Evaluation of the NSW Knockout Health Challenge 2013

Final report

ARTD CONSULTANTS
strategy & evaluation

Acknowledgments

ARTD Consultants wish to acknowledge Aboriginal and Torres Strait Islander people as the traditional owners of Australia and custodians of the oldest continuous culture in the world and pay respects to Elders past and present.

This work was completed with the assistance of Louise Maher and Neil Orr in the Evidence and Evaluation Unit, Centre for Epidemiology and Evidence of the NSW Ministry of Health.

We would also like to thank the Knockout Health Challenge participants and team managers and the state Knockout Health Challenge implementation team. We thank them for their time and insights and trust that their views are adequately represented in this report.

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List of abbreviations and acronyms

ACCHS	Aboriginal Community Controlled Health Service
ACI	Agency for Clinical Innovation
AMS	Aboriginal Medical Service
BMI	Body Mass Index
LHD	Local Health District
MoH	Ministry of Health
NSW	New South Wales
The Challenge	NSW Knockout Health Challenge
SD	Standard Deviation

Executive summary

Background

The Knockout Health Challenge aims to address overweight and obesity in Aboriginal communities, and is part of the Culture Health Communities strategy which promotes healthy lifestyles in Aboriginal communities.

In 2013, the Challenge involved Aboriginal community-based teams from across NSW competing in a 16 week weight loss Challenge, followed by a 12 week maintenance period. In 2013 the Challenge period ran from March to June and the maintenance period from July to September. A total of 586 people participated in 22 teams across NSW.

The Challenge is implemented by the Agency for Clinical Innovation and NSW Rugby League, with support from the NSW Ministry of Health and NSW Office of Preventive Health.

Methods

The Challenge was externally evaluated by ARTD Consultants. The evaluation had two components:
1. Qualitative interviews: Qualitative interviews were conducted with team managers (n=10) and the state implementation team (n=3), to explore the effectiveness of implementation and identify areas for improvement for future Challenges.
2. Quantitative data on health behaviours and outcomes for participants: Data on weight, diet and physical activity levels were collected at four time points—at the start of the Challenge (via paper form, n=576), end of the Challenge (via paper form, n=377), 5 months after Challenge (via telephone interviews (n=271) and paper form (n=76)), and 9 months after Challenge (via telephone interview, n=195).

The evaluation was approved by the Aboriginal Health and Medical Research Council Ethics Committee.

Results

Participant profile

- In 2013, 343 (72%) of Challenge participants were Aboriginal women. The average age of participants was 40 years.
- The average weight of participants at the start of the Challenge was 98.5kg, and 94% of participants were overweight or obese.

Implementing the Challenge

Overall, the Knockout Challenge was highly valued by participants and team managers, and was feasible to implement in most contexts. Coordination and support for the

Challenge was largely delivered effectively at both the state level and the local level. The program model, in which teams are formed by the local community and led by a local team manager, was successful. The majority of participants regularly participated in multiple weight loss activities, however a minority of participants trained less often and/or participated in fewer Challenge activities. The most common weight loss activities were monthly weigh-ins, team training, team meetings, visits to general practitioners and dietitian consultations. The 'mix' of weight loss activities offered at the team level varied somewhat according to the local context, the age and interests of team members, availability of facilities and other opportunities, and the skills, experience and connections of team managers.

Factors associated with successful implementation of the Challenge included:

- The competitive nature of the Challenge was an important driver of engagement, and also helped engender wider community support.
- Team managers had a vital role in engaging and motivating participants. Having a team manager who was a recognised community leader helped build on existing community connections.
- Having structured support available through team training, fitness coaching, team meetings, monthly weigh-ins, team t-shirts and incentives were key to engaging participants and maintaining interest in the Challenge.
- Dietitian consultations and the pedometer challenge had lower levels of participation but, when accessed, were generally seen as useful activities by participants.
- Forming linkages with local health organisations facilitated access to health professionals such as dietitians and exercise physiologists.
- Links with local rugby league teams engendered team spirit.
- Challenge t-shirts were highly desirable within the team and in the wider local community and were said to engender team spirit.

Challenges encountered in the implementation of the Challenge included:

- There was a short lead time for team managers to organise teams.
- Access to appropriate training opportunities and health professionals was limited in some rural locations.
- The small state implementation team had limited capacity to provide comprehensive support the large number of teams.
- There were delays in the transfer of grant funds from NSW Rugby League, and lack of clarity about how funds could be used in some cases.
- The approach used to pay for accommodation at the Challenge Carnival as a reimbursement was a barrier to participation in the Challenge Carnival.
- While take-up of local components was high, there was low take-up of components delivered at state level, such as motivational support from NRL players, the Facebook page and the Get Healthy Service.
- There was low take-up of maintenance activities such as the Challenge Carnival and the pedometer challenge. However, teams that participated in these activities stated that these encouraged their teams to stay together and participants to stay active.

Health impacts of the Challenge

Overall, the program appears to have had a modest positive impact on participants' risk factors for chronic disease, particularly in the short and medium term. Key results are summarised in Table 1.

- **Weight loss:**
  - On average, participants lost weight between the start of the Challenge and the end of the Challenge (mean weight loss 2.3kg), and lost weight between the end of the Challenge and 5 months after the Challenge (mean weight loss 1.5kg). On average, participants gained weight between 5 and 9 months after the Challenge (mean weight gain 1.9kg). Overall, participants' average weight 9 months after the Challenge was significantly lower than at the start of the Challenge (mean weight loss 2.4kg).
  - A similar pattern was observed for BMI. On average, between the start of the Challenge and 9 months after the Challenge, participants' BMI decreased by 0.9kg/m^2, from 36.5 to 35.6kg/m^2.
  - 67.1% of participants lost weight between the start of the Challenge and the end of the Challenge. 55.3% of participants lost weight between the end of the Challenge and 5 months after Challenge. 38.7% lost weight between 5 months and 9 months after the Challenge. Overall, 62.5% of participants lost weight between the start of the Challenge and 9 months after Challenge.
  - The participants most likely to lose weight during the Challenge were women, those with the highest starting weights, and those who most frequently participated in team training.

- **Physical activity:**
  - The mean number of days that participants were physically active for more than thirty minutes was 2.0 days at the start of the Challenge, 2.9 days at the end of the Challenge, 2.4 days at 5 months after Challenge, and 2.4 days 9 months after Challenge. Overall, participants were significantly more physically active 9 months after the Challenge than at the start of the Challenge.

- **Fruit and vegetable consumption:**
  - Participants consumed an average of 2.25 serves of vegetables per day at the start of the Challenge, 2.85 serves at the end of the Challenge, 2.53 serves 5 months after Challenge, and 2.41 serves 9 months after Challenge. Overall, participants' vegetable intake was slightly higher 9 months after the Challenge than at the start of the Challenge, however the increase was not statistically significant.
  - Participants consumed an average of 1.50 serves of fruit per day at the start of the Challenge, 1.95 serves at the end of the Challenge, 1.99 serves 5 months after the Challenge, and 1.88 serves 9 months after Challenge. Overall, participants' fruit intake was significantly higher 9 months after the Challenge than at the start of the Challenge.

- **Smoking:**
  - At the start of the Challenge, 28.7% of participants reported smoking daily. 9 months after the Challenge, 19.5% of participants reported smoking daily.

However, there appear to be inconsistencies in the data regarding smoking status, therefore the smoking data should be interpreted with caution.

- The results described above are for all participants who provided data at each time point, noting that not all participants provided data at each time point. These findings are summarised in Table 1 and Table 1.1. The findings are similar if only participants who provided data at all four time points are included in analysis (Table 2).

Table 1. Summary of body composition and health behaviour at each time point of the evaluation

Measure	Outcome and SD at each time point during evaluation							
	N	Start of Challenge (SD)	N	End of Challenge (SD)	N	5 months after Challenge (SD)	N	9 months after Challenge (SD)
Mean weight (kg)	575	98.54 (22.43)	379	94.97 (20.49)	268	95.85 (19.43)	184	96.39 (21.01)
Mean BMI (kg/m^2)	575	35.67 (7.76)	379	34.62 (7.43)	268	35.00 (6.91)	184	35.62 (8.25)
Mean waist circumference (cm)	574	113.25 (16.76)	355	108.35 (15.32)				
Mean number of days active for >30mins	545	1.99 (1.95)	320	2.91 (1.97)	271	2.43 (1.82)	195	2.43 (1.82)
% respondents sufficiently active – 1 question	545	12.3% (1%)	320	19.4% (2%)	271	17.3% (2%)	195	13.8% (2%)
% respondents sufficiently active – 3 questions					267	76.8% (3%)	194	78.9% (3%)
Mean number serves of vegetables per day	545	2.25 (1.48)	319	2.85 (1.57)	271	2.53 (1.45)	195	2.41 (1.45)
% eat recommended daily serves of vegetables	545	8.4% (1%)	391	16.1% (2%)	271	12.5% (2%)	195	7.2% (2%)
Mean number serves of fruit per day	544	1.50 (1.23)	321	1.95 (1.37)	271	1.99 (1.21)	195	1.88 (1.14)
% eat recommended daily serves of fruit	544	47.4% (2%)	321	64.2% (3%)	271	68.6% (3%)	195	67.2% (3%)
% smoke daily	533	28.7% (2%)	311	27.3% (3%)	271	22.5% (3%)	195	19.5% (3%)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys and Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge.

Table 1.1 Summary of health impacts of the Knockout Health Challenge 2013

Measure	Change at subsequent time points compared to start of Challenge							
	N	Start of Challenge (SD)	N	End of Challenge (95%CI)	N	5 months after Challenge (95% CI)	N	9 months after Challenge (95% CI)
Mean weight (kg)	575	98.54 (22.43)	377	**-2.29*** (-2.76, -1.82)	268	**-4.02*** (-5.02,-3.03)	184	**-2.36*** (-3.43, -1.30)
Mean BMI (kg/m^2)	575	35.67 (7.76)	377	**-0.84*** (-1.02, -0.67)	268	-1.44 (-1.8, 1.08)	185	**-0.86*** (-1.27, -0.44)
Mean waist circumference (cm)	575	113.25 (16.76)	352	**-3.73*** (-4.49, -2.97)				
Mean number days active for 30mins or more	545	1.99 (1.95)	312	**+0.8*** (0.52, 1.08)	266	**+0.59*** (0.31, 0.86)	192	**+0.59*** (0.28,0.91)
% respondents sufficiently active	545	12.3% (1%)	312	**6.5%*** (4.0, 9.7)	266	**7.9%*** (5, 11.8)	192	**6.3%*** (3.3, 10.7)
Mean number serves of vegetables per day	545	2.25 (1.48)	312	**+0.54*** (0.36, 0.73)	268	**+0.28*** (0.07, 0.49)	193	+0.14 (-0.1, 0.38)
% eat recommended daily serves of vegetables	545	8.4% (1%)	312	**7.0%*** (4.5, 10.5)	268	3.7% (1.8, 6.8)	193	-0.5% (-2.1, 0)
Mean number serves of fruit per day	544	1.50 (1.23)	313	**+0.40*** (0.24, 0.56)	267	**+0.54*** (0.39, 0.7)	193	**+0.37*** (0.18,0.56)
% eat recommended daily serves of fruit	544	47.4% (2%)	312	**15.0%*** (11.2, 19.5)	268	**26.2%*** (21, 31.9)	193	**20.2%*** (14.8,26.6)
% smoke daily	533	28.7% (2%)	302	2.0% (-4.3, -0.7)	267	-4.5% (-7.7, -2.3)	193	-4.7% (-8.7, -2.2)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys and Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

Table 2. Summary of health impacts of the Knockout Health Challenge 2013 for participants with complete data sets

Measure	N	Start of Challenge (SD)	Change at subsequent time points compared to start of Challenge		
			End of Challenge (95% CI)	**5 months after Challenge (95% CI)**	**9 months after Challenge (95% CI)**
Mean weight (kg)	123	97.87 (20.16)	**-2.12*** (-2.97,-1.28)	**-4.29*** (-5.72,-2.85)	**-2.3*** (-3.49,-1.1)
Mean BMI (kg/m^2)	123	35.75 (6.68)	**-0.8*** (-1.12, -0.48)	**-1.52*** (-2.03, -1.01)	**-0.82*** (-1.28, -0.37)
Mean waist circumference (cm)	352	112.12 (15.53)	**-3.73*** (-4.49, -2.97)		
Mean number days active for 30mins or more	109	2.01 (1.83)	**0.85*** (0.4, 1.3)	**0.69*** (0.26, 1.13)	0.43 (-0.01, 0.86)
% respondents sufficiently active	109	10.1% (3%)	6.4% (2.6, 12.8)	**10.1*%** (5.1, 17.3)	4.6% (1.5, 10.4)
Mean number serves of vegetables per day	109	2.55 (1.41)	**0.38*** (0.11, 0.66)	0.12 (-0.2, 0.44)	-0.11 (-0.41, 0.18)
% eat recommended daily serves of vegetables	109	9.2% (3%)	6.4% (2.6, 12.8)	5.5% (2, 11.6)	-2.8% (-7.8, -0.6)
Mean number serves of fruit per day	109	1.57 (1.04)	**0.33*** (0.06, 0.59)	**0.37*** (0.12, 0.62)	**0.34*** (0.09, 0.59)
% eat recommended daily serves of fruit	109	49.5% (5%)	**20.20%*** (13.1, 28.9)	**21.10%*** (13.9, 30)	**18.40%*** (11.6, 26.9)
% smoke daily	107	26.2% (4%)	-5.6% (-11.8, -2.1)	**-8.4%*** (-15.4, -3.9)	-5.6% (-11.8, -2.1)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

Participants' perceptions

- Participants perceived the major impacts of the Challenge to be losing weight, becoming more active and feeling physically healthier. Participants reported that it was easier to change physical activity than eating habits.
- Participants also reported psychological and social benefits such as feeling more socially connected, improved self-esteem, feeling less stressed and feeling happier. Participants attributed these benefits to their improved physical health, and the social aspects of team training and team meetings
- Most participants reported becoming better linked with their local Aboriginal Medical Service.

- Participants perceived the Challenge had raised awareness in the community of the need to address chronic disease risk factors, particularly overweight and lack of physical activity.
- Few participants reported any adverse impacts from being involved in the Challenge for themselves or for the wider community.
- Few participants identified barriers to participation.

Recommendations

Participant profile

1. Explore strategies to encourage more men to participate in future Challenges.
2. Encourage teams to use a broad suite of recruitment strategies and promotional messages that appeal to different segments of the target population.

Implementing the Challenge

3. Retain the Challenge implementation model. Review and adapt those components that were less successful.
4. Consider ways to improve teams' access to training opportunities and facilities, and to health professionals.
5. Consider ways to assist team managers to maintain team motivation during and after the Challenge, such as the Get Healthy Information and Coaching Service.
6. Consider ways to use the Challenge to facilitate wider community involvement in weight loss or other health promoting activities.

Health impacts of the Challenge

7. Continue the Knockout Health Challenge as a healthy lifestyle intervention.
8. Increase the consistency and scope of the nutrition education element of the intervention.
9. Educate team managers and participants about the importance of group training for achieving and maintaining weight loss.
10. Encourage team managers and participants to continue healthy lifestyle activities after the Challenge, whether through formal or informal maintenance activities.
11. Consider the merits of including smoking cessation in an explicit way in future Knockout Health Challenges.

Participants' perceptions

12. Consider promoting the social and mental health promoting aspects of the Challenge to partner agencies.

1. Background

This chapter describes the Knockout Health Challenge and the aims of the evaluation.

1.1 The Knockout Health Challenge

The NSW Ministry of Health has established a partnership with NSW Rugby League to reduce the risk factors for chronic disease in Aboriginal communities by addressing overweight and obesity through the NSW Knockout Health Challenge. The Challenge is implemented by the Chronic Care for Aboriginal People Team at the Agency for Clinical Innovation and NSW Rugby League, with support from the NSW Ministry of Health and NSW Office of Preventive Health. The Challenge is part of the Culture Health Communities strategy which promotes healthy lifestyles in Aboriginal communities.

The aim of the Challenge is to promote weight loss and healthy living through increased physical activity and improved nutrition. The target group for the program is Aboriginal adults in participating communities who have been confirmed by a health professional as potentially standing to benefit from increasing their levels of physical activity and improving their nutrition. The Challenge is aligned to the annual NSW Aboriginal Rugby League Knockout competition and in 2013 involved Aboriginal community-based teams from across NSW competing in a 16 week weight loss Challenge (the Challenge period) and 12 week maintenance period (maintenance period). In 2013 the Challenge period ran from March 3rd to June 26th and the maintenance period from July to September.

The Knockout Challenge program model has three main components:

1. **Establishment of the Knockout Challenge Town Committee and Team**

- ***Town Committees*:** Town Committees are established by interested Aboriginal communities from across NSW. The Town Committees promote the Challenge within their community, invite community members to join the Challenge team, and support their local team in the Challenge competition. Town Committees are made up of local volunteers from the health, local government, Aboriginal and community sectors, such as Aboriginal Community Controlled Health Services, Aboriginal Land Councils, Medicare Locals and Local Health Districts (LHD).
- ***Challenge teams*:** Teams comprise 20 to 30 people and are led by a team manager (usually also a team member) who takes on the role of managing the team and organising group activities. Participants require medical clearance by a registered nurse or doctor before they can register for the Challenge.

2. **Participation in the Challenge period**

Activities during the Challenge period include the following:

- ***Challenge activities*:** Teams are encouraged to adapt the program to their local needs hence there is a diverse range of Challenge activities. The activities can

include attending the gym, fitness coaching, cooking workshops, team forums and providing motivational support through Facebook.

- ***Motivational support*:** NRL players provide advice and motivation to teams via Facebook. Teams may also arrange for a local 'hero' or mentor to provide additional support and motivation through team visits.
- ***Incentives*:** At the end of the Challenge period the three teams that have achieved the greatest weight loss (as measured by the per cent body weight of the 20 team members with the greatest weight loss) receive a funding grant to promote healthy lifestyles in their community. A proportion of the funds can be used to support their local rugby league team to compete in the annual NSW Aboriginal Rugby League Knockout competition. There are also prizes for the male and female with the greatest waist circumference loss over the Challenge period.

3. Participation in the maintenance period

After the Challenge period has ended, the maintenance period encourages teams to stay together and maintain weight loss and lifestyle changes through to the finals of the NSW Aboriginal Rugby League Knockout competition in October. During this period, Challenge teams had the opportunity to run a pedometer challenge where participants compete to achieve the greatest step count, and to compete in the Challenge Carnival which is a sports day run by the Agency for Clinical Innovation which coincides with the NSW Aboriginal Rugby League Knockout final.

1.2 Evaluation aims

The NSW Ministry of Health contracted ARTD Consultants to independently evaluate the 2013 Challenge. The aims of the evaluation were to:

1. Describe how the 2013 NSW Knockout Health Challenge was implemented.
2. Investigate whether Challenge participants achieved and maintained weight loss and health behaviours after the Challenge was implemented.
3. Investigate which components or activities were associated with the most significant achievements in weight loss and health behaviours.

