Institute of Applied Studies, 2004.
31. Narayan PK, Smyth R. The determinants of emigration from Fiji to New Zealand: An empirical reassessment using the bounds testing approach. *International Migration* 2003; 41(5): 33-58.
32. Ali B. *Chinese in Fiji.* Suva, Fiji: Institute of Pacific Studies, University of the South Pacific, 2002.
33. Lee HM. *Tongans Overseas. Between Two Shores.* Honolulu: University of Hawaii Press, 2003.
34. Evans M, Sinclair R, Fusimalohi C, Laivaa V, Freeman M. Consumption of traditional versus imported foods in Tonga: Implications for programs designed to reduce diet-related non-communicable diseases in developing countries. *Ecol Food Nutr.* 2003; 42(2): 153-176.

35. Lako JV. Dietary trend and diabetes: Its association among indigenous Fijians 1952 to 1994. *Asia Pac J Clin Nutr.* 2001; 10(3): 183-187.
36. Saito S. 1993 National Nutrition Survey. Main Report. Suva, Fiji: National Food and Nutrition Committee, 1995.
37. Olatunbosun-Alakija A, Phongsavan P, Bauman A, Chen J, Smith B. The State of Health Behaviour and Lifestyle of Pacific Youth. Kingdom of Tonga Report. UNICEF, 2001.
38. Englberger L. Review of past food and nutrition surveys in Tonga. Nuku'alofa, Tonga: National Food and Nutrition Committee, 1983.
39. Jansen AA. Malnutrition and child feeding practices in the Kingdom of Tonga. *J Trop Pediatr.* 1982; 28(4): 202-208.
40. Tomisaka K, Lako J, Maruyama C, Anh N, Lien D, Khoi HH, Van Chuyen N. Dietary patterns and risk factors for type 2 diabetes mellitus in Fijian, Japanese and Vietnamese populations. *Asia Pac J Clin Nutr.* 2002; 11(1): 8-12.
41. The Food and Agriculture Organisation of the United Nations. Nutrition. Country Profiles. Fiji, 2003.
42. Halavatau V, Hughes R, Hughes C. The 1999 Tongatapu Infant Growth Monitoring Project. Noumea: South Pacific Commission, 2000.
43. Morton H. *Becoming Tongan. An Ethnography of Childhood.* 1st ed. Honolulu: University of Hawaii Press, 1996.
44. Cole T. Early causes of child obesity and implications for prevention. *Acta Paediatrica.* 2006; 96: 2-4.
45. Rush EC, Paterson J, Oblonkin VV, Puniani K. Application of the 2006 WHO growth standard from birth to 4 years to Pacific Island children. *Int J Obes. (Lond)* 2008; 32(3): 567-572.
46. Sloan S, Gildea A, Stewart M, Sneddon H, Iwaneic D. Early weaning is related to weight and rate of weight gain in infancy. *Child: Care, Health & Development.* 2008; 34(1): 59-64.
47. Kado S. Diet of children in urban and rural Fiji. *Pacific Health Dialog.* 2000; 6(1): 30-34.
48. Phongsavan P, Olatunbosun-Alakija A, Havea D, Bauman A, Smith BJ, Galea G, Chen J. Health behaviour and lifestyle of Pacific youth surveys: a resource for capacity building. *Health Promot Int.* 2005; 20(3): 238-248.
49. Khan N, Cigljarevic M, Schultz J. Evidence for a curriculum review for secondary schools in Fiji. *Pacific Health Dialog.* 2006; 13(2): 97-102.
50. Taylor R, Badcock J, King H, Pargeter K, Zimmet P, Fred T, Lund M, Ringrose H, Bach F, Wang RL. Dietary intake, exercise, obesity and noncommunicable disease in rural and urban populations of three Pacific Island countries. *J Am Coll Nutr.* 1992; 11(3): 283-293.
51. The World Health Organisation. Preamble to the constitution of the World Health Organisation as adopted by the International Health Conference. New York: International Health Conference, 1946.
52. The Ministry of Health. Fiji Non-communicable disease (NCD) STEPS Survey 2002. Suva, Fiji: Ministry of Health, 2004.
53. Khan A. Fiji: Nutrition Overview. World Health Organisation, 2003.
54. Duarte NL, Colagiuri S, Palu T, Wang XL, Wilcken DE. A 45-bp insertion/deletion polymorphism of uncoupling protein 2 in relation to obesity in Tongans. *Obes Res.* 2003; 11(4): 512-517.
55. Foley W, Kelly-Hope L, Halavatau V. et al. Tonga, Non-communicable Diseases and Nutrition Survey 1992: Description of Findings. Technical Report Series 98-01. Brisbane: Nutrition Programme, University of Queensland, Brisbane, 1998.
56. Maclean E, Bach F, Badcock J. The 1986 National Nutrition Survey of the Kingdom of Tonga: Summary Report. Technical Paper 200. Noumea, New Caledonia: South Pacific Commission, 1992.
57. Colagiuri S, Colagiuri R, Na'ati S, Muimuiheata S, Hussain Z, Palu T. The prevalence of diabetes in the kingdom of Tonga. *Diabetes Care.* 2002; 25(8): 1378-1383.
58. Fukuyama S, Inaoka T, Matsumura Y, Yamauchi T, Natsuhara K, Kimura R, Ohtsuka R. Anthropometry of 5-19-year-old Tongan children with special interest in the high prevalence of obesity among adolescent girls. *Ann Hum Biol.* 2005; 32(6): 714-723.
59. Smith BJ, Phongsavan P, Havea D, Halavatau V, Chey T. Body mass index, physical activity and dietary behaviours among adolescents in the Kingdom of Tonga. *Public Health Nutr.* 2007; 10(2): 137-144.
60. Koike G, Yokono O, Iino S, Adachi M, Yamamoto T, Puloa T, Suzuki M. Medical and nutritional surveys in the Kingdom of Tonga; comparison of physiological and nutritional status of adult Tongans in urbanized (Kolofo-ou) and rural (Uiha) areas. *J Nutr Sci Vitaminol. (Tokyo)* 1984; 30(4): 341-356.
61. Crawford D, Ball K. Behavioural determinants of the obesity epidemic. *Asia Pac J Clin Nutr.* 2002; 11 (Supplement): S718-S721.
62. Pollock N. *These Roots Remain: Food Habits in Islands of the Central and Eastern Pacific.* Laie, Hawaii: Institute of Polynesian Studies, 1992.
63. Becker AE, Burwell RA, Gilman SE, Herzog DB, Hamburg P. Eating behaviours and attitudes following prolonged exposure to television among ethnic Fijian adolescent girls. *Br J Psychiatry.* 2002; 180: 509-514.
64. The World Health Organisation. *Diet, Food Supply and Obesity in the Pacific.* Suva: World Health Organisation, Regional Office for the Western Pacific, 2003
65. Bott E. Power and Rank in the Kingdom of Tonga. *J Polynesian Soc.* 1981; 90(1): 7-81.
66. Ravuvu A. A Fijian Cultural Perspective on Food. In: Jansen AA, Parkinson S, Robertson A, eds. *Food and Nutrition in Fiji.* Suva: Department of Nutrition and Dietetics, Fiji School of Medicine and University of the South Pacific, 1991; 622-635.
67. Englberger L. Prizes for weight loss. *Bull World Health Organ.* 1999; 77(1): 50-53.
68. Englberger L, Halavatau V, Yasuda Y, Yamazaki R. The Tonga Healthy Weight Loss Program, 1995-1997. *Pacific Health Dialog.* 1999; 6(6): 153-159.
69. Mintz SW, Du Bois CM. The anthropology of food and eating. *Ann Rev Anthropol.* 2002; 31: 99-119.
70. Khaleghian P. *Noncommunicable Disease in Pacific Island Countries: Disease Burden, Economic Costs and Policy Options.* A Report prepared for the South Pacific Commission and the World Bank. Noumea: South Pacific Commission, 2003.
71. Kaeppeler A. *Poetry in Motion: Studies of Tongan Dance.* Nuku'alofa: Vava'u Press, in association with the East-West Center's Pacific Islands Development Program. Dance in Tonga, 1993.
72. Boggs M, Phongsavan P. *Formative Research in the Suva Subdivision. A Qualitative Study to Identify Caregivers' Beliefs, Attitudes and Infant/Child Feeding Practices.* Suva, Fiji: UNICEF, 2001.
73. Whitaker R, Wright J, Pepe M. Predicting obesity in young adulthood from childhood and parental obesity. *N Engl J Med.* 1997; 337: 869-873.

