

Original Article

The Tonga Healthy Weight Loss Program 1995–97

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A health and weight awareness program was initiated in 1995 by the Tonga National Food and Nutrition Committee to combat a high prevalence of obesity and its associated non-communicable diseases. The strategy of the program was to provide a fun activity in which people wanted to join, and at the same time gain health benefits. Three successive weight loss competitions were organized, of 4 to 6 months in length, in which radio, television, and newspaper media were major elements. A Tongan version of the 1993 South Pacific Commission weight for height chart was produced, allowing identification of overweight/obesity using body mass index. Participants were registered and given individual encouragement on diet/exercise. Prizes donated by local businesses added to the campaign, as well as the involvement of His Majesty King Taufa'ahau Tupou IV. Aerobic exercise, public walks, weigh station manager training, and weight watcher group meetings were special activities. An unexpected element was the interest by the international press, which proclaimed the Tonga national weight loss competitions to be the first in the world. A total of 3429 participants registered in the three competitions, with 1617 competing to the end. First place winners lost from 25.5 to 28.4 kg in the competitions. Difficulties encountered included problems of coordination, funds, scales, newness of the healthy weight concept, and weight gain at the close of the competition. The activity was received positively by the community, with requests for the competitions and exercise activities to continue, and much awareness on health issues relating to overweight was achieved.

Key words: obesity, non-communicable disease, lifestyle changes, weight loss competition, healthy weight-for-height, body mass index, diet, exercise, media.

Introduction

The Kingdom of Tonga is a Polynesian island country with a population of around 100 000. The population is spread over six main island groups, with almost two-thirds settled on the main island, Tongatapu. The other island groups include 'Eua, Ha'apai, and Vava'u, and the two Niuas, Niutoputapu and Niufu'ou, in the far north.

Overnutrition, the current major nutrition problem, is related to changing diets and lifestyles. The 1986 Tonga National Nutrition Survey estimated that 39.1% of women and 10.0% of men were obese as defined by a Body Mass Index of ≥ 30 for women and ≥ 32 for men.¹ This definition for obesity corresponds to 140% of relative desirable weight,² with relative desirable weight derived from Caucasian standards of the Metropolitan Life Insurance Company.³ Prevalence of obesity was even greater in older women, with 65.7% obesity in women between the ages of 40 and 49 years.¹

There is concern about the growing problem of non-communicable diseases in Tonga, particularly diabetes, high blood pressure, and heart disease. The prevalence of diabetes is not precisely known, although Prior and Brauer found diabetes in 5.5% of men in the capital Nuku'alofa and 4.7% of men in a rural village, and in 9.7 and 10.0% of the women in those two respective areas.⁴ There is also an increasing incidence of hospital admissions due to diabetes as well as an increasing prevalence of diabetes-related limb amputations,

as reported by the Tonga Ministry of Health (unpubl. data, 1995).

Plans were initiated in 1994 by the Tonga National Food and Nutrition Committee to carry out a weight loss competition, and the Central Planning Department Nutrition Unit, where it is based, was the main implementing body. The project strategy was to provide a fun community activity in which adult men and women would be interested in joining, and which would lead to health improvement. The first competition, which opened in 1995, targeted adults on Tongatapu, the main island of Tonga. The successive two competitions in 1996 and 1997 expanded to the outer islands of 'Eua, Ha'apai, and Vava'u. Although resources did not allow for the inclusion of the remote outer islands of the Niuas, a monthly walking program was initiated there in the third competition.

Methods

The first competition required considerable planning and preparation. New scales and height-measuring equipment were obtained to complement those available. Fifteen weigh

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Accepted 18 December 1998.