The evaluation covered 22 Challenge teams and 586 team members.

2. Methods

2.1 Evaluation design

The evaluation had two components:

1. Quantitative data on health behaviours and outcomes: Data on weight and health behaviours were collected at four time points—at the start of the Challenge (via paper form, n=576), end of the Challenge (via paper form, n=377), 5 months after Challenge (via telephone interviews commencing November 2013 (n=271) and paper form (n=76)), and 9 months after Challenge (via telephone interviews commencing March 2014, n=195).

2. Qualitative interviews: Qualitative interviews were conducted with team managers (n=10) and the state implementation team (n=3) to explore the effectiveness of implementation and identify areas for improvement for future Challenges.

2.2 Quantitative Data collection

2.2.1 Data collection method

The data collection process at each time point is described below.

Start of Challenge – weight form:

- **Process:** As part of registration for the Challenge, participants were asked to complete a standard form. The forms were collated by team managers and returned to the implementation team at the Agency for Clinical Innovation.
- **Data items collected:**
  - Body composition: Weight, height, waist circumference (objectively measured)
  - Health and demographic information: age, gender, chronic disease diagnoses, fruit and vegetable consumption, physical activity levels, smoking status (self-report)

End of Challenge – weight form:

- **Process:** At the end of the Challenge, participants were asked to complete a standard form. The forms were collated by team managers and returned to the implementation team at the Agency for Clinical Innovation.
- **Data items collected:**
  - Body composition: Weight, waist circumference (objectively measured)
  - Health and demographic information: age, gender, chronic disease diagnoses, fruit and vegetable consumption, physical activity levels, smoking status (self-report)

5 months after Challenge – weight form and telephone survey:

For the collection of data 5 months after the Challenge, participants were initially invited to provide objectively measured weight data via a paper form, and invited to participate

in a telephone survey about their health behaviour. However, as the response rate to the paper form was low, participants were then invited to self-report their weight as part of the telephone survey. Both data collection methods are described below.

Weight form:

- **Process**: 5 months after the Challenge, participants who had completed the Challenge and provided contact details were invited to visit their doctor or nurse to have their weight, height and waist circumference measured. A standard form and reply-paid envelope were provided. One reminder letter and form were sent. Participants who returned the form were compensated for the time and costs involved in visiting their GP with a $60 shopping voucher.
- **Data items collected:** Weight, height, waist circumference

Telephone survey:

- **Process:** All participants for whom contact details (home addresses and telephone numbers) were available were sent a survey information package two weeks prior to the survey commencing. Participants were then contacted by interviewers from McNair Ingenuity Research to arrange a time to complete the survey via a Computer Assisted Telephone Interviews (CATI). For participants who had not provided an address but had provided a phone number, the interviewers provided information about the evaluation during the initial contact and offered to send them information materials about the evaluation. Up to nine attempts were made to contact participants who provided telephone contact details. The 5 month Telephone Survey coincided with the completion of Challenge maintenance activities—the Knockout Carnival and pedometer challenge.
- **Data items collected:**
    - Body composition: Weight (self-report)
    - Health and demographic information: age, gender, chronic disease diagnoses, fruit and vegetable consumption, physical activity levels, smoking status, alcohol consumption (self-report)
    - Challenge participation: motivation and barriers for participating in the Challenge, type of participation, level of participation in the Challenge and the main benefits from participation.

9 months after Challenge – telephone survey:

- **Process:** As for 5 month telephone survey, however no attempts were made to contact participants who refused to take part in the 5 month telephone survey or had incorrect/disconnected telephone numbers. The 9 months after Challenge Telephone Survey coincided with the start of the Knockout Health Challenge 2014.
- **Data items collected:** As for 5 month telephone survey.

2.2.2 Interpretation of quantitative data

Body composition

The results have been assessed according to guidelines for healthy weight and waist circumference described on the Australian Government's *Measure Up* website, http://health.gov.au/internet/abhi/publishing.nsf/Content/home.

Weighing a person, calculating their Body Mass Index (BMI) and measuring waist circumference are all ways of assessing the link between health risks and body weight and waist circumference. A 5 per cent loss in total body weight on average in participants in weight loss programs is generally the accepted standard for a 'successful' weight loss program. However, there is evidence that even a 2 to5 per cent loss in body weight can result in positive metabolic changes for individuals[1], and could be considered beneficial at population level.

BMI is used to assess how much an individual's body weight departs from what is considered a healthy weight range. BMI is calculated by dividing a person's body weight in kilograms by height in metres squared. Overweight is measured as a BMI of 25kg/m^2 or more, with obesity determined as 30 or more (Table 3). BMI calculations can overestimate the amount of body fat for body builders or weight lifters, some high performance athletes or highly active persons and pregnant women.

Table 3. BMI classifications and risk of co-morbidities

Classification	BMI (kg/m^2)	Risk of co-morbidities
Underweight	<18.50	Low (but risk of other clinical problems increased)
Normal range	18.50 - 24.99	Average
Overweight:	>25.00	Slight increase
Pre-obese	25.00 - 29.99	Increased
Obese class 1	30.00 - 34.99	Moderate
Obese class 2	35.00 - 39.99	Severe
Obese class 3	>40.00	Very severe

Original Source: Obesity: Preventing and Managing the Global Epidemic, 2000, WHO, Geneva. Reproduced in the Australian Government health website Measure Up.

Waist circumference

The way body fat is distributed is also related to level of risk of chronic disease. In particular, the amount of abdominal fat a person has is strongly correlated with having an increased risk of ongoing health problems such as Type 2 diabetes, heart disease, stroke, high blood pressure and some cancers. Abdominal fat is estimated by measuring

[1] Wing, Rena R., et al. "Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes." Diabetes care 34.7 (2011): 1481-1486.

the circumference of the waist. A waist circumference of greater than 94cm for adult men or 80cm for adult women is an indicator of increased risk. Men are considered at greatly increased risk if their waist circumference is more than 102cm. The figure for women is more than 88cm. These classifications are based on evidence of risk for people with European heritage; no validated guidelines for people from Aboriginal or Torres Strait Islander backgrounds exist. [2]

Physical activity

The Australian National Physical Activity Guidelines have recently changed, with the change occurring after the evaluation data on physical activity levels had been collected. Consequently, the data collected do not allow a direct comparison to the new recommendations.

At the time of data collection, physical activity levels were measured using self-reporting to the question, 'In the past week, how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate?' Participants were allocated to two categories, those undertaking

- insufficient physical activity (at least 30 minutes or more of physical activity on **less than 5 days** in the past week, which was enough to raise your breathing rate)
- sufficient physical activity (at least 30 minutes or more of physical activity on **5 days or more** in the past week, which was enough to raise your breathing rate).

The physical activity recommendations at the time of data collection, as outlined in the Australian Government's National Physical Activity Guidelines were for

- adults to put together at least 30 minutes of moderate-intensity physical activity on most, preferably all, days.[3]

These subsequently changed to

- adults to accumulate 150 to 300 minutes of moderate intensity physical activity or 75 to 150 minutes of vigorous intensity physical activity, or an equivalent combination of both moderate and vigorous activities, each week.[4]

Three questions were included in the Telephone Surveys 5 months and 9 months after the Challenge to assess participants' activity in the light of these guidelines[5].

Physical activity has been identified as a key component in the improvement of health and wellbeing. Within the lower end of the activity scale, there are significant public health benefits to increasing the amount of moderate to vigorous intensity activity undertaken by adults. Limiting sedentary behavior and increasing physical activity are

[2] http://health.gov.au/internet/abhi/publishing.nsf/Content/Weight%2C+waist+circumference+and+BMI-lp#risk
[3] Step 1, is to think of movement as an opportunity, not an inconvenience and Step 2, is to be active every day in as many ways as you can. http://www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/physical-activity
[4] http://www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/physical-activity
[5] Smith, B., Marshall, A., Huang. N. "Screening activity in Family Practice, Evaluation of Two Brief Assessment Tools" in *American Journal of Preventive Medicine2005;29(4).*

two of the primary objectives of the Australian Government's National Physical Activity Guidelines which aim to improve public health outcomes in adults who undertake little physical activity[6]. Increases in fitness has benefits independent of weight loss; a stepwise relationship between fitness and mortality is evident within all BMI strata and is independent of per cent body fat.[2,8]

Diet

Fruit and vegetable consumption was compared to Australian dietary guidelines. As part of a healthy diet, the *2013 Eat For Health Australian Dietary Guidelines*[7] recommendations for vegetables are

- a minimum of 5 serves a day for women aged 19 years or more
- a minimum of 6 serves a day for men aged 19 to 50 years
- minimum of 5.5 serves a day for men aged 51 to 70 years; and
- a minimum of 5 serves for men aged over 70 years.

For fruit, the recommendations are a minimum of two serves a day for all adults.

The *Australian Dietary Guidelines* also recommend that adults eat nutritious foods and keep physically active to help maintain muscle strength and a healthy weight. In addition to maintaining muscle strength and a healthy weight, maintaining a balanced diet also helps reduce the risk of chronic health problems such as heart disease, Type 2 diabetes, some cancers and obesity.

Smoking and alcohol intake

Smoking and alcohol intake were compared to Australian government recommendations. The Australian Government recommends [6, 8]

- for healthy men and women, drinking **no more than two standard drinks on any day** reduces your risk of harm from alcohol-related disease or injury over a lifetime
- drinking **no more than four standard drinks on a single occasion** reduces the risk of alcohol-related injury arising from that occasion
- the **cessation** of smoking cigarettes.

In the *Australian Guidelines to Reduce Health Risk from Drinking Alcohol*, the Australian National Health and Medical Research Council notes that a substantial proportion of Australians consume alcohol at levels which increase their risk of alcohol-related harm. [9] Moreover, cigarette smoking is noted as the largest preventable cause of death and disease in Australia. The reduction of both alcohol and cigarette consumption is a key priority in the effort to reduce preventable death and disease in Australia. Smoking

[6] http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-strateg-phys-act-guidelines/$File/Guideline%20Evidence%20Summary.PDF
[7] www.eatforhealth.gov.au
[8] www.alcohol.gov.au
[9] www.nhmrc.gov.au

tobacco is correlated with increased risk of ischemic heart disease and other diseases, such as lung cancer.

2.2.3 Data analysis

Preliminary data cleaning identified duplicate records for two participants. One record was deleted for each participant. One outlier in the 5 month Telephone Survey and another in the 9 month Telephone Survey were excluded from the analysis using the criteria of a self-reported weight change of more than 30 per cent body weight between relevant contiguous data collection points.

Where objective weight data were provided at 5 month follow up via the Weight Form, these data were used for analysis, otherwise self-reported data from the 5 month Telephone Survey were used.

The approach to the statistical analysis was provided by the NSW Ministry of Health. For each measure, results were tested in a series of 6 pairwise comparisons across all time points, that is, start of Challenge and end of Challenge (T1-T2), start of Challenge and 5 months after Challenge (T1-T3), start of Challenge and 9 months after Challenge (T1-T4), , end of Challenge and 5 months after Challenge (T2-T3), end of Challenge and 9 months after Challenge (T2-T4), and 5 months after Challenge and 9 months after Challenge (T3-T4).

Changes in continuous variables between time points were analysed using linear mixed models (the MIXED procedure in SPSS V22). Included in the models were gender (as a fixed factor) and team (as a random factor). Differences in proportions were tested with McNemar's test for two related groups.

Differences in means at the team level were tested with dependent t-tests. Overall, the data used in parametric tests satisfied the assumptions of normality (of the sample; this cannot be estimated for the population, as the data was not sampled) and homogeneity of variance. However, this was not examined for each team in the team analysis.

The relationships between demographic characteristics, program participation and change in BMI were tested by multiple regressions, using forced entry. The models satisfied the assumptions of lack of auto correlation, and linearity for metric predictors; variation inflation factor and tolerance statistics were within acceptable ranges. Statistical significance was assessed at p=0.05 in all analyses described above.

Appendix 6 shows copies of the measurement tools/ questions used to collect data on the outcomes measures.

2.3 Qualitative data

2.3.1 Data collection method

Qualitative data were obtained from interviews with team managers, interviews with the Challenge state-wide implementation team, and open-ended questions from the participant telephone surveys conducted at 5 and 9 months after the Challenge.

Interviews with team managers

ARTD invited 23 team managers from all 22 participating teams to take part in a semi-structured telephone interview during October 2013. The list of names was provided by the NSW Ministry of Health. A total of 10 team managers (43%) from 8 teams (36%) participated.

The interviews aimed to collect information about how the Challenge was implemented at the team level. Team managers were asked to provide information about the acceptability of the intervention to participants and team managers, enablers and barriers to implementation, kinds of weight loss activities chosen and reasons, and what team managers saw as the broad benefits of the Challenge.

Team managers received a letter informing them about the evaluation and inviting them to participate in the interviews. An experienced Aboriginal researcher then attempted to contact them by telephone and email, making up to five calls and also emailing them where email details were available, to confirm consent and arrange a mutually convenient interview time.

The outcomes of contact attempts were

- ten completed interviews
- two wrong number/ phone disconnected
- two initial contact made but unsuccessful with follow-up calls to complete the interview
- nine no contact made.

Interviews with the state-wide implementation team

Three representatives from the state-wide implementation team participated in interviews about their experiences and perceptions of the Challenge, and the achievements and challenges of implementing the Challenge.

Telephone surveys with Challenge participants

The telephone surveys conducted 5 months and 9 months after the Challenge contained one open-ended question: 'Q9. Could you please describe some of the major impacts for you from participating in the Knockout Health Challenge? These could be personal or community impacts, and may be positive or negative.'

2.3.2 Data analysis

The interviews with team managers and the state-wide implementation team were recorded and transcribed. The analysis involved:

- describing and collating the responses to questions about teams' approaches to implementation and broad benefits of the implementation
- identifying themes related to implementation enablers and barriers and broad benefits of participation
- comparing responses between teams according to their implementation approach and reasons for these approaches and broad benefits.

The analysis of the open-ended telephone survey question involved identifying major themes, such as the broad kinds of impacts, negative or positive and type (e.g. changes in attitudes or knowledge or behaviour or social or health changes) by respondents' level of participation (as indicated in Q2).

2.4 Ethics approval

The evaluation was approved by the Aboriginal Health and Medical Research Council Ethics Committee. All participants and team managers were provided information about the evaluation. Participants gave consent for their data to be used in the evaluation.

2.5 Response rates

For each type of data collection, Table 4 shows the number of participants for whom data was collected at each stage, and of that number the proportion of those who were able to be contacted and willing to provide data (response rates). Figure 1 shows the number of participants (the denominator) used for the analysis for each outcome measure at each stage of data collection and takes account of missing data for the outcomes questions.

Participants proved more difficult to contact over time as the data collection period got further away from the end of the Challenge. At each stage of data collection, the proportion of registered participants who provided data for the evaluation decreased so that by 9 months after Challenge only 31 per cent of registered participants provided data for the evaluation and 69 per cent were lost to follow-up. Where participants could be contacted the response rates for the Telephone Surveys were reasonable—79.2 per cent 5 months after Challenge and 68 per cent 9 months after Challenge. The participants with data at 9 months after Challenge were a little older, included a slightly higher proportion of females, people with high cholesterol and unstable asthma, and a lower proportion with inadequate daily fruit consumption or who smoked daily than participants with data at the start of Challenge.

The response rate for the 5 month Weight Form was 14.8 per cent, which is relatively low and means that these results cannot be generalised to all participants completing the Challenge. A comparison of the profiles of respondents who returned the 5 month Weight Form with respondents who completed a Telephone Survey at the same time shows that weight form respondents were generally older and more likely to have health conditions related to chronic disease, although they rated their own health more highly.[10] As a group, weight form respondents were

- slightly lighter in weight on average
- three years older on average (47 years) than Telephone Survey respondents (42 years)
- slightly more likely to be female (78% vs 75%)
- almost twice as likely to have Type 2 diabetes (32% vs 18%)
- more likely to have high cholesterol (25% vs 17%)

[10] Perhaps this group are more regular users of general practitioner services and have more opportunity to get their weight form completed.

- more likely to have high blood pressure (35 % vs 26%)
- less likely to rate their health as fair or poor (18% vs 23%).

In addition, a high proportion of the 5 month Weight Form data came from teams that lost the least amount of weight biasing the weight findings towards the least amount of change.

Figure 1. No. participants used in each analysis

Note: Total numbers for each box are not provided on right hand side, where numbers of un-paired responses vary according to outcome

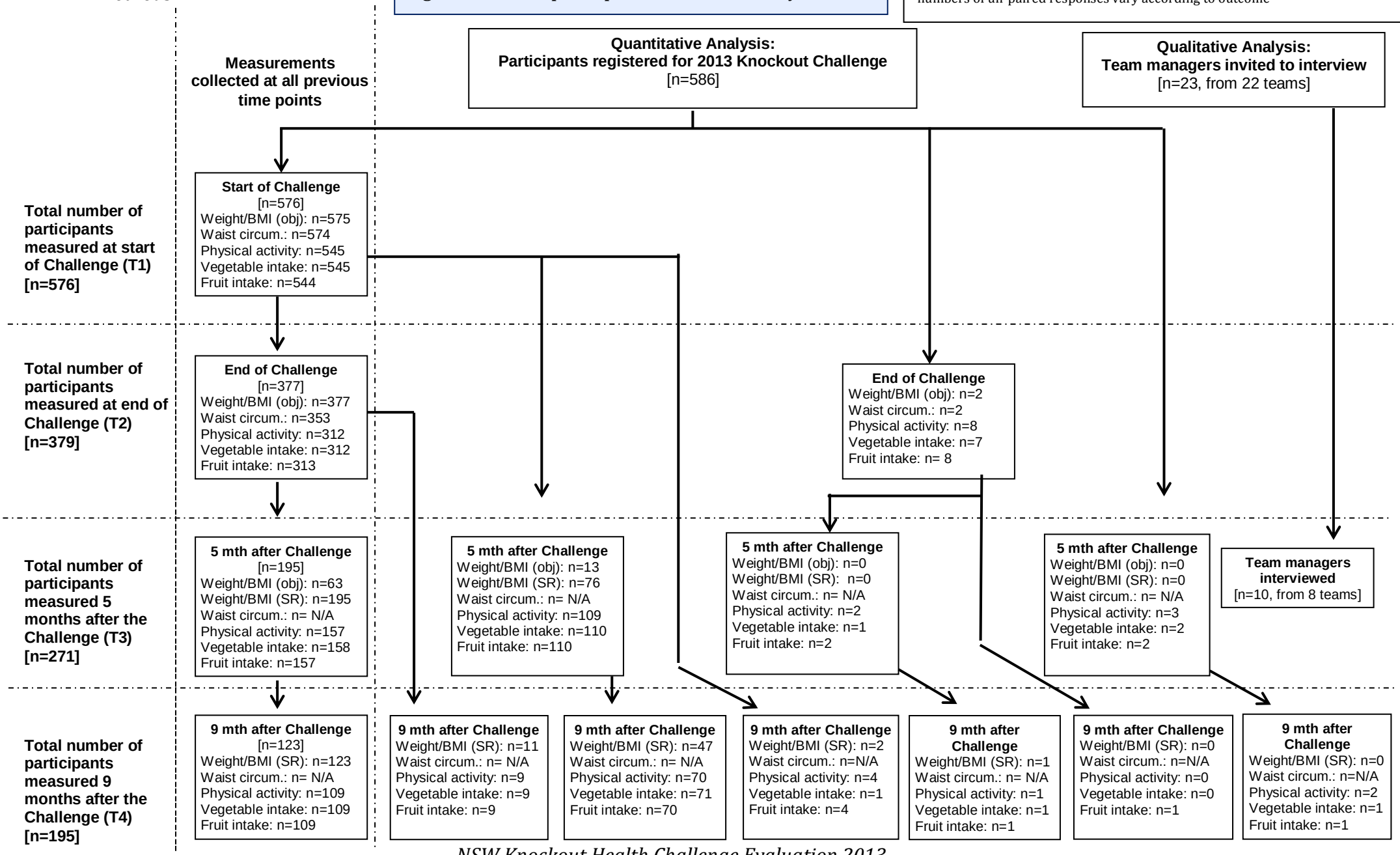


Table 4. Response rate by data source

Source	Participant sample	Able to be contacted	Provided data	Proportion of all registered participants	Proportion of participants able to be contacted
Start of Challenge Data	586	576[11]	576	98%	100%
End of Challenge Data	Not recorded	Unknown[12]	379	65%	Unknown
5 month Telephone Survey	487	340	271	46%	79%
5 month Weight Form	515	515	76	13%	15%
9 month Telephone Survey	367*	269	195	33%	72%

*Sample includes those that responded to Telephone Survey 5 months after Challenge + 98 participants not able to be contacted at that time.