## Review

# Sociocultural factors relating to Tongans' and Indigenous Fijians' patterns of eating, physical activity and body size

Helen M Mavoa PhD and Marita McCabe PhD

*School of Psychology, Deakin University, Burwood, Australia*

## 社會與文化因子與東加群島人及斐濟原住民的飲食型態、身體活動量和體型有關

本篇文章回顧了 1974 到 2007 年之間，發表對於東加群島人及斐濟人其社會與文化因子對於飲食型態、身體活動量（活動量）和體型之影響的文獻。這段期間在飲食（更多進口食物以及較少的傳統食物）、活動量（減少，特別是居住在城市的居民）、居所（鄉村與城市之間的遷移）以及體型（肥胖增加，特別是在年輕人之中）都有改變。在過去 20 年，東加群島人及斐濟人過重/肥胖的盛行率迅速的增加，並且保持全世界最高值之一（東加 >80%；斐濟 >40%），而女性肥胖者更多於男性。在為數不多的這些研究中，社會與文化因子如階級組織、地位及身份（性別、資歷）、價值觀（敬重、關心、合作）、和/或角色期待等曾被探討，檢視它們對當地飲食型態、活動量和體型的影響。為了要 i) 建立可促增肥胖或預防肥胖的因子，ii) 告知適當的文化角度介入來促進健康的生活型態及體型，以及 iii) 終止肥胖的流行性，特別是在有肥胖高盛行率的文化群體中，因此評估社會與文化因子如何影響飲食、活動量、及體型是重要的。針對主要的社會與文化因子更多有系統的研究是必需的，但同時也要考量到社會與文化因子和行為以及其他影響（歷史、社會經濟、政策、外圍全球性的影響、自然環境）之間複雜的交互作用。

**關鍵字：**飲食、身體活動量、東加、斐濟原住民、肥胖