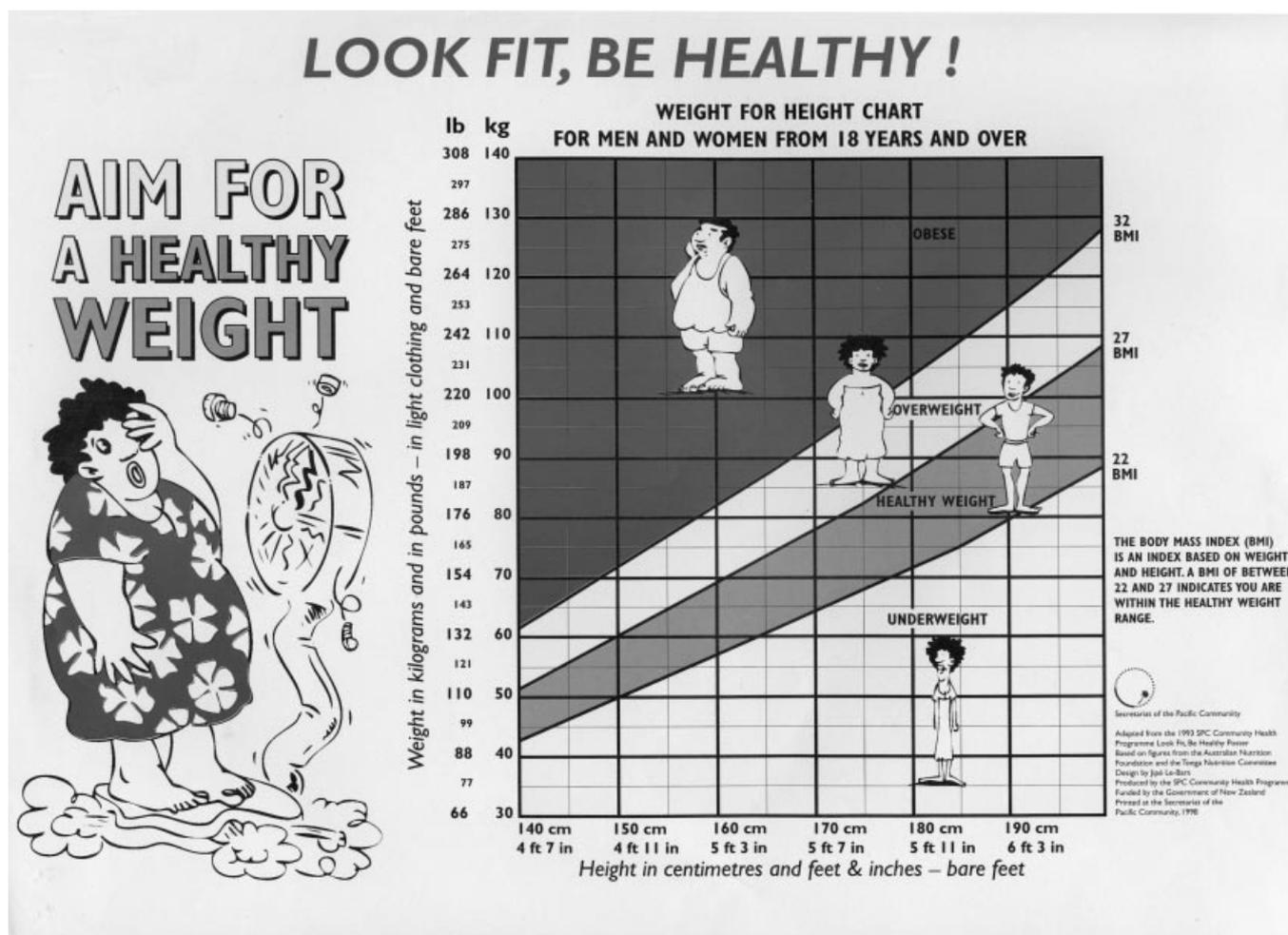


Figure 1. English version of the 'Look Fit, Be Healthy! Weight for Height Chart' of the 1993 South Pacific Commission.

stations were originally selected, mainly in the capital city Nuku'alofa, to minimize coordination and transport difficulties. Weigh stations were selected on the basis of access to the public and availability of staff to take on extra work responsibilities. Government offices, the Nuku'alofa post office, hospital, bank offices, schools and agricultural offices were the main stations. One or two people from each weigh station were the designated weigh station managers, and they were trained to uniformly weigh, measure height, record, and advise participants on diet and exercise.

All weigh stations of the first competition remained active in the second and third except for two village stations, in which there were problems of coordination and transport. All weigh stations of the second competition remained active in the third.