Data availability by team

Although response rates varied by data source (Table 4) and team (Appendix 3), teams across the weight-loss spectrum (as determined by their Challenge placement) contributed data fairly evenly at all data collection stages of the evaluation, as shown in Table 5. Those teams that lost the most weight (1st quartile) provided more end data than those that lost less weight, however those that lost the least weight provided the most Weight Form Data at 5 months after. Participation in the Telephone Surveys at 5 months and 9 months after Challenge were evenly spread across the weight-loss spectrum.

[11] No demographic data was recorded at registration for 10 participants.
[12] Data was not kept on which people did not complete the Challenge, so it is not possible to distinguish how many did not complete the Challenge from how many did not agree to provide data. Two teams did not provide any end of Challenge data, and the other 20 teams did not provide data on an average of 7.9 participants (range 1 to 23).

Table 5. Data sources by team placement quartiles

Team placement quartile	Amount of data provided at start of Challenge	Amount of data provided at end of Challenge	Amount of Telephone Survey Data provided at 5 months after Challenge	Amount of Weight Form Data provided at 5 months after Challenge	Amount of Telephone Survey data provided at 9 months after Challenge
1st quartile	25.0%	28.2%	24.4%	19.7%	24.1%
2nd quartile	22.6%	27.2%	23.2%	25.0%	25.6%
3rd quartile	23.4%	26.4%	26.9%	21.1%	24.6%
4th quartile	22.0%	18.2%	24.4%	34.2%	24.6%
Did not place	6.9%		1.1%		1.5%
Total	100%	100%	100%	100%	100%

Source: Start of Challenge and end of Challenge forms. Weight form and Telephone Surveys at 5 months and 9 months after Challenge.

3. Results

3.1 Profile of participants and teams

This section describes the characteristics of participants in the NSW Knockout Health Challenge 2013. The information in this section is drawn from the *Start of Challenge–Weight Form* and telephone surveys of Challenge participants. The data show that the Challenge reached people in the target population who were most at risk of chronic disease, that is participants who were more overweight and reported poorer health outcomes and behaviours compared to the broader NSW Aboriginal population.

3.1.1 Participant characteristics at registration

The youngest participant was aged 18 years and the oldest was aged 82 years. The average age was 40 years (SD=13.6, n= 575). Almost three quarters (72%) of participants were female. The average weight of participants was 98.5 kilograms (kg) (SD=22.4, n=575), and the average BMI was 35.67 (SD=7.76, n=575). A BMI of 35.67 is classified as Obese Class 2, and persons in this class have a "severe risk" of co-morbidities. Around half of all participants were in Obese Class 1 (29%) or Obese Class 2 (22%); a further 26% were in Obese Class 3, which carries a "very severe" risk of co-morbidities (Table 6). Participants were substantially more overweight (94% had a BMI >25) than the broader population of Aboriginal adults in NSW (57% had a BMI >25)[13].

Female participants' waist circumference ranged from 52 centimetres (cm) to 163cm. The average waist circumference among females was 112cm (SD=16.9, n=416). Male participants' waist circumference ranged from 88cm to 165cm. The average waist circumference among males was 117cm (SD=15.8, n=158). A high proportion (88.3%) of participants were at "greatly increased risk" of health problems related to their waist circumference (Table 6)[14].

The prevalence of health conditions or illness among participants compared to the broader NSW Aboriginal and Torres Strait Islander population is shown in Appendix 1. Forty-one per cent of participants had a diagnosis of, and/or were currently being treated for, one or more chronic condition, and around one in five participants had two or more chronic conditions. The most common condition was high blood pressure (25%), followed by Type 2 diabetes (16%) and high cholesterol (15%) (Table 6). Twelve per cent of participants had a physical condition or impairment that would limit their ability to be physically active.

3.1.2 Team profiles

A total of 586 people were registered across the 22 teams. The number of participants in each team ranged from 22 to 30. Seven teams had thirty members, the maximum allowed. The age composition of individual teams varied widely. For example, the

[13] Source: Australian Bureau of Statistics, 2012–13. Australian Aboriginal and Torres Strait Islander Health Survey: First Results.
[14] Source of risk categories for waist circumference on http://health.gov.au/internet/abhi/publishing.nsf/Content/Weight%2C+waist+circumference+and+BMI-lp#risk.

'youngest' team had a mean age of 33 years and the two 'oldest' teams had a mean age of 53 years (Table 7). The ratio of female to male participants held fairly consistently across the majority of teams, with all but two registering more women than men (Table 7). However, one team had slightly more men than women and the ratio of men to women was higher than average for three other teams. BMI differed somewhat on average according to the composition of teams, for example the lowest average BMI for a team on enrolment was 30 and the highest was 41.

3.1.3 Participants' ratings of current health

Participants were asked to rate their current health at 5 months and 9 months after the Challenge, and there were only very small differences in their ratings. Despite the high rates of chronic health conditions, five months after the Challenge, the majority (78%) of participants rated the state of their health as "excellent", "very good" or "good" (Table 8). Nine months after the Challenge , participants' self-reported health was mostly unchanged, with 73% rating their health as "excellent", "very good" or "good" (Table 8).

Table 6. Profile of participants by BMI, waist circumference and health conditions at start of Challenge

Category	Percentage
BMI classification (n=575)	
Underweight (BMI < 18.5)	<1%
Normal range (BMI 18.5 to 24.99)	5%
Pre-obese* Overweight (BMI 25 to 29.99)	17%
Obese Class 1 (BMI 30 to 34.99)	29%
Obese Class 2 (BMI 35 to 39.99)	22%
Obese Class 3 (BMI > 40)	26%
Waist circumference classification (n=573)	
Normal risk	4%
Increased risk	8%
Greatly increased risk	88%
Health conditions and illnesses diagnosed with or currently being treated for (n=539)	
High blood pressure	25%
Type 2 diabetes	16%
High cholesterol	15%
Unstable asthma	6%
Mental illness (current treatment only)	5%
Angina/ ischaemic heart disease	4%
Emphysema	1%
Mild stroke	1%
Arrhythmia	1%
Pacemaker or similar	0%
Neurological disorder	0%
Multiple sclerosis	0%
Other	26%
Number of conditions diagnosed or currently being treated for (n=539)	
0	59%
1	23%
2	10%
3	6%
4	2%

Source: Start of Challenge Data.

Table 7. Demographic characteristics by team at registration

New Team ID	Number enrolled	Age (years)		Gender	Diagnosed or treated for illness (number)	Weight (kg)		BMI (kg/m²)	
		Range	Mean (*SD*)			Range	Mean (*SD*)	Range	Mean (*SD*)
1	22	19-80	53 (*13.9*)	17 F 5 M	13	58-112	84 (*16.9*)	21-40	30 (*5.2*)
2	24	20-69	40 (*15*)	20 F 4 M	7	56-157	91 (*21.7*)	20-44	32 (*6.1*)
3	26	21-58	37 (*11.6*)	21 F 5 M	4	61-134	97 (*18.3*)	25-49	36 (*6.6*)
4	29	18-66	38 (*13.8*)	25 F 4 M	10	60-127	98 (*17.5*)	23-49	37 (*6.3*)
5	30	26-73	46 (*14*)	19 F 10 M	14	77-171	111 (*21.6*)	30-59	41 (*7.6*)
6	28	23-56	39 (*9.8*)	19 F 9 M	12	49-143	98 (*22.4*)	17-48	35 (*6.8*)
7	28	23-82	53 (*15*)	13 F 14 M	20	58-168	105 (*27.7*)	23-66	38 (*9.8*)
8	23	18-63	39 (*14.1*)	19 F 2 M	12	57-131	93 (*23.2*)	24-52	35 (*7.5*)
9	30	18-64	36 (*11. 9*)	25 F 5 M	6	58-185	97 (*23.9*)	23-52	35 (*7.2*)
10	20	20-71	36 (*10.9*)	17 F 3 M	6	64-148	93 (*17.8*)	26-51	35 (*5.9*)
11	30	18-79	51 (*15.7*)	26 F 4 M	17	69-140	102 (*18.9*)	29-51	38 (*6.4*)
12	26	20-60	33 (*10.7*)	13 F 13 M	8	62-147	99 (*23.7*)	23-87	34 (*11.7*)
13	30	22-67	39 (*12*)	25 F 5 M	14	57-145	102 (*20.7*)	25-55	38 (*7.8*)
14	30	19-62	35 (*12.9*)	21 F 9 M	9	62-179	107 (*25.1*)	23-57	39 (*8.7*)
15	28	20-74	44 (*14.4*)	24 F 4 M	17	58-144	94 (*23.5*)	23-51	35 (*6.9*)
16	24	19-53	35 (*10.5*)	16 F 3 M	2	44-128	86 (*25.9*)	16-47	32 (*8.9*)
17	30	21-58	35 (*9.9*)	18 F 12 M	11	68-141	96 (*16.5*)	25-47	34 (*5*)
18	26	21-55	36 (*11*)	19 F 7 M	9	62-166	105 (*25.6*)	23-59	38 (*8.3*)
19	26	18-70	38 (*11.5*)	15 F 11M	5	62-139	89 (*17.9*)	20-46	31 (*5.5*)
20	22	18-53	35 (*11.6*)	12 F 9 M	N/A	62-130	95 (*17.8*)	23-44	32 (*5.3*)
21	30	18-65	39 (*11.9*)	21 F 9 M	12	80-180	114 (*23.3*)	28-63	40 (*8.2*)
22	24	28-64	43 (*9.8*)	14 F 10 M	14	52-134	97 (*18.7*)	20-43	35 (*5.9*)

Source: Start of Challenge Data. Total n=586; Team IDs have been randomly allocated. M=male. F=female. N/A=Not available. Age data is missing for 10 participants.

Table 8. Participants' rating of their health

	5 month follow up		9 month follow up		
Rating	**Number**	**Per cent**	**Number**	**Per cent**	**NSW Aboriginal population 2012-13***
Excellent	21	8%	15	8%	39%
Very Good	81	30%	52	27%	
Good	108	40%	76	39%	34%
Fair	50	18%	40	21%	19%
Poor	11	4%	12	6%	8%
Total	271	100%	195	100%	100%

Source: Telephone survey 5 months after Challenge and 9 months after Challenge
* Australian Bureau of Statistics, 2012–13. Australian Aboriginal and Torres Strait Islander Health Survey: First Results

3.2 Implementing the Challenge

This section describes the local variations, challenges and issues that arose in implementing the Challenge, with a specific focus on describing the nature of the weight loss activities. It draws on evidence from semi-structured interviews with ten team managers from eight teams, interviews with the state-wide implementation team, and relevant questions from the participant telephone surveys at 5 months and 9 months after Challenge about the frequency of participation in team and individual training.

3.2.1 Coordinating and supporting teams

The state implementation team successfully coordinated support to teams. However, they faced several challenges in their role, and foremost of these was meeting the ongoing demands of all 22 Challenge teams. Another issue was being unable to provide Challenge material to teams until after the Challenge had started, because of delays caused by shipping of these materials from overseas.

Team managers were commonly Aboriginal Health or Outreach Workers or dietitians. The dietitians tended to work with Aboriginal workers within their organisations to organise activities and manage the teams. Most team managers were committed to the role and felt they had successfully supported their teams' participation in the Challenge. Participants who responded to the 5 month Telephone Survey were very positive about the support they received from team managers. They felt that one important characteristic of a good team manager was their capacity to connect with team members and continue to support participants over the whole Challenge. As a group, team managers commonly recognised that the Challenge was about not only losing weight, but also bringing people together to improve their health, by changing their lifestyles and building social connections. Team managers took on the role because they saw the

Challenge as helping participants and doing something positive about preventing chronic disease in their communities. Some found out about the Challenge through their workplace, others through professional or personal connections, and took on the role of team leader voluntarily. Seven had been nominated for the role by their workplace, two team managers' paid work was somewhat related to health promotion or chronic disease prevention and one team manager's paid work was not related to the Challenge.

Where the team manager's workplace supported their role and/or they were supported by other team members, team managers felt able to fulfil the expected duties without much difficulty. However, most also commented on the challenges they faced because of the relatively short time allowed for planning, recruiting and registration for the 2013 Challenge and the high workload. Team managers often organised the Challenge in addition to their normal work duties and many felt this fact was not sufficiently recognised in the planning and registration process put in place by NSW Health. Those team managers who were also a Challenge team member commented that being a participant helped them lead and motivate other members and better understand the barriers people faced to participating in the Challenge.

3.2.2 Recruiting and engaging team members

Team managers used a mix of approaches to recruit team members. In some cases, the Challenge was promoted to the wider community, and people self-selected or were encouraged to join by their family and friends. In other cases, the team manager targeted individuals they suspected would benefit from being involved, for example because they were overweight or had chronic health issues (and could be identified because they were involved in clinics or outpatient groups) or because team managers felt they would benefit from the social aspects of the Challenge. This description is supported by the evidence from participants. Thirty-six per cent of participants at 5 months after Challenge indicated that a family or friend had recommended they become involved; for twenty-six per cent, the recommendation came from their health provider; and for two per cent, their workplace (Table 9). Two team managers also recruited from the ranks of the local rugby league teams.

According to a number of team managers, individuals who were specifically targeted were more likely to engage more fully in the Challenge than those who responded to general promotions about the Challenge. However, team managers also commonly reported that keeping all team members engaged over the duration of the Challenge was difficult and only the most motivated participants stayed involved until the completion of the Challenge.

Table 9. Participants' reasons for becoming involved in the Challenge

Reasons	Yes, per cent
To lose weight	86%
To get healthy	86%
To have some fun	48%
To be with my friends and family	41%
To meet new people	39%
Recommended by family or friend	36%
Recommended by healthcare provider	26%
Work organised to participate	2%
Community involvement	1%
Recommend by organiser	<1%
Due to illness	0%
Assist in training	0%
To win cash	0%
Other*	3%

Source: Telephone at 5 months after Challenge. N=271.
Multiple responses permitted means proportions do not total to 100 per cent. *Other responses: advertisement, Koori Mail, through Local Aboriginal Land Council, through health program, word of mouth, to encourage other people to be involved. No participants indicated "none of these reasons".

3.2.3 Town Committees and team meetings

Six out of eight teams indicated they had a Town or Team Committee. Two teams had Town Committees, with the expected broad representation, for example community leaders and representatives from local health organisations such as the Aboriginal Community Controlled Health Service (ACCHS) or Local Health District (LHD). The other four teams' committees were made up of team members and the team manager.

Five of the eight teams held regular team meetings as advised in the Challenge Handbook[15]. Team managers reported that team meetings had a positive influence on team members because the meetings helped engage team members in decisions about team activities and hence the Challenge more broadly. Team meetings also provided a forum for team members to support and encourage each other. Using a support group

[15] The Challenge handbook describes the Challenge, the roles and responsibilities of team members and team leaders, sets out key dates for the years program, provides registration and medical clearance forms and has resources such as a goal planner and weekly food and activity planners for participants to use.

approach to assist individual weight loss efforts has a long history in weight loss programs, for example Weight Watchers is based on this premise.

3.2.4 Involvement of local health organisations

Most team managers who were interviewed reported that a local health organisation—ACCHS (3 teams), Medicare Local or Aboriginal Health Services (2 teams), and/or the LHD (2 teams)—was involved to some extent in supporting Challenge activities. A couple of teams had more than one local health organisation involved. The types of involvement of local health services varied widely across teams. Health organisations supported Challenge teams in several ways, including by:

- providing health checks for team members;
- supporting staff members to be team managers;
- allowing team members to access health service facilities,
- allowing team members to access specialist health professionals, such as dieticians or exercise physiologists; and
- providing teams with additional funding for equipment or activities.

ACCHSs, Medicare Locals and Aboriginal Health Services were most often involved by providing health checks, dedicated staff time in the form of team managers and through allowing access to facilities for training or nutrition education sessions. LHDs mainly supported the Challenge through the involvement of allied health professionals for health education or to assist team training.

3.2.5 Usefulness of the Challenge resources

Most team managers reported that the Challenge resources were useful, while also expressing their frustration that these were not provided before the Challenge commenced. Team managers found the Knockout Health Challenge Pack particularly useful, especially the nutrition and exercise information. The food trackers and meal planners were used to assist team members to understand their eating habits. The Challenge t-shirts were very popular among team members and were said to help engender a team identity and spirit, for example being worn at team training sessions. Friends and family of Challenge members also actively sought Challenge t-shirts. Team managers mentioned that the Knockout Health Challenge Handbook was useful as it assisted in planning activities and understanding their role.

Four teams also developed local resources or provided health information from non-Challenge sources to participants. Examples of locally developed resources—which team managers reported were useful—included personal contracts (which outlined individual goals and were signed by participants), nutrition and exercise information, monthly newsletters, food diaries and information booklets on understanding your heart, liver and kidneys.