A Tongan version of the 'Look Fit, Be Healthy! Weight for Height Chart' of the South Pacific Commission (SPC) was produced,⁵ to allow identification of overweight and obesity for those eligible for the competition. The Tongan version is identical to the SPC chart (Fig. 1), with language and artwork adapted for Tonga, and is based on the Body Mass Index (BMI), the standard population-based measure of overweight and obesity, calculated by weight in kilograms divided by height in metres squared. According to the chart, those adults 18 years and older with a BMI of 27–32 are defined as overweight, whereas adults with a BMI over 32

are defined as obese, as corresponding to 120% and 140% of desirable weights derived from Caucasian standards.^{2,3}

Equipment at the weigh stations

Proper equipment and materials were important. Each weigh station had the following available: scales (either on a permanent or sharing basis); height measure (prepared on cardboard with measuring tape, some microtoise); registration book (uniform hard-back record books prepared for all); Weight for Height Poster and diet/exercise leaflet; competition flier with rules/prizes/dates/other information; flier on hypertension (provided in the second competition); and a referral letter to doctor for hypertension (provided in the third competition).

The Registration Book for each station included: participant name and whether participating in previous competitions; sex/age/address/telephone number; height and maximum healthy weight for height; weight for each month in the competition; and records of blood pressure and percentage body fat, if measured.

The range of maximum weight for the available scales ranged from 136 to 150 kg. Fifteen of the program scales were electronic and seven were balance beam. Some stations had their own scales, and other stations had to share scales from another station. There was no need to standardize scales, as participants were required to weigh at one station.

However, scales were calibrated in order to make comparisons between stations.

Blood pressures were measured when possible. Waist circumference and waist/hip measurement techniques were introduced to the station managers, but they could not be performed on all participants due to limited staff and time resources.

Per cent body fat measurements

Per cent body fat measurements were initiated in the second competition and continued to be popular in the third. These measurements were taken by new equipment based on bio-electric impedance and had the advantage of looking more directly at body fat; a loss of weight, for example water, not necessarily reflecting loss of body fat. Also, percentage body fat measurements detected individuals not overweight or obese as indicated by body mass index, but who needed to improve fitness and diet. Again these measurements could not always be done, due to limited equipment and staff.

Diet and exercise

A diet/exercise leaflet was prepared in Tongan and English for general advice. Participating individuals were advised to set goals for weight loss, with 0.5–1 kg per week suggested as a good result. The diet advised was based on fish, seafood, green leaves, local fruits, vegetables and root crops, with emphasis on eating less fatty, sugary, and salty foods, eating three regular meals a day, and avoiding late night eating. A Tongan version of the SPC Three Food Group poster was produced to encourage healthy island foods and was displayed at weigh stations.

Thirty to 60 min a day of exercise was recommended, emphasizing first low intensity exercise and increasing to higher intensity exercise once fitness was improved. Low intensity exercise advice included walking, increased movement in house/garden and at work, and low-intensity exercise classes. High intensity exercise advice included brisk walking, intensive agricultural work and gardening, aerobic exercise, and other high-intensity sports.

Many participants were interested in exercise groups. A group 'Walk for Health' was initiated in Nuku'alofa in the first competition and was continued later as a monthly activity. These Walks for Health became a popular symbol for the fitness movement and began to be used in other events in Tonga, such as the celebration for the King's Birthday, the Royal Agricultural Show, and unity acts of Parliament. Aerobic exercise classes provided much interest and motivation. An additional staff member for fitness instruction was added to the Nutrition Unit, and the fitness program was expanded.

Motivational meetings and maintaining interest

Meetings for the weigh station managers were initiated in the first competition, and these were held monthly throughout the second and third competitions. Although not all weigh station managers could attend, the meetings were helpful for providing motivation, information, and training.

Weight watcher meetings were initiated in the first competition and featured talks by guest speakers. Later, these meetings featured cooking classes teaching new low-calorie recipes using healthy local foods. Several were televised, providing wider coverage.

Rules

Rules were established in the first competition, including the requirement to weigh monthly at the station where registered, and to be overweight. In succeeding competitions, all participants desiring weight monitoring were welcomed to join, regardless of overweight status. In the first competition, there was a single prize category, that of 'Total Weight Loss'. Other categories of 'Reaching Healthy Weight for Height' and 'Maintaining Weight Loss' were added in the second and third competitions.

Media

The local radio, newspapers, and television were used extensively and contributed much to the program. A weekly radio program provided competition details, updates on weight losses from the weigh stations, interviews with successful weight-losing participants and others involved. One participant referred to it as 'our program'. The local *Chronicle* newspaper provided weekly ads of the Walks for Health for no charge using the logo of a sports shoe and included regular articles on competition updates. Televised spots advertising the monthly Walks for Health and featuring shots of previous walks became popular.

The international media visiting Tonga to cover the story created considerable interest. Radio programs from overseas first started interviewing those involved with the program, and later the activity was covered by television documentaries including the New Zealand *60 Minutes* and *CNN News*, and popular magazines such as *Marie-Claire* and *Reader's Digest*. These brought attention to the country overseas, and also created interest in the activity locally.

Prize-giving ceremonies

At the end of each competition, prize-giving ceremonies were held, with winners receiving prizes from His Majesty King Taufa'ahau Tupou IV, who himself has achieved and maintained a 70 kg weight loss. He encourages his people to work for a healthy weight for height, and in 1997 initiated a Healthy Lifestyles Program to encourage healthy diets, exercise, moderation in alcohol, and avoidance of tobacco.

Aerobic exercise demonstrations featured popularly in the ceremonies. The 1997 weight loss competition was timed so that the prize-giving coincided with World Food Day.

Results

Participation and weight loss results

Table 1 provides a summary of the participation and weight loss results (L. Englberger *et al.*, unpubl. data, 1996).^{6,7} A total of 3429 participants registered in the three competitions. The number registering ranged from almost 1000 in the first, increasing to well over 1000 in the second, and decreasing in the third competition. The less active and shorter advertising campaign in the third competition is implicated in the decrease in participation.

However, despite the decreased registration in the third competition, the number completing the competition was almost the same as in the second, the percentage rate completing increasing from 49.7 to 56.8%, which was much improved over the completion rate of 32.8% in the first competition. With 1617 participants completing the three competitions, the overall completion rate was 47.2%. Completing

Table 1. Final results of Tonga healthy weight loss competitions

Weigh stations	No. registering			No. completing			% completing	No. losing	% losing	Weight lost (kg)	Average weight lost/person (kg)
	Male	Female	Total	Male	Female	Total					
First Tonga healthy weight loss competition											
Tongatapu	284	699	983	119	203	322	32.80	229	71.10	1168.5	3.6
Second Tonga healthy weight loss competition											
Tongatapu	—	—	973	183	360	543	55.80	303	55.80	686.7	1.3
Eua	—	—	76	7	37	44	57.90	29	65.90	213.4	4.9
Ha'apai	—	—	73	12	40	52	71.30	22	42.30	98.5	1.9
Vava'u	—	—	191	5	8	13	6.80	13	100.00	137.1	10.5
Total	—	—	1313	207	445	652	49.70	367	56.30	1335.7	2.0
Third Tonga healthy weight loss competition											
Tongatapu	265	655	920	149	407	556	60.40	310	55.80	945	1.7
Eua	9	23	32	4	5	9	28.10	8	88.90	53	5.9
Ha'apai	12	50	62	9	36	45	72.60	18	40.00	74	1.6
Vava'u	55	64	119	10	23	33	27.10	25	75.80	70.8	2.1
Total	341	792	1133	172	471	643	56.80	361	56.10	1142.8	1.8

—, Numbers for males and females not recorded.

participants were defined as participants who came either to the last or second to last weighing and were recorded for 4 months for the first two competitions with lengths of 6 months, or recorded for 3 months in the third competition with the length of 4 months.

More women than men participated in the competitions. In the first competition, 699 women registered, compared with 284 men. The breakdown for men and women registering was not calculated in the second, but the comparison calculated in the third showed again more women participating: 792 women registering compared with 341 men. More than twice as many women as men completed in the three competitions, 1119 women compared with 498 men. However, men won in both the first and third competitions.