3.2.6 Use of Challenge funding

The NSW Rugby League managed and distributed funding for the Challenge, including grant funds to the teams. Members of the state-wide implementation team felt this

arrangement did not work as efficiently as intended because accounts management processes were not well set up. Team managers reported delays in receipt of funds and poor communication about funds transfer/ invoice payment processes, which reportedly impacted somewhat on teams' ability to implement Challenge activities at times. Nevertheless, teams were able to use the funding in a variety of ways that met their teams' needs. Grant funding paid for:

- exercise physiologists to work closely with team members;
- personal trainers to run team training sessions;
- incentives such as shopping vouchers for team members, for example shopping vouchers for the greatest weight loss amongst team members mid-way through the Challenge
- gym memberships
- gym equipment.

3.2.7 The rugby league connection

To engage and encourage people's involvement, the Challenge built on the popularity of rugby league among Aboriginal people. It appears that some teams successfully connected with their local rugby league teams, and for three teams players from the local rugby league club occasionally attended the Challenge training sessions.

At the state level, 8 out of 22 Challenge teams attended the Challenge Carnival held to coincide with the NSW Aboriginal Rugby League Knockout Carnival in October 2013. The most common reason teams gave for not attending the Challenge Carnival was because of the great distance to travel to the event. Cost was also a factor because although all teams had their costs covered, some participants were required to pay their travel costs up-front, which team managers said was not always affordable.

Just over a third of participants (36%) accessed the Challenge Facebook page (Table 38). Those not accessing the Facebook page were not able to take advantage of the motivational support from NRL players. According to team managers, some older participants were unlikely to use this form of social media. The biggest issue the NSW Rugby League faced was communicating the role of NSW Rugby League ambassadors. In the 2012 Challenge, NSW Rugby League ambassadors came to two team forums in Sydney. Even so, the team managers commonly expected ambassadors to visit their teams in 2013, although these visits were not planned.

3.2.8 Implementation of Challenge activities

Team managers implemented a range of activities. Weigh-in sessions were used to measure progress and encourage participation. Some team managers gave out monthly prizes for the "greatest loser" in the team and reported that such incentives were very effective in motivating participants. Team training and team meetings were important (and common) weight loss activities. Team training activities included gym sessions, exercise classes, swimming or walking and provided the opportunity for talks about nutrition, exercise and healthy lifestyles. These sessions were sometimes led by an exercise physiologist or personal trainer (4 teams), who worked closely with participants to ensure the training intensity and exercise was suitable for their age and

general health. One team had a very structured training calendar with different kinds of training sessions available at various times every week. Other teams maintained a consistent approach to training over the Challenge period.

Along with team meetings, team training provided a supportive environment for the team and helped build commitment to the Challenge and motivate individual team members to continue to lose weight and change their lifestyle. Team managers reported that team training allowed people to help one another and share their experiences and stories. Teams often held team meetings at the end of team training sessions and one team manager described holding reflection and discussion sessions every week, which they reported worked very well as a strategy for motivating people to stay committed to losing weight and getting more physically active. Participants also appreciated getting the expert help of exercise physiologists or personal trainers.

Team members in six teams were given the opportunity to consult with a dietitian about their nutritional and eating habits. The dietitians were accessed through Medicare Locals, AMSs or LHDs. One team commented that the LHD dietitian lacked cultural understanding, while another reported that because the dietitian was only available during business hours the consultations did not occur.

A common issue was maintaining participants' involvement in weight loss activities over the whole Challenge and in the maintenance period. Team managers reported dropouts in attendance over time at team training sessions, monthly weigh-ins and in other weight loss activities. For example, only three of the eight teams we spoke to took part in the pedometer challenge offered in the maintenance phase of the Challenge. For the teams that participated, it was a chance to reinvigorate the team members and get them to take on a new training challenge. Another issue was accommodating participants' other work and life commitments when planning the timing of sessions. One team held sessions after hours because most of their team worked. Another team changed sessions originally scheduled for after hours to ensure that health specialists were able to attend and give talks. One team had problems accessing suitable training facilities.

Factors influencing how the Challenge was implemented

The effective organisation and management of teams and team activities was pivotal to the success of teams and participants. Each team implemented the Challenge in different ways to suit the interests, demographics and health needs of their team members, and the local community circumstances. The availability of training facilities and gym equipment varied across communities, as did local health organisation involvement. Teams with older members offered lower impact training and older people were less likely to use Facebook.

The mix of weight loss activities used by teams also appears to have been driven by the experience and expertise of the team managers. The extent their workplace supported the team manager in their role was also a factor. Team managers were opportunistic and tapped into linkages within the community and through their workplaces to support their teams. Team managers working for local health organisations were able to use their connections to access health professional expertise, additional funding, resources and facilities. Other team managers who were not working within a health organisation

tended to have less success linking in with local health services, for example finding it difficult to access a dietitian to provide consultations with participants.

The types of activities implemented were also influenced by how much additional funding through donations from business or health organisations, teams were able to access. These donations were used to purchase exercise equipment and top-up incentives.

3.2.9 Frequency of participation in Challenge activities

In the 5 month Telephone Survey, participants were asked to indicate how frequently they participated in weight loss activities during the Challenge, including how often they trained. The results across all weight loss activities are shown in Appendix 4 and the results for frequency of training in Table 10 below.

Participants recalled being regularly and actively involved in a range of Challenge activities, with participants most often being involved in group-based activities. Participants indicated they had taken part in between 1 and 6 different types of Challenge activities or a mean of 4.1 activities (SD=1.5, n=271) during the Challenge. Almost two-thirds of participants (174 or 64%) participated in Challenge activities regularly, that is, every week or on most weeks (Table 39). Only 27 participants (10%) indicated they had little involvement other than registering for the Challenge. Participants most commonly took part in monthly weigh-ins (87%), team training sessions (86%), visits to General Practitioners/ AMS/ nurses (78%) and attended team meetings (73%) (Table 38).

A high proportion (225 participants, 83%) also trained on their own outside of team training sessions, with just over half (54%) training multiple times a week outside of team training sessions (Table 10). According to team managers, the frequency of attending team training was influenced by how often these were organised as well as participants' ability to attend. It appears that individual training sessions were used to complement team training sessions by motivated participants.

Table 10. Self-reported frequency of team and individual training during the Challenge

	Team training		Individual training	
How often did you train	**Number**	**Per cent**	**Number**	**Per cent**
Multiple times per week	90	33%	147	54%
At least once a week	75	28%	52	19%
Once every couple of weeks	37	14%	12	4%
Once a month	18	7%	9	3%
Less often than once a month	14	5%	5	2%
Never	37	14%	45	17%
Total	271	100%	270	100%

Source: Telephone Survey 5 months after Challenge.

3.2.10 Contact with the *Get Healthy Information and Coaching Service*

NSW Health provides a free and confidential telephone-based expert advice and coaching service, the *Get Healthy Information and Coaching Service*. A total of 67 participants had contacted the service, with the most common time a participant first contacted the service being during the Challenge; 30 participants (45%) (Table 11). One third of participants (33%) had first contacted the service before the Challenge. The majority of participants had either contacted the service for information only (37%) or indicated they had received some coaching but did not complete (31%) (Table 12). A small number (7 participants, 10%) had completed the coaching service and graduated. Six participants continue to be involved in the service.

Table 11. Timing of first contact with the *Get Healthy Information and Coaching Service*

Period first contacted service	Number participants indicated yes*	Per cent
Before the Challenge	22	33%
During the Challenge	30	45%
5 months after Challenge	9	13%
9 months after Challenge	6	9%
Total ever contacted	67	100%

Source: Telephone Surveys at 5 months after Challenge and 9 months after Challenge. *Data from each wave has been combined; listed is the first time that each individual contacted *the Get Healthy Information and Coaching Service* (where a participant nominated more than one time period).

Table 12. Kinds of participation in the *Get Healthy Information and Coaching Service*

Response	Number	Per cent
I received information only	25	37%
I received some coaching (but did not complete)	21	31%
I enrolled in the coaching service (but did not commence)	8	12%
I am continuing to receive coaching.	6	9%
I completed the month coaching service and graduated	7	10%
Total	67	100%

Source: Telephone Surveys at 5 months after Challenge and 9 months after Challenge. *Data from each wave has been combined; listed is the first time that each individual contacted the *Get Healthy Information and Coaching Service* (where a participant nominated more than one time period).

3.2.11 Acceptability of the intervention

According to team managers and participants, the Challenge as a concept and Challenge activities were well received by team members and the wider community. Indeed, 44 per cent of participants who responded to the 9 month Telephone Survey had re-enrolled in the 2014 Challenge.

Most of the participants who responded to the 5 month Telephone Survey were very positive about the way the Challenge was organised and the opportunities being involved had provided them. Categorised results from open-ended questions revealed they liked the group training, describing the approach as being fun, social and as helping keep them motivated to continue. Importantly, a high proportion of follow-up participants (78%) indicated there were no negative effects resulting from the Challenge.

A small proportion nominated one or more negative effects of the Challenge at 5 months, in particular community issues (8%) and being frustrated when other team members dropped out of the Challenge (5%). No participants had received a physical injury as a result of the Challenge and nor had they experienced stigma associated with being overweight or having unhealthy behaviours.

At 9 months after Challenge, 4% nominated community issues, 2% nominated stigma associated with being overweight, 1% nominated stigma associated with unhealthy behaviours, and 1% nominated physical injuries.

A minority indicated that they faced barriers to achieving lifestyle goals and fully participating in the Challenge. The most frequent barriers were:

- lots of demands at home/ work (24%)
- finding the time (10%)
- physical conditions that prevent them from doing physical activity (10%)
- difficulty staying motivated (9%).

Although fewer than 3 per cent of participants mentioned other barriers to participating in the Challenge, the kinds of barriers mentioned provide useful insights for future implementation of the Challenge. These were poor organisation of Challenge activities; unsuitable training facilities for those in poor health, morbidly obese or older people; lack of engagement of key health organisations in the Challenge; unacceptable travel time to training sessions or education events; and personal crises, for example unstable accommodation, and sickness in the family.

3.3 Program impact

This section reports the impact of the Challenge on body composition and health behaviours. For brevity, the following names are used for each time period:

T1 – Start of Challenge
T2 – End of Challenge
T3 – 5 months after Challenge
T4 – 9 months after Challenge.

For each outcome, six pairwise comparisons between time points were conducted:

T1—T2: Change from start of Challenge to end of Challenge
T1—T3: Change from start of Challenge to 5 months after Challenge
T1—T4: Change from start of Challenge to 9 months after Challenge
T2—T3: Change from end of Challenge to 5 months after Challenge
T2—T4: Change from end of Challenge to 9 months after Challenge
T3—T4: Change from 5 months after Challenge to 9 months after Challenge.
Additionally, in Appendix 5 are tables showing comparisons for

T1—T2—T3—T4 for participants that have data for all four time points.

3.3.1 Body composition

a) Body mass/ BMI

Weight was measured objectively at T1 and T2, via a mix of objective and self-report at T3, and self-report at T4.

Change in body mass over time (Tables 13, 14 and 15)

Changes in weight and BMI are described in detail below and the measures used and the results of tests of statistical significance are shown in tables 13, 14 and 15. Similar patterns were found when using data for participants with complete data sets; these results tables are in Appendix 5.

The mean weight of participants was 98.54kg (mean BMI 35.67) at T1, 94.97kg at T2, 95.85kg (mean BMI 35) at T3 and 96.39kgs (mean BMI 35.62)at T4 (Table 13).

Between T1 and T4, participants reported a mean loss of 2.36kg and reduced their BMI by 0.86kg/m^2, both of which were statistically significant (Table 14). The greatest decrease in mean weight loss between two different time points was from T1 to T3; a significant decrease of 4.02kg and 1.44 BMI points. Participants also showed a significant mean loss of weight from T2 to T3 (1.46kg, 0.48 BMI points). The smaller decreases of 0.16kg and 0.03 BMI points from T2 to T4 were not significant. Participants showed a mean increase in weight between T3 and T4; with a significant increase of 1.85kg and 0.66 BMI points.

When weight changes are considered as a percentage of body mass, on average participants lost 2.26 per cent of total body mass between T1 and T2, lost an additional 1.09 per cent between T2 and T3, and had a mean increase of 2.27 per cent between T3 and T4 (Table 14).

Two hundred and fifty three (67.1%) participants lost weight between T1 and T2, and 191 participants (71.3%) lost weight between T1 and T3 (Table 14). A majority of participants also lost weight between T1 and T4 (115 participants or 62.5%); and between T2 and T3 (109 participants or 55.3%). Fewer than half of participants lost weight between T2 and T4 (62 participants or 44.6%), and between T3 and T4 (64 participants or 38.7%).

The most common pattern of weight loss over time was for participants to have lost weight from T1 to T2 and T2 to T3, and gain weight from T3 to T4 (Table 16).

Whilst the majority of participants were classified as being moderately, severely or very severely obese at all four time points, the proportion of those in these categories shifted from 77.3 per cent at T1 to 73.4 per cent at T2 (Table 15). In this time period, the analysis shows that some participants' BMIs reduced substantially, but also that in a small number of teams very few participants reduced their BMI. At T3 and T4 respectively, the proportion of participants with BMIs ≥30 was 76.5 per cent and 74 per cent, both proportions being less than the proportion at T1.

Table 13. Body composition at each time point of the evaluation

Measure	Outcome and SD at each time point during evaluation							
	N	T1 (SD)	N	T2 (SD)	N	T3 (SD)	N	T4 (SD)
Mean weight (kg)	575	98.54 (22.43)	379	94.97 (20.49)	268	95.85 (19.43)	184	96.39 (21.01)
Mean BMI (kg/m^2)	575	35.67 (7.76)	379	34.62 (7.43)	268	35.00 (6.91)	184	35.62 (8.25)
Mean waist circumference (cm)	574	113.25 (16.76)	355	108.35 (15.32)				

Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge.

Table 14. Change in body composition at each time point of the evaluation

Comparison time points	N (pair)	Mean weight (kg)	Mean BMI (kg/m²)	Mean % total body weight lost	% respondents that lost weight	N (pair)	Mean waist circumference
T1 (SD)	377	97.25 (20.78)	35.47 (7.53)			353	112.12 (15.53)
T2 (SD)		94.96 (20.54)	34.63 (7.45)				108.39 (15.37)
Change T1-T2 (95% CI)		**-2.29**[16]* (-2.76, -1.82)	**-0.84**[17]* (-1.02, -0.67)	-2.26% (-2.72, -1.79)	67.1% (62.1, 71.8)		**-3.73**[18]* (-4.49, -2.97)
T1 (SD)	268	99.88 (20.77)	36.44 (7.25)				
T3 (SD)		95.85 (19.43)	35 (6.91)				
Change T1-T3 (95% CI)		**-4.02**[19]* (-5.02, -3.03)	**-1.44**[20]* (-1.8, -1.08)	-3.56% (-4.51, -2.62)	71.3% (65.4, 76.6)		
T1 (SD)	184	98.75 (22.04)	36.48 (8.56)				
T4 (SD)		96.39 (21.07)	35.61 (8.25)				
Change T1-T4 (95% CI)		**-2.36**[21]* (-3.43, -1.30)	**-0.86**[22]* (-1.27, -0.44)	-2.05% (-5.5, -0.6)	62.5% (55.3, 69.7)		
T2 (SD)	197	95.38 (18.68)	34.87 (6.4)				
T3 (SD)		93.92 (17.36)	34.39 (6.23)				
Change T2-T3 (95% CI)		**-1.46**[23]* (-2.48, 0.44)	**-0.48**[24]* (-0.85, -0.12)	-1.09% (-2.12, -0.06)	55.3% (48.1, 62.4)		
T2 (SD)	139	96.08 (20.46)	35.31 (8.09)				
T4 (SD)		95.93 (20.8)	35.28 (8.17)				
Change T2-T4 (95% CI)		-0.16 (-1.24, 0.93)	-0.03 (-0.46, 0.39)	-0.07% (-1.18, 1.03)	44.6% (36.2, 53.3)		
T3 (SD)	165	94.56 (20.03)	34.81 (7.27)				
T4 (SD)		96.41 (20.82)	35.47 (7.39)				
Change T3-T4 (95% CI)		**1.85**[25]* (0.51, 3.19)	**0.66**[26]* (0.17, 1.15)	2.27% (0.7, 6.1)	38.7% (31.3, 46.7)		

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[16] Linear Mixed Modelling: $F(1,378)=96.319$, $p<0.001$.
[17] Linear Mixed Modelling: $F(1,378)=89.098$, $p<0.001$.
[18] Linear Mixed Modelling: $F(1,358)=99.990$, $p<0.001$.
[19] Linear Mixed Modelling: $F(1,284)=62.115$, $p<0.001$.
[20] Linear Mixed Modelling: $F(1,279)=59.270$, $p<0.001$.
[21] Linear Mixed Modelling: $F(1,193)=19.318$, $p<0.001$.
[22] Linear Mixed Modelling: $F(1,190)=16.109$, $p<0.001$.
[23] Linear Mixed Modelling: $F(1,209)=6.565$, $p<0.011$.
[24] Linear Mixed Modelling: $F(1,206)=5.416$, $p=0.021$.
[25] Linear Mixed Modelling: $F(1,173)=4.509$, $p=0.035$.
[26] Linear Mixed Modelling: $F(1,160)=4.842$, $p=0.029$.

Table 15. Change in BMI from start to end of the Challenge

	T1		T2		T3		T4	
BMI classification	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Underweight (BMI < 18.5)	3	0.5%	0	0.0%	0	0.0%	0	0.0%
Normal range (BMI 18.5 to 24)	30	5.2%	23	6.1%	14	5.2%	12	6.5%
Overweight (BMI 25 to 29)	98	17%	78	20.6%	49	18.3%	36	19.5%
Moderately obese (BMI 30 to 34)	169	29.4%	112	29.6%	86	32.1%	48	25.9%
Severely obese (BMI 35 to 40)	124	21.6%	89	23.5%	59	22%	41	22.2%
Very severely obese (BMI > 40)	151	26.3%	77	20.3%	60	22.4%	48	25.9%
Total	575	100.0%	379	100.0%	268	100.0%	185	100.0%

Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge.

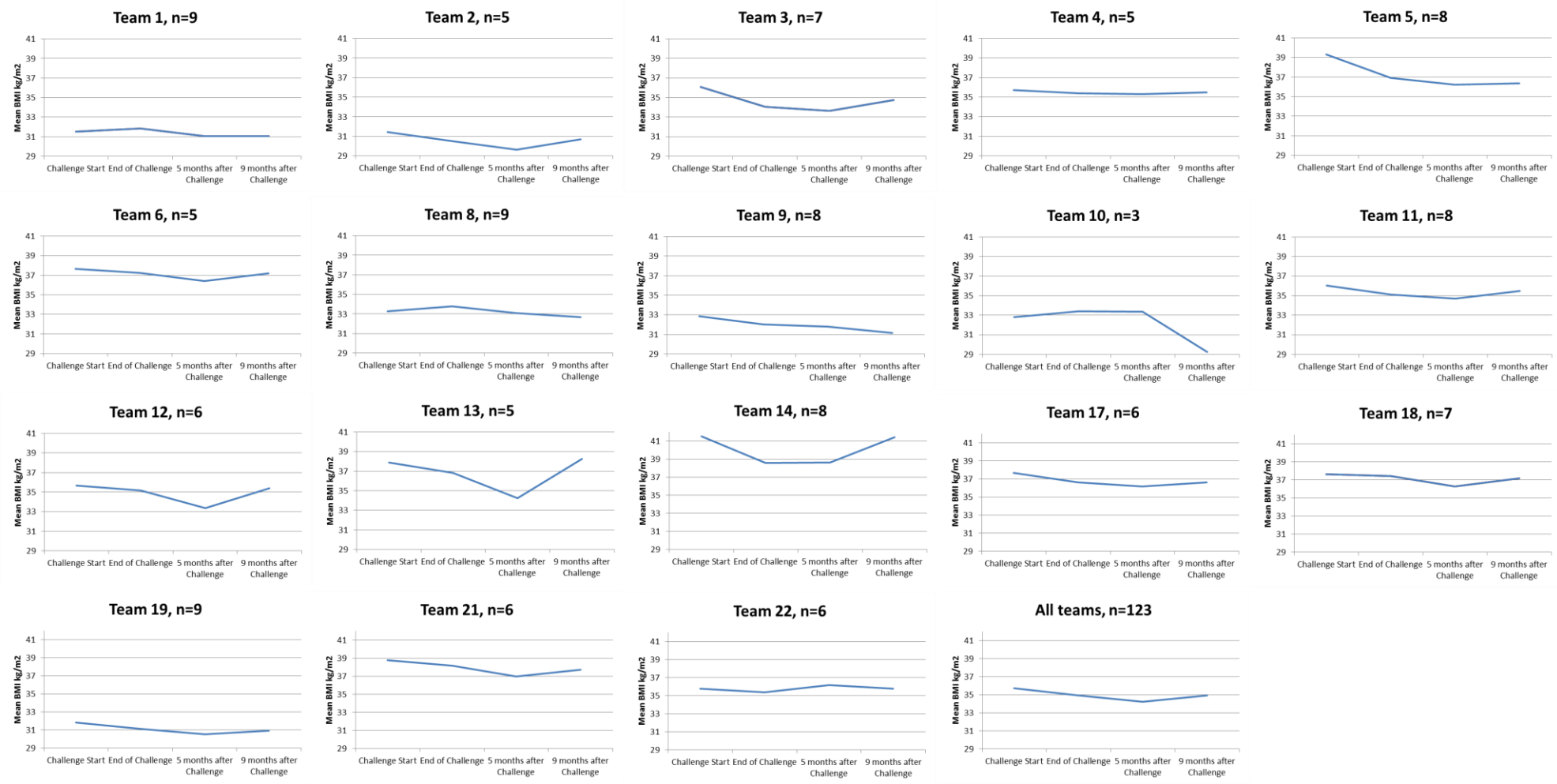
Table 16. Pattern of change in weight loss (N=123)

Weight loss pattern	Per cent
Lost weight in Challenge, 5 months after Challenge and 9 months after Challenge	5.7%
Lost weight in Challenge and 5 months after Challenge, same weight 9 months after Challenge	2.4%
Lost weight in Challenge and 5 months after Challenge, gained weight 9 months after Challenge	30.1%
Lost weight in Challenge, same weight 5 months after Challenge, and lost weight 9 months after Challenge	0.8%
Lost weight in Challenge, gained weight 5 months after Challenge, and lost weight 9 months after Challenge	13.8%
Lost weight in Challenge, gained weight 5 months after Challenge, and same weight 9 months after Challenge	3.3%
Lost weight in Challenge, gained weight 5 months after Challenge and 9 months after Challenge	9.8%
Same weight in Challenge, lost weight 5 months after Challenge and 9 months after Challenge	0.8%
Same weight in Challenge and 5 months after Challenge, gained weight 9 months after Challenge	0.8%
Same weight in Challenge, gained weight 5 months after Challenge, lost weight 9 months after Challenge	0.8%
Same weight in Challenge, lost weight 5 months after Challenge, same weight 9 months after Challenge	0.8%
Gained weight in Challenge, lost weight 5 months after Challenge and 9 months after Challenge	11.4%
Gained weight in Challenge, lost weight 5 months after Challenge, same weight 9 months after Challenge	0.8%
Gained weight in Challenge, lost weight 5 months after Challenge, gained weight 9 months after Challenge	8.9%
Gained weight in Challenge and 5 months after Challenge, lost weight 9 months after Challenge	8.9%
Gained weight in Challenge and 5 months after Challenge, same weight 9 months after Challenge	0.8%
Total	100%

*Calculated using a combination of Weight Form and Telephone Survey data 5 months and 9 months after Challenge.

Participants within some teams were much more successful in losing weight than in other teams and as a group, some teams were more successful than others (Figure 2). Thirteen out of twenty-two teams' mean team BMIs had decreased from T1 to T4 (Figure 2).

Figure 2. Average BMI for each team where n>2 at four points in time



Factors effecting observed changes in BMI (Tables 17, 18 and 19)

To understand the combined effects on BMI of people's participation in the different aspects of the Challenge the evaluation explored a range of demographic factors, training activity frequency and participation in Challenge components in a statistical model. The factors were explored separately using outcomes data for the following periods:

- Start of the Challenge (T1) to end of the Challenge (T2)
- End of the Challenge (T2) to 5 months after Challenge (T3),
- 5 months after Challenge (T3) to 9 months after Challenge (T4).

Two factors predicted significant changes in BMI at two of three time periods tested—starting weights and frequency of team training (Tables 17 and 18). Those with the highest starting weights were likely to lose the most weight between T1 and T2 and between T2 and T3, however this was not predictive of weight loss between T3 and T4. Frequency of team training significantly predicted weight loss from T1 to T2 and T2 to T3, but not T3 to T4.

From T1 to T2, women were likely to lose more weight than men. Participants in the Challenge carnival were significantly more likely to be those who had increased their BMI between T2 and T3. However, this is probably an artefact of which teams were able to attend the Carnival, and the fact that 40 per cent of participants increased their weight over this period.

None of the factors tested predicted change in BMI from T3 to T4 (Table 19), where the model explained only 7% of the variation in the change in BMI.

Starting weights

From T1 to T2, on average, participants with higher start weights lost 0.22 kg/m^2 more than those weighing 10kg less on commencement. From T2 to T3, people with higher start weights lost 0.37 kg/m^2 more than those weighing 10kg less on commencement. From T3 to T4, people with higher start weights lost 0.51 kg/m^2 more than those weighing 10kg less on commencement.

Frequency of training

From T1 to T2, on average, people who participated in team training once a week lost 0.2 kg/ m^2 more than those who participated once every couple of weeks, and those who participated multiple times each week lost on average 1.5 kg/ m^2 more than those who did not participate beyond signing up. From T2 to T3, people who trained with their team once a week lost 0.2 kg/m^2 more than those who trained with their team once every couple of weeks, and those who trained with their team multiple times each week lost on average 1.5 kg/m^2 more than those who did not train with their team at all during this time.

Table 17. Predictors of BMI change for participants: start of the Challenge (T1) to the end of the Challenge (T2)

Variable	B	95% CI	SE B	β	*p*
(Constant)	1.115	(-0.638, 2.867)	.888		.211
Weigh in	.694	(-0.333, 1.722)	.521	.105	.184
Team meeting	-.270	(-0.97, 0.431)	.355	-.058	.448
Facebook	-.224	(-0.76, 0.312)	.272	-.061	.410
GP_AMS	-.144	(-0.872, 0.584)	.369	-.030	.697
Dietitian	.223	(-0.323, 0.768)	.276	.059	.421
Second year in the Challenge	-.447	(-1.069, 0.175)	.315	-.105	.158
Contacted Get Healthy Service during the Challenge	.065	(-0.722, 0.852)	.399	.012	.871
Frequency of team training (0-5)	-.211	(-0.395, -0.027)	.093	-.173	.025*
Frequency of training solo (0-5)	.077	(-0.067, 0.222)	.073	.075	.293
Number of chronic illnesses	.133	(-0.146, 0.413)	.142	.082	.348
Start weight	-.022	(-0.036, -0.008)	.007	-.237	.002*
Female	-.858	(-1.491, -0.225)	.321	-.200	.008*
Age	-.020	(-0.045, 0.004)	.012	-.145	.104
Team	-.025	(-0.069, 0.018)	.022	-.088	.251

Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge; n=192; R^2=.162. *p<0.05. The model describes 16% of the variation in change in BMI.

Table 18. Predictors of BMI change for participants: end of the Challenge (T2) to 5 months after Challenge (T3)

Variable	B	95% CI	SE B	β	*p*
(Constant)	-1.777	(-3.456, -0.098)	.851		.038
Pedometer challenge	-.107	(-0.8, 0.586)	.351	-.022	.761
Challenge carnival	1.134	(0.332, 1.935)	.406	.203	.006*
Second year	.582	(-0.251, 1.414)	.422	.104	.170
Contacted Get Healthy Service during maintenance	-.450	(-2.452, 1.552)	1.014	-.031	.658
Frequency of solo training (maintenance)(0-5)	-.076	(-0.236, 0.084)	.081	-.066	.351
Frequency of team training (maintenance)(0-5)	-.210	(-0.357, -0.064)	.074	-.194	.005*
Start weight	-.037	(-0.054, -0.019)	.009	-.298	.000*
Female	.249	(-0.525, 1.023)	.392	.045	.526
Age	.022	(-0.003, 0.048)	.013	.123	.086
Team	.034	(-0.021, 0.089)	.028	.090	.227

Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge; n=184; R^2=.213. The model describes 21% of the variation in change in BMI. *significant.

Table 19. Predictors of BMI change for participants: 5 months after Challenge (T3) to 9 months after Challenge (T4)

Variable	B	95% CI	SE B	β	*p*
(Constant)	0.954	(-0.663, 1.798)	1.261		0.45
Second year in Challenge	-0.382	(-0.104, 2.099)	0.607	-0.051	0.53
Re-enrolled in 2014 Challenge	0.998	(-0.2, 0.315)	0.558	0.159	0.075
Frequency of team training in 2014 before new Challenge (0-5)	0.057	(-0.15, 0.27)	0.13	0.039	0.66
Frequency of solo training in 2014 before new Challenge (0-5)	0.06	(-0.013, 0.037)	0.106	0.045	0.573
Start weight	0.012	(-0.066, 0.005)	0.012	0.083	0.34
Female	0.567	(-1.58, 0.817)	0.623	0.078	0.364
Age	-0.031	(-0.088, 0.078)	0.018	-0.136	0.092
Team	-0.005	(-0.663, 1.798)	0.042	-0.01	0.906

Source: Start of Challenge and end of Challenge forms, Telephone Surveys or Weight Form (if available) at 5 months and Telephone Surveys 9 months after Challenge; n=162; R^2=.065. The model describes 7% of the variation in change in BMI.

b) Waist circumference (Tables 13 and 14, and Table 20)

Changes in waist circumference are described in detail below and the measures used and the results of tests of statistical significance are shown in Tables 13 and 14. Waist circumference measures are available for 352 participants at T1 and T2. Waist circumference measures were also available for 53 participants who returned the 5 month Weight Form. These data are not reported here because the demographic characteristics of this group were found to be different to other participants for whom we have data 5 months after Challenge (T3) (Section 2.5).

The mean waist circumference for all participants at T1 was 113.25cm, which decreased to 108.35cm at T2; a significant mean loss of 3.73cm. The mean waist circumference of female participants was 112cm at T1 and 108cm at T2. Women are classified as being at greatly increased risk where their waist measurement is more than 88cm. The mean waist measurement of male participants was 116cm at T1 and 110cm at T2. Men are classified as being at greatly increased risk where their waist measurement is more than 102cm.

From T1 to T2, 241 participants (69%) reduced their waist circumference measurement. Most (83%) remained classified as being at an increased risk of co-morbidities related to their waist circumference (Table 20).

Table 20. Change in waist circumference from start (T1) to end of the Challenge (T2)

	Start of Challenge		End of Challenge	
	Frequency	Per cent	Frequency	Per cent
Normal risk	19	3%	22	6%
Increased risk	48	8%	37	11%
Greatly increased risk	507	88%	294	83%
Total	574	100%	353	100%

Source: Start of Challenge and End of Challenge forms.

3.3.2 Physical activity

Change in physical activity at each time point of the evaluation (Tables 21, 22 and 23)

Changes in physical activity are described in detail below. The measures used and the results of tests of statistical significance are shown in Tables 21 and 22. Similar patterns were found when using data for participants with complete data sets; these results tables are in Appendix 6.

At T1, the mean number of days that participants were physically active for more than thirty minutes was 1.99 days, which increased to 2.91 days at T2. The number of days that participants were physically active for more than thirty minutes then decreased to 2.43 days at T3, remaining stable at 2.43 days at T4.

Participants reported a mean increase of 0.8 days of physical activity greater than thirty minutes per week betweenT1 and T2, a change that was statistically significant. Despite decreases in the mean number of days participants reported being physically active between T2-T3, T3-T4, and T2-T4, there was also an overall increase in mean number of days participants were physically active for more than thirty minutes between T1 andT4. This increase between T1 and T4 was 0.59 days and was statistically significant.

From T2 to T4 there was a statistically significant decrease in the mean number of days participants were physically active for more than thirty minutes (0.52 days). While there were also decreases in this measure from T2 to T3, and T3 to T4, these changes were not statistically significant.

For each pairwise comparison there was a percentage of participants who increased the number of days they were physically active. This percentage was highest from T1 to T2, at 52.2 per cent. From T1 to T3, 44.7 per cent of participants increased the number of days they were physically active. From T1 to T4, 48.4 per cent of participants increased the number of days they were physically active. From T2 to T3, and from T3 to T4, 33 per cent of participants increased the number of days they were physically active. This figure was similar for T2 to T4, at 34.5 per cent.

The percentage of participants who were sufficiently active varied at each time point of the evaluation. From T1 to T2, there was a 6.5 per cent increase in the percentage of participants who were sufficiently active. From T1 to T3, there was a 7.9 per cent increase in the percentage of participants who were sufficiently active. Finally, from T1 to T4 there was a 6.3 per cent increase in the percentage of participants who were sufficiently active. These three comparisons were statistically significant. All other comparisons for percentage of participants sufficiently active were not significant.

Data from T3 and T4 included additional measurements of physical activity—there were three additional questions which asked participants about the intensity of their physical exercise.[27] These data are shown in the tables under the column "% respondents sufficiently active - 3 questions". At T3, 76.8 per cent of participants were sufficiently active under this metric. This figure increased to 78.9 per cent at T4, however, when tested as a pairwise comparison this change was not statistically significant.

Table 21. Physical activity at each time point of the evaluation

Measure	Outcome and SD at each time point during evaluation							
	N	T1 (SD)	N	T2 (SD)	N	T3 (SD)	N	T4 (SD)
Mean number of days active for >30mins	545	1.99 (1.95)	320	2.91 (1.97)	271	2.43 (1.82)	195	2.43 (1.82)
% respondents sufficiently active – 1 question	545	12.3% (1%)	320	19.4% (2%)	271	17.3% (2%)	195	13.8% (2%)
% respondents sufficiently active – 3 questions					267	76.8% (3%)	194	78.9% (3%)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

[27] Three questions asked how often respondents usually partake in vigorous-intensity physical activity, moderate-intensity physical activity and in walking.

Table 22. Change in physical activity at each time point of the evaluation

Comparison time points	N (pair)	Mean number of days active for >30mins	% respondents sufficiently active – 1 question	% respondents who increased number of days active	N (pair)	% respondents sufficiently active - 3 questions
T1 (SD)	312	2.11 (1.96)	13.1 (2%)			
T2 (SD)		2.9 (1.98)	19.6 (2%)			
Change T1-T2 (95% CI)		**+0.8**[28]***** (0.52, 1.08)	**6.5**[29]***** (4, 9.7)	52.2 (46.5, 57.9)		
T1 (SD)	266	1.86 (1.88)	9.8 (2%)			
T3 (SD)		2.45 (2.06)	17.7 (2%)			
Change T1-T3 (95% CI)		**+0.59**[30]***** (0.31, 0.86)	**7.9**[31]***** (5, 11.8)	44.7 (38.7, 50.9)		
T1 (SD)	192	1.84 (1.71)	7.8% (2%)			
T4 (SD)		2.43 (1.83)	14.1% (3%)			
Change T1-T4 (95% CI)		**+0.59**[32]***** (0.28, 0.91)	**6.3**[33]***** (3.3, 10.7)	48.4 (41.2, 55.7)		
T2 (SD)	159	2.84 (1.89)	17.0% (3%)			
T3 (SD)		2.57 (2.12)	18.9% (3%)			
Change T2-T3 (95% CI)		-0.27 (-0.68, 0.14)	1.9 (0.4, 5.4)	33.3 (26.1, 41.2)		
T2 (SD)	119	2.95 (1.92)	17.6% (3%)			
T4 (SD)		2.43 (1.79)	13.4% (3%)			
Change T2-T4 (95% CI)		**-0.52**[34]***** (-0.96, -0.08)	-4.2 (-8.9, -1.8,)	34.5 (26, 43.7)		
T3 (SD)	182	2.54 (2.06)	17.6% (3%)		179	71.5% (3%)
T4 (SD)		2.42 (1.85)	14.3% (3%)			79.3% (3%)
Change T3-T4 (95% CI)		-0.12 (-0.43, 0.19)	-3.3 (-7, -1.2)	33 (26.2, 40.3)		7.8 (4.3, 12.8)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[28] Linear Mixed Modelling: $F(1,383)=45.253$, $p<0.001$.
[29] McNemar's Test: $\chi^2=2.824$, $p=0.02$.
[30] Linear Mixed Modelling: $F(1,318)=14.706$, $p<0.001$.
[31] McNemar's Test: $\chi^2=7.843$, $p=0.005$.
[32] Linear Mixed Modelling: $F(1,243)=12.462$, $p<0.001$.
[33] McNemar's Test: $\chi^2=4.321$, $p=0.038$.
[34] Linear Mixed Modelling: $F(1,274)=5.243$, $p=0.023$.

3.3.3 Frequency of participation in training after the Challenge

One hundred and ninety nine participants (73%) indicated they did not continue to train with their team at T3 compared to 73 participants (27%) who continued to do so. At T4, 131 participants (67%) reported not being involved in team training compared to 64 (33%) who continued to do so. A much higher proportion of participants registered for the 2014 Challenge reported training with their team (52%) at T4 compared to those not registered (18%). Of the 73 participants who continued to train with their team at T3, most trained regularly either multiple times per week (34 participants) or at least once a week (24 participants) (Table 23). Of the 64 participants who continued to train with their team at T4, most trained multiple times per week (37 participants) or at least once a week (20 participants).