A total of 2647 kg weight was lost in the three competitions, the winners of the three competitions losing from 25 to 28.4 kg in the 4–6 month period. An average of 319 participants lost weight per competition.

Different parameters of the competitions including increase in weigh stations and improvement in completion rates show that there has been a steady growth of the program (Table 2).

Table 2. Comparison of parameters of 1st, 2nd and 3rd competitions

Parameters	Competitions		
	1st	2nd	3rd
Weigh stations	15	26	36
Months in competition	6	6	4*
Participants registered	983	1313	1133
Participants completing	322	652	643
% completing	32.8	49.7	56.8
Participants losing weight	229	367	361
% participants losing weight**	71.1	56.3	56.1
Average weight lost / person (kg)	3.6	2.0	1.8
Total kilograms weight lost	1168	1335.7	1142.8

*The shorter length of the 3rd competition was due to changes in staff and the timing of the prize-giving to coincide with World Food Day;

**Percentage of participants losing weight calculated as percentage of participants completing.

Blood pressure measurement results

Blood pressure measurements were taken in the second and third competitions for registering and completing participants when possible. These could not always be taken due to limited equipment and staff. In the third competition, 18 of the 36 weigh stations for measuring blood pressure were visited. Of the 324 participants measured, 32.4% were found with hypertension as defined by systolic/diastolic readings of over 150/90. These participants were given a doctor's referral and advice. A greater percentage of the males in both Tongatapu and Ha'apai were found with hypertension. Although the numbers were low for comparison, there was less hypertension found in Ha'apai, the rural area (Table 3).

Body mass index results

An analysis of Body Mass Index (BMI) values of participants was made in the third competition to give an indication of the degree of obesity of the participants. Values of BMI were calculated for the participants both at the beginning of the competition and at the end. For the purpose of this analysis, obesity was defined as a BMI of ≥ 30 , according to World Health Organization standards (Table 4).

At the beginning of the competition, the average BMI values for men and women of both age groups fell in the obese category, with a value of 33 for younger and older men and younger women, but a value of 35 for older women. The BMI averages did drop at the end of the competition for completing younger age group participants; that is, to 32 for both men and women. The average BMI values did not show a decrease at the end of the competition for the older age group men and women. Clearly, there was more obesity among the

Table 3. Prevalence of hypertension in completing participants of 3rd Tonga healthy weight loss competition

Weigh station	No. participants measured			No. participants with hypertension (%)*		
	Male	Female	Total	Male	Female	Total
Tongatapu	91	193	284	41 (45)	57 (30)	98 (35)
Ha'apai	7	33	40	2 (29)	5 (15)	7 (18)
Total	98	226	324	43 (44)	62 (27)	105 (32)

*Hypertension defined by systolic/diastolic measurement of over 150/90.

Table 4. Comparison of obesity (Body Mass Index) of participants in 3rd competition by sex and age

Sex	Age group (years)	No. participants	No. participants BMI <30 (%)		No. participants BMI ≥30 (%)		Average BMI	
			Begin	End	Begin	End	Begin	End
Male	18–35	55	15 (27)	18 (33)	40 (73)	37 (67)	33	32
Male	>35	91	22 (24)	22 (24)	69 (76)	69 (76)	33	33
Female	18–35	215	72 (34)	74 (34)	143 (67)	141 (66)	33	32
Female	>35	206	25 (12)	32 (16)	181 (88)	174 (85)	35	35
Total		567	134 (24)	146 (26)	433 (76)	421 (74)	33.5	33

*Obesity defined as a body mass index (BMI) ≥30.

women and among the older age group participants. At the end of the competition, it was seen that most progress was found among the younger men and the older women.