Ninety two participants (34%) indicated they did not continue to train on their own from T2 to T3, compared to one hundred and seventy-nine participants (66%) who continued to do so. At T4, seventy-four participants (38%) reported not training on their own compared to one hundred and twenty-one participants (62%) who continued to do so. Of the 179 participants who continued to train on their own at T3, most trained multiple times per week (109 participants) (Table 24). A similar proportion of those registered for the 2014 Challenge and those not registered continued to train on their own at T4. Of the 121 participants who continued to train on their own at T4, most trained multiple times per week (94 participants).

Table 23. Extent team training continued at 5 (T3) and 9 months (T4) after Challenge; 9 month (T4) data by whether participants registered for 2014 Challenge

Frequency of team training	5 months after Challenge (N=272)		9 months after Challenge					
			Registered in 2014 Challenge (n=85)		Not registered in 2014 Challenge (n=110)		All 9 months participants (N=195)	
	N	% Yes	N	% Yes	N	% Yes	N	% Yes
Did not train with team	199	73%	41	48%	90	82%	131	67%
Trained with team:	73	27%	44	52%	20	18%	64	33%
Multiple times per week	*34*	*13%*	*31*	*36%*	*6*	*5%*	*37*	*19%*
At least once a week	*24*	*9%*	*12*	*14%*	*8*	*7%*	*20*	*10%*
Once every couple of weeks	*10*	*4%*	*1*	*1%*	*3*	*3%*	*4*	*2%*
Once a month	*2*	*1%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
Less often than once a month	*3*	*1%*	*0*	*0%*	*1*	*1%*	*1*	*1%*

Source: Telephone Surveys at 5 months after Challenge and 9 months after Challenge. Missing data in frequency of team training (n=2) in 9 months after Challenge data set.

Table 24. Extent individual training continued at 5 (T3) and 9 months (T4) after Challenge; 9 month data (T4) by whether participants registered for 2014 Challenge

Frequency of individual training	5 months after Challenge (N=271)		9 months after Challenge					
			Registered in 2014 Challenge (n=85)		Not registered in 2014 Challenge (n=110)		All participants (N=195)	
	N	% Yes	N	% Yes	N	% Yes	N	% Yes
Did not train on own	92	34%	31	36%	43	39%	74	38%
Trained on own:	179	66%	54	64%	67	61%	121	62%
Multiple times per week	*109*	*40%*	*44*	*52%*	*50*	*45%*	*94*	*48%*
At least once a week	*54*	*20%*	*10*	*12%*	*15*	*14%*	*25*	*13%*
Once every couple of weeks	*13*	*5%*	*0*	*0%*	*0*	*0%*	*0*	*0 %*
Once a month	*4*	*1%*	*0*	*0%*	*0*	*0%*	*0*	*0%*
Less often than once a month	*2*	*1%*	*0*	*0%*	*1*	*1%*	*1*	*1%*

Source: Telephone Surveys at 5 months and 9 months after Challenge. Missing data in frequency of solo training (n=1) , and frequency of team training (n=2) 9 months after Challenge

Table 25. Amongst participants who continued training after Challenge: frequency of training at 5 months (T3) and 9 months (T4) after Challenge

	Team training		Individual training	
How often did you train	5 months after Challenge % participated N=73	9 months after Challenge % participated N=62	5 months after Challenge % participated N=179	9 months after Challenge % participated N=120
Multiple times per week	46.6%	59.7%	60.9%	78.3%
At least once a week	32.9%	32.3%	30.2%	20.7%
Less than once a week	20.5%	8.0%	10.6%	1.0%
Total	100%	100%	100%	100%

Source: Telephone Surveys at 5 months and 9 after Challenge. Missing data in frequency of solo training (n=1) in 9 months after Challenge data set.

3.3.4 Diet

The metrics for daily fruit and vegetable intake data are all self-reported data, that is, serves participants reported usually eating each day. It is possible that some of the observed changes are due to participants being better educated about the appropriate

response and may not wholly reflect behaviour changes. During the Challenge, 58 per cent of participants attended a dietitian consultation aimed at assisting them to improve their diet.

Change in usual daily vegetable intake over time (Tables 26 and 27)

Changes in usual daily vegetable intake are described in detail below and the measures used—mean serves a day, and proportion of participants consuming recommended daily serves—and the results of tests of statistical significance are shown in Tables 26 and 27. Similar patterns were found when using data for participants with complete data sets; these results tables are in Appendix 6.

The mean number of serves of vegetables consumed per day was 2.25 at T1, 2.85 at T2, 2.53 at T3, and 2.41 at T4. The proportion of participants reporting consuming the recommended number of serves of vegetables daily was 8.4% at T1, 16.1% at T2, 12.5% at T3 and 7.2% at T4.

For female participants, the mean number of serves of vegetables reported to be consumed per day was 2.4 serves at T1, 3.0 serves at T2, and 2.6 at T3 and T4. The recommended intake is 5 serves a day for women. For male participants, the mean number of serves of vegetables consumed per day was 1.9 at T1, 2.5 at T2, 2.2 at T3, and 1.9 at T4. The recommended daily intake for men is 5.5 to 6 serves a day.

Participants reported a mean increase of 0.14 serves of vegetables per day from T1 to T4; and a decrease of 0.5 per cent of participants reported they usually eat the recommended number of serves of vegetables per day. The greatest increase in reported usual number of serves of vegetables consumed per day between two different time points was from T1 to T2; a significant increase of 0.54 serves per day and a significant increase of 7 per cent of participants reported they usually eat the recommended number of serves of vegetables per day. Participants also showed a significant mean increase in serves of vegetables consumed per day between T1 and T3; an increase of 0.28 serves per day. However the 3.7 per cent increase in those reporting they usually eat the recommended number of serves of vegetables per day in this time period was not significant. Participants reported a significant decrease in number of serves of vegetables consumed per day between T2 and T3 of 0.28 serves; and a decrease of 0.6 per cent of participants reported they usually eat the recommended number of serves of vegetables per day. The number of serves of vegetables consumed per day also decreased between T3 and T4; a decrease of 0.21 serves per day and a 6.6 per cent decrease in those reporting they usually eat the recommended number of serves per day. The greatest decrease in mean serves of vegetables per day was between T2 and T4; a significant decrease of 0.5 serves per day. Between these time periods there was a significant decrease of 10.9 per cent of participants reporting they usually eat the recommended number of serves of vegetables per day.

One hundred and fifty-seven of three hundred and twelve participants (50.3%) reported an increase in the number of serves of vegetables they eat daily from T1 to T2. Fewer than half of participants, 117 of 268 participants (43.7%), reported an increase in the number of serves of vegetables they eat daily from T1 to T3. Seventy-seven of one hundred and ninety-three participants (39.9%) reported an increase in the number of serves of vegetables they eat daily from T1 to T4. Around one third of participants, 55 of

159 participants (34.6%), reported an increase in the number of serves of vegetables they eat daily from T2 to T3. Thirty of one hundred and nineteen participants (25.2%) reported an increase in the number of serves of vegetables they eat daily from T2 to T4. A similar proportion - 25.8 per cent (47 of 182 participants)- reported an increase in the number of serves of vegetables they eat daily from T3 to T4.

Change in usual daily fruit intake over time (Tables 26 and 27)

Changes in usual daily fruit intake are described in detail below and the measures used—mean serves a day, per cent participants eat recommended daily serves—and the results of tests of statistical significance are shown in Tables 26 and 27. Similar patterns were found when using data for participants with complete data sets; these results tables are in Appendix 6.

The mean number of serves of fruit consumed per day was 1.50 at T1, 1.95 at T2, 1.99 at T3, and 1.88 at T4. The recommended intake is two serves a day for adults. The proportion of participants who reported usually consuming the recommended number of serves of fruit daily was 47.4% at T1, 64.2% at T2, 68.6% at T3 and 67.2% at T4.

Participants reported a significant mean increase of 0.37 serves of fruit per day fromT1 to T4; and a significant increase of 20.2 per cent of participants reported they usually eat the recommended number of serves of fruit per day. The greatest increase in reported usual number of serves of fruit consumed per day between two different time points was from T1 to T3; a significant increase of 0.54 serves per day and a significant increase of 26.2 per cent of participants reported they usually eat the recommended number of serves of fruit per day. Participants also showed a significant mean increase in serves of fruit consumed per day from T1 to T2; an increase of 0.40 serves per day. The 15 per cent increase in those reporting they usually eat the recommended number of serves of fruit per day in this time period was also significant. Participants reported a small increase in number of serves of fruit consumed per day from T2 to T3 of 0.06 serves; and an increase of 4.4 per cent of participants reported they usually eat the recommended number of serves of fruit per day. The number of serves of fruit consumed per day decreased slightly from T2 to T4; a decrease of 0.01 serves per day and a 1.7 per cent decrease in those reporting they usually eat the recommended number of serves per day. The consumption of mean serves of fruit per day between T3 and T4 also showed a small decrease of 0.1 serves per day. Between these time periods there was a decrease of 2.7 per cent of participants reporting they usually eat the recommended number of serves of fruit per day.

One hundred and thirty five of three hundred and thirteen participants (43.1%) reported an increase in the number of serves of fruit they eat daily from T1 to T2. Just over half of participants, 135 of 267 participants (50.6%), reported an increase in the number of serves of fruit they eat daily from T1 to T3. Eighty four of one hundred and ninety three participants (43.5%) reported an increase in the number of serves of fruit they eat daily from T1 to T4. Around one third of participants, 52 of 159 participants (32.7%), reported an increase in the number of serves of fruit they eat daily from T2 to T3. Thirty seven of one hundred and nineteen participants (31.1%) reported an increase in the number of serves of fruit they eat daily from T2 to T4. A smaller proportion of 26.9 per cent (49 of 182 participants) reported an increase in the number of serves of fruit they eat daily from T3 to T4.

Table 26. Diet at each time point of the evaluation

Measure	Outcome and SD at each time point during evaluation							
	N	T1 (SD)	N	T2 (SD)	N	T3 (SD)	N	T4 (SD)
Mean number serves of vegetables per day	545	2.25 (1.48)	319	2.85 (1.57)	271	2.53 (1.45)	195	2.41 (1.45)
% eat recommended daily serves of vegetables	545	8.4% (1%)	391	16.1% (2%)	271	12.5% (2%)	195	7.2% (2%)
Mean number serves of fruit per day	544	1.50 (1.23)	321	1.95 (1.37)	271	1.99 (1.21)	195	1.88 (1.14)
% eat recommended daily serves of fruit	544	47.4% (2%)	321	64.2% (3%)	271	68.6% (3%)	195	67.2% (3%)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

Table 27. Change in fruit and vegetable intake at each time point

Comparison time points	N (pair)	Mean number daily serves vegetables	% eat recommended daily serves vegetables	% respondents who increased vegetable intake	N (pair)	Mean number daily serves fruit (95% CI)	% eat recommended daily serves fruit (95% CI)	% respondents who increased fruit intake (95% CI)
T1 (SD)	312	2.3 (1.44)	8.7% (2%)		313	1.56 (1.24)	49.5% (3%)	
T2 (SD)		2.84 (1.55)	15.7% (2%)			1.96 (1.38)	64.5% (3%)	
Change T1-T2 (95% CI)		**+0.54**[35]***** (0.36, 0.73)	**7.0%**[36]***** (4.5, 10.5)	50.3% (44.6, 56)		**+0.40**[37]***** (0.24, 0.56)	**15.0%**[38]***** (11.2, 19.5)	43.1% (37.6, 48.8)
T1 (SD)	268	2.27 (1.48)	9.0% (2%)		267	1.45 (1.15)	43.1% (3%)	
T3 (SD)		2.55 (1.44)	12.7% (2%)			2 (1.22)	69.3% (3%)	
Change T1-T3 (95% CI)		**+0.28**[39]***** (0.07, 0.49)	3.7% (1.8, 6.8)	43.7% (37.6, 49.8)		**+0.54**[40]***** (0.39, 0.7)	**26.2%**[41]***** (21, 31.9)	50.6% (44.4, 56.7)
T1 (SD)	193	2.28 (1.48)	7.8% (2%)		193	1.5 (1.15)	46.6% (4%)	
T4 (SD)		2.42 (1.45)	7.3% (2%)			1.88 (1.14)	66.8% (3%)	
Change T1-T4 (95% CI)		+0.14 (-0.1, 0.38)	-0.5% (-2.1, 0)	39.9% (32.9, 47.2)		**+0.37**[42]***** (0.18, 0.56)	**+20.2%**[43]***** (14.8, 26.6)	43.5% (36.4, 50.8)
T2 (SD)	159	2.86 (1.39)	13.8% (3%)		159	1.87 (1.16)	64.8% (4%)	
T3 (SD)		2.58 (1.42)	13.2% (3%)			1.93 (1.08)	69.2% (4%)	
Change T2-T3 (95% CI)		**-0.28**[44]***** (-0.56, 0)	-0.6% (-3.5, 0)	34.6% (27.2, 42.5)		+0.06 (-0.14, 0.26)	4.4% (1.8, 8.9)	32.7% (25.5, 40.6)
T2 (SD)	119	2.96 (1.48)	16.8% (3%)		119	1.95 (1.2)	71.4% (4%)	
T4 (SD)		2.45 (1.43)	5.9% (2%)			1.94 (1.04)	69.7%(4%)	
Change T2-T4 (95% CI)		**-0.5**[45]***** (-0.8, -0.21)	**-10.9%**[46]***** (-18, -5.9)	25.2% (17.7, 34)		-0.01 (-0.24, 0.23)	-1.7% (-5.9, -0.2)	31.1% (22.9, 40.2)
T3 (SD)	182	2.63 (1.45)	14.3% (3%)		182	1.98 (1.25)	69.2% (3%)	
T4 (SD)		2.42 (1.47)	7.7% (2%)			1.88 (1.13)	66.5% (3%)	
Change T3-T4 (95% CI)		-0.21 (-0.42, 0.01)	**-6.6%**[47]***** (-3.5, -11.2)	25.8% (19.6, 32.8)		-0.1 (-0.29, 0.08)	-2.7% (-6.3, -0.9)	26.9% (20.6, 34)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[35] Linear Mixed Modelling: $F(1,342)=42.934$, $p<0.001$.
[36] McNemar's Test: $\chi^2=9.587$, $p=0.002$.
[37] Linear Mixed Modelling: $F(1,354)=31.011$, $p<0.001$.
[38] McNemar's Test: $\chi^2=18.400$, $p<0.001$.
[39] Linear Mixed Modelling: $F(1,336)=8.801$, $p=0.003$.
[40] Linear Mixed Modelling: $F(1,314)=45.585$, $p<0.001$.
[41] McNemar's Test: $\chi^2=44.083$, $p<0.001$.
[42] Linear Mixed Modelling: $F(1,239)=19.011$, $p<0.001$.
[43] McNemar's Test: $\chi^2=22.215$, $p<0.001$.
[44] Linear Mixed Modelling: $F(1,282)=7.839$, $p=0.005$.
[45] Linear Mixed Modelling: $F(1,227)=15.323$, $p<0.001$.
[46] McNemar's Test: $p=0.004$.
[47] McNemar's Test: $p=0.023$.

3.3.5 Smoking and alcohol intake

Change in smoking and alcohol intake over time (Tables 28 and 29)

Changes in smoking and alcohol intake are described in detail below. The measurements used and the results of tests of statistical significance are shown in Tables 28 and 29. Similar patterns were found when using data for participants with complete data sets; these results tables are in Appendix 6.

There appear to be inconsistencies in the data regarding smoking status. From T1 to T2, there was a 5 per cent increase in the proportion of participants reporting never having smoked; this was the only statistically significant result. This suggests the smoking data should be interpreted with caution. Although not statistically significant, there was an overall trend of decreased daily smoking from T1 to T4, with a 4.7 per cent reduction in the percentage of participants who reported smoking daily. Over the same period (T1-T4), the percentage of participants who reported smoking occasionally rose by 2.6 per cent, while the percentage who reported having tried it a few times and being ex-smokers stayed stable (-0.5% and -1.6%, respectively).

Data on alcohol intake were collected at T3 and T4. At T3, the mean number of days per week participants reported drinking alcohol was 0.57 and the mean number of standard drinks on an alcohol day was 6.20. At T4, these figures were 0.47 and 6.60, respectively.

Table 28. Smoking and alcohol intake at each time point of the evaluation

Measure	Outcome at each time point during evaluation							
	N	T1 (SD)	N	T2 (SD)	N	T3 (SD)	N	T4 (SD)
% smoke daily	533	28.7% (2%)	311	27.3% (3%)	271	22.5% (3%)	195	19.5% (3%)
% smoke occasionally	533	7.7% (1%)	311	7.4% (1%)	271	6.3% (1%)	195	8.2% (2%)
% tried it a few times but never smoked regularly	533	25.0% (2%)	311	21.2% (2%)	271	26.6% (3%)	195	28.7% (3%)
% ex-smoker	533	4.5% (1%)	311	3.5% (1%)	271	5.2% (1%)	195	4.6% (2%)
% never smoked	533	34.1% (2%)	311	40.5% (3%)	271	39.5% (3%)	195	39% (3%)
Mean number of days per week drink alcohol					271	0.57 (1.16)	195	0.47 (0.92)
Mean number of standard drinks on an alcohol day					83	6.20 (3.94)	53	6.60 (4.04)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

Table 29. Change in smoking at each time point of the evaluation

Comparison time points	N (pair)	% smoke daily	% smoke occasionally	% tried it a few times	% ex-smoker	% never smoked
T1 (SD)	302	29.5% (3%)	7.3% (1%)	5.6% (1%)	22.2% (2%)	35.4% (3%)
T2 (SD)		27.5% (3%)	7.3% (1%)	3.6% (1%)	21.2% (2%)	40.4% (3%)
Change T1-T2 (95% CI)		-2.0% (-4.3, -0.7)	0.0%	-2.0% (-4.3, -0.7)	-1.0% (-2.9, -0.2)	**5.0%**[48]* (2.8, 8.1)
T1 (SD)	267	27.3% (3%)	6% (1%)	5.2% (1%)	26.6% (3%)	34.8% (3%)
T3 (SD)		22.8% (3%)	6.4% (1%)	5.2% (1%)	26.2% (3%)	39.3% (2%)
Change T1-T3 (95% CI)		-4.5% (-7.7, -2.3)	0.4% (0, 2.1)	0.0%	0.4% (- 2.1, 0)	4.5% (2.3, 7.7)
T1 (SD)	193	24.4% (3%)	5.7% (2%)	5.2% (2%)	26.9% (2%)	37.8% (3%)
T4 (SD)		19.7% (3%)	8.3% (2%)	4.7% (2%)	28.5% (3%)	38.9% (4%)
Change T1-T4 (95% CI)		-4.7% (-8.7, -2.2)	2.6% (0.8, 5.9)	-0.5% (-2.9, 0)	-1.6% (-4.5, -0.3)	1.1% (0.1, 3.7)
T2 (SD)	155	24.5% (3%)	6.5% (2%)	2.6% (1%)	23.2% (2%)	43.2% (4%)
T3 (SD)		20.6% (3%)	5.8% (2%)	5.2% (2%)	25.8% (3%)	42.6% (4%)
Change T2-T3 (95% CI)		-3.9% (-8.2, -1.4)	-0.7% (-3.5, 0)	2.6% (0.7, 6.5)	2.6% (0.7, 6.5)	-0.6% (-3.5, 0)
T2 (SD)	166	19.8% (3%)	6.9% (2%)	2.6% (1%)	25.9% (3%)	44.8% (4%)
T4 (SD)		19.8% (3%)	7.8% (2%)	4.3% (2%)	27.6% (3%)	40.5% (4%)
Change T2-T4 (95% CI)		0.0%	0.9% (0, 3.3)	1.7% (0.4, 5.2)	1.%7 (0.4, 5.2)	-4.3% (-8.5, -1.7)
T3 (SD)	182	20.3% (3%)	5.5% (0.02)	28% (3%)	4.4% (0.02)	41.8% (0.04)
4 (SD)		19.8% (3%)	7.1% (2%)	29.1% (3%)	4.4% (2%)	39.6%(4%)
Change T3-T4 (95% CI)		-0.5% (-3, 0)	1.6% (0.3, 4.7)	1.1% (0.1, 3.9)	0.0%	-2.2% (-5.5, -0.6)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[48] McNemar's Test: χ^2=5.939, p=0.015.

3.4 Participants' perceptions of impacts

This section summarises team managers' and participants' perceptions about the health and social benefits accruing from their involvement in the Challenge. Much of the evidence is drawn from the 5 month Telephone Survey, specifically the open-ended question asking about major impacts of the Challenge (Q9) and closed-ended question (Q10), and semi-structured interviews with 10 team managers. Additional evidence is drawn from the 9 month Telephone Survey.

The patterns in responses to questions about the personal and community benefits from being involved in the Challenge were very similar at 5 months and 9 months after Challenge for most categories. The proportion identifying the range of potential impacts is shown in Table 30. The exceptions were impacts on improved chronic disease management, improved smoking habits or quitting smoking and reduced medication use (Table 30). For these three possible impacts, fewer participants (between 10 to 19 per cent) nominated these as areas where they had experienced personal benefits from their involvement in the Challenge at 9 months, compared with 5 months.

Participants commonly nominated the major personal impacts of the Challenge as losing weight and becoming more active and feeling physically healthier, along with some additional psychological, physiological and social benefits. At the broader community level, team managers gave examples about how participants had become better connected socially. At the community level, participants and team managers reported that the Challenge had raised awareness among some in the community (broader than the team members) of the need to address chronic disease risk factors, particularly overweight and lack of physical activity.

Some outcomes were said to be harder to achieve or maintain than others. Team managers observed that it was relatively easy to sustain team training sessions but that it had proved much more difficult to change people's eating habits.

One additional piece of evidence about the value participants place on the Challenge is whether they choose to re-enter in 2014; 85 participants who responded to the 9 month Telephone Survey (44%) indicated they had registered for the 2014 Challenge. However, a range of reasons could explain why participants did not enter in 2014 that are not related to the perceived benefits or value they accrued from taking part previously.

Table 30. Perceived personal and community benefits of the Challenge, 5 and 9 months after Challenge

Area of change	5 months after Challenge (T3) Yes, per cent	9 months after Challenge (T4) Yes, per cent	Specific participant impacts highlighted in open-ended question	In their own words (illustrative quotes from participants)
Personal benefits				
Improved physical health	91%	93%	▪ Loss of weight ▪ Improved physical fitness ▪ Improved metabolic indicators, e.g. reduction in cholesterol levels, improvements in diabetic control ▪ Improved asthma control ▪ Improved appetite	*Diabetes management better, I lost weight and have better health and diet.* *Better cholesterol, sugar dropped dramatically and generally my overall wellbeing mentally improved.*
Improved knowledge of nutrition and physical activity	90%	93%	▪ How to exercise or what kinds of exercise will improve their health and fitness ▪ What kinds of exercise facilities are available in their local area and where these are located ▪ Healthy eating, e.g. identifying fatty food ▪ How to prepare healthy food	*Just a better awareness of diet and exercise. It's important.*
Improved confidence to eat healthily Change to better diet	92% 90%	93% 91%	▪ Becoming more motivated to exercise and/or eat healthier ▪ Eating more healthy food ▪ Eating less take-away food ▪ Food preparation, e.g. low fat cooking	*I started eating healthier and thinking about what I am eating. Instead of grabbing a can of drink, I am going for water instead now.*
Improved confidence to be physically active	88%	93%	▪ Greater self-confidence in ability to make changes/ get physically active ▪ Walking regularly ▪ Training regularly at the gym ▪ Running for exercise	*Doing a lot more walking than I used to.*
Improved quality of life (happiness, family life, stress)	76%	89%	▪ Improved self-image/ feeling better about self ▪ Greater energy in	*Got more confidence in myself. Felt proud as a team doing what we did for our*

Area of change	5 months after Challenge (T3) Yes, per cent	9 months after Challenge (T4) Yes, per cent	Specific participant impacts highlighted in open-ended question	In their own words (illustrative quotes from participants)
			normal life to get things done	*community. Felt a lot happier and more active.*
Reduced stress and anxiety levels	76%	72%	▪ Have a more positive outlook on life	*Personal impacts were more energy and feeling better about myself.* *It helped me improve my self-esteem to get motivated to start exercising*
Improved chronic disease management	73%	54%		
More aware of or linked into local Aboriginal Medical Service	72%	72%		
Improved smoking habits or quitting smoking	63%	51%	▪ Smoking less	*Yes, it has changed my life a bit. I am eating healthy and I have given up drinking. I am also trying to cut down on smoking.*
Reduced medication use	36%	27%		
Community benefits				
Improved awareness of health in the community	88%	88%	▪ New focus on major health issues such as heart health and Type 2 diabetes ▪ Participants as role models for extended family and wider community, e.g. others encouraged to exercise more by participants' examples	
Increase in community pride and connectedness	87%	87%	▪ Positive image for community ▪ Making new friends ▪ Having more opportunities to socialise	*Positive would be I lost weight and it got the family together.* *I lost weight and it's broadened my network of fitness. Taking part in a team and got to know people more. More knowledge*

Area of change	5 months after Challenge (T3) Yes, per cent	9 months after Challenge (T4) Yes, per cent	Specific participant impacts highlighted in open-ended question	In their own words (illustrative quotes from participants)
				of activities that were in place in our area. *I enjoyed the mateship and community involvement.*
More community activities occurring	76%	76%	▪ Brought groups and participants together	*A wider range of the community getting together (different age groups); confidence booster (encouraged some of her relatives who would never have considered).*

Source: Telephone Surveys at 5 months after Challenge and 9 months after Challenge.

4. Discussion and implications

4.1 Profile of participants and teams

4.1.1 Principal findings

In 2013, 343 (72%) Challenge participants were Aboriginal women. The average age of participants was 40 years. There was a high prevalence of chronic health conditions such as Type 2 diabetes, high cholesterol and high blood pressure. The average weight of participants at the start of the Challenge was 98.5kg, and 94% of participants were overweight or obese.

4.1.2 Interpretation and implications

The Challenge achieved its objective of targeting individuals in Aboriginal communities as well as those at risk of developing serious chronic health problems due to being overweight or obese. At registration, the vast majority of participants displayed indicators that put them at an increased risk of health problems, such as an elevated BMI and waist circumference. Additionally, the prevalence of health conditions, such as Type 2 diabetes, high cholesterol and high blood pressure among participants indicates that the Challenge was able to successfully involve individuals currently experiencing chronic disease. Furthermore, according to team managers and the state implementation team, the Challenge reached Aboriginal people who would not otherwise be reached by existing health prevention or health promotion interventions.

However, relative to the number of Aboriginal women involved, there were fewer Aboriginal men involved in the Challenge and as such it is clear that the intervention did not reach or appeal to all members of the target population. The implications are either that the promotional messages inviting recruitment had less appeal to men than women or that the intervention itself has less intrinsic appeal to men.

The differences in team composition most likely reflected the different recruitment approaches team managers used and the position and connections of the team manager. These differences imply that specific recruitment strategies and messages appeal to different segments or groups in the community.

4.1.3 Recommendations

Increasing the number of men in the Challenge would improve its reach to the target population and enable the positive effects of the Challenge to spread more broadly within the community and target population. In addition, there is potential for existing teams to increase their appeal and membership by using a broader suite of recruitment and marketing messages designed to appeal to specific groups.

1. **Explore strategies to encourage more men to participate in future Challenges**.

2. **Encourage teams to use a broad suite of recruitment strategies and promotional messages that appeal to different segments of the target population**.

4.2 Implementing the Challenge and program participation

4.2.1 Principal findings

Overall, the Challenge was highly valued by participants and team managers, and was feasible to implement in most contexts. Coordination and support for the Challenge was largely delivered effectively at both the state level and the local level. The program model, in which teams are formed by the local community and led by a local team manager, was successful. The majority of participants regularly participated in multiple weight loss activities; most commonly monthly weigh-ins, team training, team meetings, visits to general practitioners and dietitian consultations. The 'mix' of weight loss activities offered at the team level varied somewhat according to the local context, the age and interests of team members, availability of facilities and other opportunities, as well as the skills, experience and connections of team managers, and a minority of teams trained less often and/or participated in fewer Challenge activities.

Factors associated with successful implementation of the Challenge included:
- The competitive nature of the Challenge was an important driver of engagement, and motivation also helped engender wider community support.
- Team managers had a vital role in engaging and motivating participants. Having a team manager who was a recognised community leader helped build on existing community connections.
- Having structured support available through team training, fitness coaching, team meetings, monthly weigh-ins, team t-shirts and incentives was key to engaging participants and maintaining interest in the Challenge.
- Dietitian consultations and the pedometer challenge had lower levels of participation but, when accessed, were generally seen as useful activities by participants.
- Forming linkages with local health organisations facilitated access to health professionals such as dietitians and exercise physiologists.
- Links with local rugby league teams engendered team spirit.
- Challenge t-shirts were highly desirable within the team and in the wider local community and were said to engender team spirit.

Challenges encountered in the implementation of the Challenge included:
- There was a short lead time for team managers to organise teams.
- Access to appropriate training opportunities and health professionals was limited in some rural locations.
- The small state implementation team had limited capacity to provide comprehensive support to support the large number of teams.
- There were delays in the transfer of grant funds from NSW Rugby League, and lack of clarity about how funds could be used in some cases.
- The approach used to pay accommodation at the Challenge Carnival as a reimbursement was a barrier to participation in the Challenge Carnival.

- While take-up of local components was high, there was low take-up of components delivered at state level, such as motivational support from NRL players, the Facebook page and the Get Healthy Service.
- There was low take-up of maintenance activities such as the Challenge Carnival and the pedometer challenge. However, teams that participated in these activities stated that these encouraged their teams to stay together and participants to stay active.

4.2.2 Interpretation and implications

The team managers who were interviewed provided a rich and detailed commentary about the implementation of the Challenge. The experiences of team managers who did not participate in interviews may or may not have differed from the team managers who did.

The results show that the Knockout Health Challenge implementation model—forming teams from local communities to participate in weight loss activities and compete against other teams—is an appropriate and effective health promotion intervention for Aboriginal people at risk of poor health related to being obese. Although there are no major changes needed to the implementation model, the evaluation did identify some issues. One issue was the relatively low reach of components delivered at the state level. It appears more effort needs to go in targeting and promoting these strategies. Another issue was the differential access to support from health professionals and/or appropriate training facilities across teams. Participants with less access to these strategies may have reduced chances of benefiting from their involvement in the Challenge. However, because the evaluation received feedback from only half of all team managers it is not possible to be certain about the correlation between the involvement in specific components, for example access to health professionals, and the health outcomes of teams or participants.

Having weak or no linkages with local health services often reduced participants' opportunities to get specialist advice from exercise physiologists and dietitians and it is clear that getting access to expert advice was helpful and appreciated by participants. Teams with stronger links generally had team managers who were employed in some role by local health services. Although it would not be appropriate for NSW Health to choose local team leaders on this or any other basis, it could be appropriate to encourage teams to invite a health professional to play a role in coordinating access to health professionals. For example, those working in population health would be one obvious source of professionals who could play this linkage role. A direct benefit for population health services is that such involvement could assist them to leverage off the Challenge and increase the reach of other health promotion initiatives into the local Aboriginal community.

The results show that structured support—provided through team training, team meetings and monthly weigh-ins—was key in driving participation and ultimately, for achieving the weight loss and other social outcomes. Most weight loss activities were done as a team in order to help motivate individual participants and to enhance opportunities for them to support each other and share their successes and failures. Team training was particularly important, with results indicating that team training predicted individual weight loss. Given that dropping out of weight loss and exercise

programs is a common issue and occurred to some extent in the Challenge, these results show the importance of encouraging future Challenges to focus on providing structured support. It is also apparent that the level of engagement in activities determined the success of the program and that this can be improved through team managers' actions. Team managers had a vital role in providing structured support and engaging and motivating participants and any support they can get to equip them to do so would only enhance their role.

An important component of the program, in addition to team training sessions, was the undertaking of individual training sessions by Challenge participants. This is important because it assisted participants to practice training methods so they could maintain these behaviours and continue to reap the health benefits of the Challenge after it has been completed.

Fitness coaches (often exercise physiologists or fitness trainers) showed participants how to train in a safe manner. Being able to access expert advice in this area was highly appreciated by teams, when this was made available. No injuries as a result of training for the Challenge were reported by respondents to the 5 month Telephone Survey, perhaps because of the involvement of fitness coaches.

Many of the components that appeared to work less well and/or had lower levels of participation were those not delivered locally, such as motivational support from NRL players via Facebook, the *Get Healthy Information and Coaching Service* and the Challenge Carnival. There is insufficient evidence to be sure about the reasons why but it may be these were either not well targeted or promoted. It may also be that these were not seen as central to the Challenge by team managers and/or participants.

Lastly, the evaluation showed that there are opportunities for improving the level and nature of support for the intervention at the central agency level, which would allow team managers to focus their efforts and implement those strategies which successfully engage and motivate team members. Addressing some of the issues raised about the kinds and levels of support for teams; particularly processes for managing grant funding, ways to lever off the rugby league connection, and making sure resources and materials are available at the start of the program, can only improve the effectiveness of implementation.

4.2.3 Recommendations

3. **Retain the Challenge implementation model. Review and adapt those components that were less successful.**

   Most components of the Challenge model were largely feasible to implement and appropriate for the target group. Components not delivered at the local level, for example motivational support from NRL players, appear to have had low reach into the target group, and options for improving the targeting and delivery of these components warrant consideration.

4. **Consider ways to improve teams' access to training opportunities and facilities, and to health professionals**.

Group training sessions are an integral component of the Challenge and contributed greatly to participants' weight loss. Ensuring that all teams and participants have access to training opportunities and health professionals will further enable the successful outcomes of the Challenge. A focus on rural locations, for which access to these components was sometimes problematic, would improve outcomes for these locations. Moreover, participants' and teams' access to exercise physiologists and trainers appears to have reduced potential harm associated with fitness activities. Ensuring that all participants have access to this component will further improve outcomes, especially surrounding long-term benefits, with participants learning about training and exercise. Changing eating behaviour is difficult and dietitians' consultations were helpful for some participants. Ensuring all participants can access nutrition advice will assist participants to understand what changes are needed to eat more healthy food and reduce their energy intake.

5. **Consider ways to assist team managers to maintain team motivation during and after the Challenge, such as the Get Healthy Information and Coaching Service.**

   Participation in Challenge weight loss activities dropped off over time and further consideration should be given to possible strategies to keep teams and participants interested over the whole period of the Challenge and afterwards. Given that structured support from team managers was an effective strategy for engaging and motivating participants, it is important they be supported in their role over the whole Challenge period, for example they could be provided with motivational 'tips'. It may also be important to investigate whether some sort of support for team managers (necessarily at a lower level) can continue to be provided during the maintenance period. Additional team-based activities were provided in the maintenance period but these had low take-up by teams. When taken up, the maintenance activities did encourage teams and participants to maintain participation in weight loss activities and it will be important to consider what maintenance activities are most likely to attract team engagement and when these are best rolled out.

6. **Consider ways to use the Challenge to facilitate wider community involvement in weight loss or other health promoting activities.**

   The demand for future team places and the positive reception the Challenge had within communities means that the Challenge could be used to promote healthy lifestyles amongst those close to participants or others in the community. For example, given their popularity, team t-shirts could be made available to those who are not "officially" team members to encourage their participation in parallel weight reduction activities. Information could be made available through Aboriginal health services involved in the Challenge, using the Challenge branding, about where individuals could get help to lose weight and become more active and improve their health. The local population health services could design interventions that build on the popularity of the Challenge for the wider community.

4.3 Program impact

4.3.1 Principal findings

Health impacts of the Challenge

Overall, the program appears to have had a modest positive impact on participants' risk factors for chronic disease, particularly in the short and medium term. Key results are summarised in Table 1.

- **Weight loss:**
  - On average, participants lost weight between the start of the Challenge and the end of the Challenge (mean weight loss 2.3kg), and lost weight between the end of the Challenge and 5 months after the Challenge (mean weight loss 1.5kg). On average, participants gained weight between 5 and 9 months after the Challenge (mean weight gain 1.9kg). Overall, participants' average weight 9 months after the Challenge was significantly lower than at the start of the Challenge (mean weight loss 2.4kg).
  - A similar pattern was observed for BMI. On average, between the start of the Challenge and 9 months after the Challenge, participants' BMI decreased by 0.9kg/m^2, from 36.5 to 35.6kg/m^2.
  - 67.1% of participants lost weight between the start of the Challenge and the end of the Challenge. 55.3% of participants lost weight between the end of the Challenge and 5 months after Challenge. 38.7% lost weight between 5 months and 9 months after the Challenge. Overall, 62.5% of participants lost weight between the start of the Challenge and 9 months after Challenge.
  - The participants most likely to lose weight during the Challenge were women, those with the highest starting weights, and those who most frequently participated in team training.

- **Physical activity:**
  - The mean number of days that participants were physically active for more than thirty minutes was 2.0 days at the start of the Challenge, 2.9 days at the end of the Challenge, 2.4 days at 5 months after Challenge, and 2.4 days 9 months after Challenge. Overall, participants were significantly more physically active 9 months after the Challenge than at the start of the Challenge.

- **Fruit and vegetable consumption:**
  - Participants consumed an average of 2.25 serves of vegetables per day at the start of the Challenge, 2.85 serves at the end of the Challenge, 2.53 serves 5 months after Challenge, and 2.41 serves 9 months after Challenge. Overall, participants' vegetable intake was slightly higher 9 months after the Challenge than at the start of the Challenge, however the increase was not statistically significant.
  - Participants consumed an average of 1.50 serves of fruit per day at the start of the Challenge, 1.95 serves at the end of the Challenge, 1.99 serves 5 months after the Challenge, and 1.88 serves 9 months after Challenge. Overall, participants' fruit intake was significantly higher 9 months after the Challenge than at the start of the Challenge.