Discussion

The prevalence of obesity in Tonga is reaching epidemic proportions, similar to other regions of the Pacific and throughout the world.^{8–11} Increased availability of high-fat energy-dense food, increased sedentary lifestyles, environmental and societal influences, and individual/biological susceptibility with a presumed genetic adaptation by some ethnic groups favouring fat deposition, have been suggested by researchers to be the causes. Large-scale community and national prevention programs promoting healthy diet and physical exercise have been recommended, though there have been few in the world dealing specifically with overweight and obesity.⁸

The purpose of the Tonga Healthy Weight Loss Program was to combat the serious problem of obesity in Tonga with its associated non-communicable disease via a positive activity and voluntary participation by all adults. The name 'Tonga Healthy Weight Loss Competition' was chosen so that the public could associate health benefits with weight loss. The competition was open and equally accessible to both men and women, but there was a predominance of women, both in registering and completing. Also, most of the weigh station managers were women.

One difficulty that arose and still remains is that of the definition of obesity using the Body Mass Index and the variations between ethnic groups. Maclean *et al.* speculated that Tongans are naturally heavier and that moderately overweight for Caucasians might be a normal weight for Tongans.¹ Also, the SPC BMI charts based on Tongan data do use BMI break-off points for overweight and obesity that are higher than those of WHO.^{2,3,5}

Swinburn *et al.* have found that at an identical BMI, Polynesians have a lower percentage body fat than Caucasians as measured by bioelectric impedance.¹² Also, Rush *et al.* have shown that for the same percentage body fat, BMI was higher in Polynesian women than in Caucasian women, using isotopic measurements of total body water.¹³ Swinburn *et al.* also point out that the definition of normal range BMI of 20–25 kg/m² is based on the lowest mortality rates in longitudinal studies of Caucasians, and that this may not be appropriate for other ethnic groups, such as Polynesians.¹² Use of the standard BMI charts will probably overestimate obesity for individual Tongans, also leading to unrealistic indications for weight loss.

Waist circumference is another measure shown to identify people at risk due to overweight and obesity, and might be

used more in the future. It has the definite advantage of requiring a single measurement, eliminating the need for measuring height.¹⁴ Some of the Tongan competition participants were measured for this, and they appreciated it greatly as an additional measure which provided further motivation.

A study was undertaken in 1996 in conjunction with the Tonga National Food and Nutrition Committee to look at BMI in Tonga in relation to percentage body fat and body perception, and it is hoped that results from this may help provide further information on percentage body fat related to BMI.¹⁵ This study also looked at body image and the often-quoted Tongan belief in 'Big is Beautiful'. Those surveyed were shown two series of photos and asked to point out what body sizes they saw as their perceived size, their preferred size, as well as healthy and attractive sizes. In fact, both women and men chose larger attractive sizes than healthy sizes for both females and males. Men chose larger healthy and attractive sizes for both females and males than did women. Women's preferred size was similar to healthy size and men's preferred size was similar to attractive. Women underestimated, whereas men overestimated, their own body size.¹⁵

A recent doctoral thesis carried out on adolescent obesity in Tonga has studied the cultural attitudes and values relating to the onset of obesity.¹⁶ One finding was that there is more obesity among adolescent girls than among adolescent boys. Other points brought out were that girls had less healthy attitudes about food and less healthy food habits; the channel of health messages was important; programs needed to avoid being too prescriptive; and fatalistic views in explaining health conditions should be avoided.

Organizational difficulties included problems with scales, coordination, particularly with outer islands, and limited resources, staff, and transport. Due to lack of scales, some stations were required to share, adding additional coordination work. Some scales broke, and some participants weighed more than the scales' maximum. Weight gain after the competition and the need to maintain interest between competitions were issues. The use of a graph for identifying overweight and obesity involved some difficulties, as well as the appropriate BMI ranges for overweight and obesity already discussed.

Organization of the information required for the media campaign was not always easy. The decrease in number registering for the third competition is related to the less active and shorter advertising campaign at its onset.

Maintaining interest throughout the competition was difficult. Great effort was made to improve completion rates and to encourage participants to complete even if they had not lost weight. A survey was carried out in the second competi-

tion to look at the reasons why participants dropped out. Some reasons given included travel overseas and to outer islands, change of job and work office, difficulty getting to weigh station, and pregnancy. However, the major reasons for dropout were related to not losing weight or not losing as much weight as expected, and loss of interest. Survey participants pointed out that maintaining interest in the program was very important, this remaining a challenge to competition coordinators and weigh station managers.

The factor most important for achieving success of weight loss seemed to be that of motivation. The weigh stations with the best group performances had active weigh station managers who provided needed support and motivation. Individuals with strong motivation also did well. The media, in particular radio and television, seemed to have been very instrumental in helping participants to remain motivated and to stay with the program.

Availability of healthy low-cost food was a problem. Provisional figures from the 1992/93 Tonga Household Consumption and Expenditure Survey (Statistics Department, unpubl. data, 1993) indicate that the fatty mutton flap is the item on which Tongans spend most of their money. Imports of mutton flaps have tripled from 1976 to 1996.¹⁷ There is concern that mutton flaps in Tonga may sometimes have a considerably higher fat content than the general value of 27.4% presently documented.¹⁸ Also, there is concern about the amount of fatty tinned corned beef, fatty meat, and imported chicken that is now being consumed in Tonga. A Subcommittee on Mutton Flaps and Other Fatty Meats was established in Tonga in 1995 to develop a policy on the issue. A basic problem in the choice of mutton flaps and other imported foods is that they are cheaper than the local foods.

The change in the traditional Tongan diet, which is similar to other Pacific countries, has been from a diet based on coconut, root vegetables, other local staples of breadfruit and plaintain, fish and seafood, green leaves, and tropical fruits, to one based on flour, imported animal fats, tinned meats, mutton flaps/other imported meats, and sugar.^{19,20} The major nutritional differences between the Western and traditional diets include increases in energy (calories), sugar, salt, fats of animal origin, and alcohol, and a decrease in fibre.¹⁹

Apart from the problem of dietary improvement, some people were reticent about joining the competition. Overcoming embarrassment about weights being taken and recorded where others could see was a problem, although the records were kept confidential. There was no problem with excess weight loss, though some weigh station managers reported that they had to advise some participants to lose weight slowly. Social obligations to attend traditional feasts such as weddings and funerals were noted as a problem in diet control.

Weight gain after the close of the competition was a problem. A survey was conducted to look at the weights of past participants in the first and second competitions.²¹ Of the 140 surveyed, 38.6% gained back all weight lost, and 30.7% gained some. A new prize category was included in the third competition for maintenance of weight loss to provide greater motivation for maintenance of weight loss and to provide recognition of weight maintenance even when no further weight was lost. The survey did show that 30.7% maintained their weight lost, which is a positive finding, and the winners

had maintained much of their weight loss, though they had gained back some. However, whether long-term weight loss is sustained by the participants remains to be seen.

Conclusion

Very positive results can be achieved with the problems of obesity, overweight, and non-communicable diseases if approached with a positive and fun community activity such as a weight loss competition, in which participation is voluntary, and in which particular recognition and rewards in addition to health are also given. Weight loss is difficult to maintain, but is possible and can be achieved particularly with regular physical exercise, a healthy diet, and sufficient motivation.

The strong support from government, local businesses, community groups, and the King was a major factor in the success of the Tongan program. Also, close collaboration between governmental and non-governmental groups, the private sector and the media was extremely important.

The activity has become popular among the people and there is enthusiasm in continuing the program on an annual basis, with the prize-giving coinciding with World Food Day. Still the challenge remains, as expressed by His Majesty in an article for *Marie-Claire* magazine: 'I'd like to see Tongan people return to having a reputation for being strong athletes, not for being obese.'²²

Note added in proof

Tonga has now completed its 4th and is currently in its 5th yearly national Healthy Weight Loss Competition.

Acknowledgements. The authors would like to acknowledge the support provided by the Tonga National Food and Nutrition Committee, and Mr Paula Lavulo, its Chairman and Director of Planning; all weigh station managers; and many staff of the Ministries of Health, Education, Agriculture, the Central Planning Department, and the media. The New Zealand Overseas Development Aid, Japanese Overseas Cooperation Volunteer Program, Australian Small Grants Scheme, United Nations Children's Fund, Secretariat of the Pacific Community (formerly titled South Pacific Commission), World Health Organization are acknowledged, as are the local Tongan businesses which provided competition prizes and in particular, His Majesty King Taufa'ahau Tupou IV for his special support.

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