- **Smoking:**
  - At the start of the Challenge, 28.7% of participants reported smoking daily. 9 months after the Challenge, 19.5% of participants reported smoking daily. However, there appear to be inconsistencies in the data regarding smoking status, therefore the smoking data should be interpreted with caution.

4.3.2 Interpretation and implications

The research design—observational before and after study (4 time points)—means caution needs to be taken when assessing the success of the program using outcomes data. Changes in the outcomes measure over time observed may be influenced by other causal factors that are not measured or understood. The study did not have a control group, which would strengthen causal claims.

Observed changes in behaviour and impacts on health are based substantially on self-report outcomes data. We can be most confident about changes in body composition between the start and end of the Challenge, where objective measures are available; the self-report data for weight and other measures are likely to be less reliable. Although participant data was available for almost all participants at the start of the program, two teams decided not to participate further in the evaluation. Additionally, there was loss to follow-up at each data collection point, although data were collected from teams across the weight loss spectrum throughout. The participants who provided data for the evaluation at 5 months and 9 months after Challenge were similar to each other as a group but differed somewhat from registered (start) participants. Follow-up participants were slightly older and slightly more likely to be female than participants at the start. However, the proportion with a BMI greater than 25 was very similar. There was no information collected about reasons for not participating in the follow-up. In addition, there is a potential for a pre-test effect, where participants become sensitised to the socially desirable answers in follow-up 'testing'. For these reasons, caution should be taken in ascribing the observed changes in outcomes to the program.

It is also apparent that the intervention 'dose', along with individuals' preparedness for changing their physical activity and eating behaviours differed. Participants joined the program through a range of pathways, some targeted, some self-select. The teams they participated in operated very differently, with some providing many opportunities for participants to participate in exercise and learn about and change other lifestyle behaviours, and other teams providing fewer opportunities. Individual participation also varied widely. In particular, is unclear how much and what the nature of nutrition education was received apart from a consultation with a dietitian (58 per cent of participants). This is important because the most successful weight loss programs combine exercise and diet strategies. At the minimum we can say it appears a substantial minority did not get the opportunity to access individualised dietary advice, which may have impacted on their understanding of and ability to make dietary changes.

In evaluating the program impacts of the Knockout Challenge it is apparent that the program impacts for the different outcomes measures trend in similar ways, and the different types and levels of intervention that seek to alter these measures for participants point to a broad range of recommendations for program continuation and

modification. Participation in the Challenge appears to have promoted a modest amount of weight loss and increased physical activity amongst many participants, particularly during the Challenge and to a lesser extent in the 5 months after Challenge. In the longer term, the early gains of the Challenge in terms of weight loss were on average retained. Even modest weight losses are important for this high-risk group. The results indicate that the observed changes are likely to have a positive impact on participants' physical health, particularly those participants who have progressed to pre-diabetes. The common measure of a success for weight loss programs is 5 per cent or more total body weight loss on average. The program did not achieve this, a reported 4 per cent loss between start and 5 months after Challenge was the greatest reduction observed. However, there is evidence that even a 2 to5 per cent loss in body weight can result in positive metabolic changes for individuals.[49] As is a common experience for weight loss programs, the rate of weight loss slowed after the program and then weight gain was observed on average in the longer term. Even so, when compared to other weight programs the proportion of participants who continued to lose weight in the longer term was higher than could be expected (39.2 per cent). According to Franz et al[50] in their systematic review of weight loss program, the usual proportion of participants who continue to lose weight in the longer term (after a year) is 15 to 20 per cent of participants in clinical weight loss programs.

Improving the level of physical activity for participants in this high risk group, particularly those who are morbidly obese can be difficult. Like many Australians, the majority of Challenge participants were doing insufficient physical activity prior to the Challenge, and although the average number of days increased during the Challenge, these activity levels on average remained below the recommended levels. Nevertheless, the results imply that, on average, participants had made some improvements in their fitness levels and increasing fitness levels has benefits, independent of weight loss during the Challenge. Studies show a stepwise relationship between fitness and mortality is evident in all BMI strata and is independent of body fat[50]. A third of participants reported they continued to increase their activity levels in the longer term and most did so by training on their own. This decrease in the mean number of days active appears to be driven by both those who maintained activity levels and those who decreased the number of days they are active during the week. Training on your own did not predict weight loss, the implication being that at least some of that training was lower intensity and insufficient to ensure that energy output was higher the energy intake. On the other hand, training as a team did predict weight loss, but after the Challenge those involved in team training dropped off, which indicates that many teams did not continue to train together. This implies that less motivated high risk participants may need some sort of ongoing support structures to stay motivated and increase their physical activity levels and that the maintenance activities were not sufficient to encourage team training sessions to continue. The results also provide evidence for the case of holding annual Challenges because the team structures are effective in providing such support structures.

[49] Wing, Rena R., et al. "Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes." Diabetes care 34.7 (2011): 1481-1486.

[50] Marion J. Franz, Ms, Rd; Jeffrey J. Vanwormer, Ms; A. Lauren Crain, Phd; Jackie L. Boucher, Ms, Rd; Trina Histon, Phd; William Caplan, Md; Jill D. Bowman; Nicolas P. Pronk, PhD Weight-Loss Outcomes: A Systematic Review and Meta-Analysis of Weight-Loss Clinical Trials with a Minimum 1-Year Follow-Up. Journal of American Dietetic Society, 2007.

To lose weight your energy intake must be less that your energy needs. As such, successful weight loss often involves both increasing your activity levels and changing your diet to decrease your energy intake. Part of the program model was facilitating participants' access to expert nutrition advice from dietitians on an individual basis or through group nutrition education sessions. However, this strategy was not always able to be implemented and when it was, the results indicate that although professional support helped participants make some changes to their diet, such support may not be sufficient on its own to sustain changes in eating behaviours after the Challenge. Vegetable intake did increase on average at the end of the Challenge; however these changes were not maintained after the Challenge. Team managers spoke about the lack of healthy alternatives at local take-away food shops and the cost of fresh food as hindering people's efforts to eat more healthily. The implications are that although individualised dietary advice is helpful, participants may find it difficult to change their diet without broader interventions at the food supply and policy levels. This fits with decades of research into improving people's eating behaviours and diets.

Although smoking was not targeted explicitly in the intervention we did see a trend in decrease in reported regular smoking levels, albeit not significant. Because smoking was not addressed in the program model it is difficult to make a case for any changes being related to program participation. However, a few participants commented in open questions that being involved in the program inspired them to quit smoking as part of other actions to improve their health. So there could be some impact from the program, for some participants there may be merit in explicitly targeting smoking cessation and other risky behaviour as part of future Challenges.

4.3.3 Recommendations

7. **Continue the Knockout Health Challenge as a healthy lifestyle intervention**.
   The program appears to have had a modest positive impact on participants' risk factors for chronic disease, particularly in the short and medium term. There is sufficient evidence to make a case for the benefits of the Challenge to continue offering this intervention to high risk Aboriginal people.

8. **Increase the consistency and scope of the nutrition education element of the intervention**.
   The literature says most successful weight loss programs address both these elements, and it is unclear if sufficient nutrition education is available for all participants under the current model.

9. **Educate team managers and participants about the importance of group training for achieving and maintaining weight loss**.
   Group training was the only statistically significant predictor of weight loss.

10. **Encourage team managers and participants to continue healthy lifestyle activities after the Challenge, whether through formal or informal maintenance activities**.
    The evaluation has shown that motivation and participation activity drops off over time without social or structured support.

11. Consider the merits of including smoking cessation in an explicit way in future Knockout Health Challenges.

4.4 Participants' perceptions of impacts

4.4.1 Principal findings

- Participants perceived the major impacts of the Challenge to be losing weight, becoming more active and feeling physically healthier. Participants reported that it was easier to change physical activity than eating habits.
- Participants also reported psychological and social benefits such as feeling more socially connected, improved self-esteem, feeling less stressed and feeling happier. Participants attributed these benefits to their improved physical health, and the social aspects of team training and team meetings
- Most participants reported becoming better linked with their local Aboriginal Medical Service.
- Participants perceived the Challenge had raised awareness in the community of the need to address chronic disease risk factors, particularly overweight and lack of physical activity.
- Few participants reported any adverse impacts from being involved in the Challenge for themselves or for the wider community.
- Few participants identified barriers to participation.

4.4.2 Interpretation and implications

The evidence indicates that the Challenge is achieving wider benefits than the stated objectives of improving participants' physical health through losing weight and increasing physical activity. The reported mental health benefits are not wholly surprising given the recognised link between improved mental health and physical activity and the link between mental health and social connectedness.[51] The design of the intervention promotes these linkages. Improving mental health may be equally as an important outcome as improving physical health, given the high rates of depression and suicide in the Aboriginal community.

Participants recognise that lifestyle behaviours are difficult to change and maintain. As discussed earlier, the strategy of training together was recognised as a way of motivating participants to keep going and to maintain new behaviours. Changing eating habits was recognised as being harder to do and then maintain. The implications are two-fold. The first is that the difficulty of changing diet could be discussed with participants and a greater focus placed on this aspect of behaviour change to improve potential outcomes during the Challenge. The second implication is that other health promotion strategies to influence the local food supply and affordability of healthy food could be considered, as these were factors which may influence the success of nutrition consultations and education sessions. One team is intending to work with their local school in 2014 to incorporate healthy food choices on its menu and use marketing

[51] Weir K (2011).*The Exercise Effect.* American Psychological Association Monitor on Psychology, Vol 42, No.11.

strategies to promote these foods and drinks to students. This idea could be more widely implemented to further the reach of the program.

4.4.3 Recommendations

12. Consider promoting the social and mental health promoting aspects of the Challenge to partner agencies.

5. Recommendations summary

5.1 Profile of participants and teams

1. Explore strategies to encourage more men to participate in future Challenges.
2. Encourage teams to use a broad suite of recruitment strategies and promotional messages that appeal to different segments of the target population.

5.2 Implementing the Challenge and program participation

3. Retain the Challenge implementation model. Review and adapt those components that were less successful.
4. Consider ways to improve teams' access to training opportunities and facilities, and to health professionals.
5. Consider ways to assist team managers to maintain team motivation during and after the Challenge, such as the Get Healthy Information and Coaching Service.
6. Consider ways to use the Challenge to facilitate wider community involvement in weight loss or other health promoting activities.

5.3 Program impact

7. Continue the Knockout Health Challenge as a healthy lifestyle intervention.
8. Increase the consistency and scope of the nutrition education element of the intervention.
9. Educate team managers and participants about the importance of group training for achieving and maintaining weight loss.
10. Encourage team managers and participants to continue healthy lifestyle activities after the Challenge, whether through formal or informal maintenance activities.
11. Consider the merits of including smoking cessation in an explicit way in future Knockout Health Challenges.

5.4 Participants' perception of impacts

12. Consider promoting the social and mental health promoting aspects of the Challenge to partner agencies.

Appendices

Appendix 1: Comparison of participant characteristics with general population

This table compares participant characteristics at each of the four time points, and provides comparison data for the general Aboriginal and Torres Strait Islander population in either NSW or Australia. Where NSW prevalence data are available this has been used.

Table 31. Participant characteristics by sources of information

	Start of Challenge Data Collection	End of Challenge Data Collection	Telephone Survey at 5 months after Challenge	Weight Form Data at 5 months after Challenge	Telephone Survey at 9 months after Challenge	NSW Aboriginal population figures
Number	n=576	n=379	n=271	n=76	N=195	
Median age	39 years	40 years	42 years	47 years	42 years	21 years†
Gender	72% female	74% female	75% female	78% female	77% female	51% female†
BMI over 25	94.3%	93.9%	94.8%	94.7%	93.5%	57%*
Type 2 diabetes	16%	16%	18%	32%	17%	13.1 %**
High cholesterol	15%	16%	17%	25%	22%	2%*
High blood pressure	25%	24%	26%	35%	26%	31%‡
Unstable asthma	6%	6%	6%	8%	11%	23%*
Inadequate daily fruit consumption	53%	52%	57%	49%	33%	56%*
Inadequate daily vegetable consumption	92%	91%	91%	92%	93%	94%*
Daily smoker	29%	28%	27%		19.5%	50%*
Self-assessed health status		-	n=267	n=62	N=195	
Excellent/ Very Good			38%	44%	34%	39%*
Good			40%	39%	39%	34%*
Fair			19%	15%	21%	19%*
Poor			4%	3%	6%	8%*

* Source: http://www.healthstats.nsw.gov.au/Indicator/beh_bmi_age/beh_bmi_atsi?filter1ValueId=&filter2ValueId: NSW. **Source: http://www.healthstats.nsw.gov.au/Indicator/dia_prev_age/dia_prev_atsi_trend: NSW data.
† Source: 2011 Census data, ABS: NSW. ‡ Source: NSW Adult Population Health Survey Data for 2011 on http://www.healthstats.nsw.gov.au/Indicator/cvd_bp_age/cvd_bp_atsi_trend;

Appendix 2: Weight results by team

Table 32. End of the Challenge (T2): weight results by team

New Team ID	N	Average weight T1 (kg)	Average weight T2 (kg)	Average % weight loss per participant	Average BMI T1 (kg/m2)	Average BMI T2 (kg/m2)	Mean BMI change(kg /m2)	Mean BMI change paired t-test results
1	20	83.6 (SD 17.55)	83.3 (SD 17.04)	-.21 (SD 3.40)	30.49 (SD 5.41)	30.41 (SD 5.44)	-0.08 (SD 0.94)	t=0.36 df=19 p=.725 95%CI -0.37 to 0.518
2	21	88.6 (SD 17.26)	86.3 (SD 16.20)	-2.35 (SD 4.14)	32.09 (SD 5.90)	31.29 (SD 5.61)	-0.80 (SD 1.42)	t=2.58 df=20 p=.018 95%CI 0.15 to 1.45
3	24	97.4 (SD 18.98)	94 (SD 17.77)	-3.18 (SD 5.16)	36.41 (SD 6.84)	35.09 (SD 6.07)	-1.32 (SD 2.06)	t=3.14 df=23 p=.005 95%CI 0.45 to 2.19
4	15	95.2 (SD 20.33)	92.3 (SD 17.95)	-2.64 (SD 3.96)	36.18 (SD 7.49)	35.08 (SD 6.74)	-1.11 (SD 1.54)	t=2.79 df=14 p=.015 95%CI 0.25 to 1.96
5	19	109.7 (SD 24.73)	104.3 (SD 25.05)	-5.01 (SD 4.77)	41.21 (SD 8.44)	39.21 (SD 8.80)	-2.00 (SD 2.23)	t=3.91 df=18 p=.001 95%CI 0.93 to 3.07
6	20	96.1 (SD 16.27)	95.7 (SD 17.08)	-.63 (SD 2.37)	34.76 (SD 4.73)	34.55 (SD 4.86)	-0.21 (SD 0.80)	t=1.17 df=19 p=.255 95%CI -0.17 to 0.59
7	4	112 (SD 28.29)	113.3 (SD 30.73)	.76 (SD 3.91)	35.94 (SD 6.75)	36.33 (SD 7.71)	.40 (SD 1.43)	t=-0.55 df=3 p=.619 95%CI -2.67 to 1.88
8	18	94.9 (SD 24.12)	93.9 (SD 23.91)	-.93 (SD 5.11)	35.63 (SD 7.64)	35.24 (SD 7.51)	-0.39 (SD 1.84)	t=0.89 df=17 p=.388 95%CI -0.53 to 1.30
9	18	89.1 (SD 14.37)	88.9 (SD 15.45)	-.35 (SD 4.23)	31.88 (SD 4.38)	31.78 (SD 4.67)	-.09 (SD 1.40)	t=0.29 df=17 p=.778 95%CI -0.60 to 0.79
10	16	93.4 (SD 19.60)	93.8 (SD 19.56)	.47 (SD 3.66)	36.01 (SD 6.27)	36.12 (SD 6.13)	0.10 (SD 1.23)	t=-0.34 df=15 p=.742 95%CI -0.76 to 0.55
11	21	102.9 (SD 20.24)	101.5 (SD 20.32)	-1.39 (SD 2.94)	37.41 (SD 6.40)	36.90 (SD 6.54)	-0.51 (SD 1.15)	t=2.01 df=20 p=0.58 95%CI -0.02 to 1.03
12	23	97 (SD 22.70)	95.7 (SD 23.55)	-1.39 (SD 3.64)	34.08 (SD 12.37)	33.78 (SD 13.54)	-0.29 (SD 1.60)	t=0.88 df=22 p=.389 95%CI -0.40 to 0.99
13	20	96.3 (SD 18.00)	94.3 (SD 18.20)	-2.20 (SD 2.89)	35.84 (SD 7.23)	35.08 (SD 7.17)	-0.76 (SD 0.93)	t=3.65 df=19 p=.002 95%CI 0.33 to 1.20
14	27	104.9 (SD 20.73)	96.5 (SD 20.77)	-8.01 (SD 6.22)	39.16 (SD 8.21)	35.96 (SD 7.78)	-3.20 (SD 2.57)	t=6.49 df=26 p<.001 95%CI 2.19 to 4.22
16	-	-	-	-	-	-	-	-
15	11	88.2 (SD 19.32)	89 (SD 18.78)	1.14 (SD4.19)	33.05 (SD 5.06)	33.39 (SD 4.93)	0.35 (SD 1.93)	t=-.83 df=10 p=.427 95%CI -1.28 to 0.56
17	22	95.9 (SD 13.41)	92.7 (SD 13.40)	-3.37 (SD 3.57)	33.98 (SD 4.02)	32.82 (SD 3.88)	-1.17 (SD 1.29)	t=4.25 df=21 p<.001 95%CI 0.60 to 1.74

New Team ID	N	Average weight T1 (kg)	Average weight T2 (kg)	Average % weight loss per participant	Average BMI T1 (kg/m2)	Average BMI T2 (kg/m2)	Mean BMI change(kg /m2)	Mean BMI change paired t-test results
18	19	108.6 (SD 23.67)	106.8 (SD 24.00)	-1.74 (SD 4.03)	39.42 (SD 7.68)	38.75 (SD 7.80)	-0.67 (SD 1.56)	t=1.88 df=18 p=.076 95%CI -0.08 to 1.42
19	22	85.9 (SD 15.33)	83.5 (SD 15.13)	-2.71 (SD 4.43)	30.24 (SD 5.00)	29.36 (SD 4.66)	-0.88 (SD 1.30)	t=3.20 df=21 p=.004 95%CI 0.31 to 1.46
20	-	-	-	-	-	-	-	-
21	19	116 (SD 19.65)	113.4 (SD 20.64)	-2.40 (SD 3.31)	40.76 (SD 7.02)	39.79 (SD 7.12)	-0.97 (SD 1.44)	t=2.93 df=18 p=.009 95%CI 0.27 to 1.66
22	18	95.3 (SD 19.54)	93.3 (SD 20.39)	-2.21 (SD 4.50)	34.27 (SD 6.65)	33.60 (SD 7.15)	-0.67 (SD 1.43)	t=2.00 df=17 p=.062 95%CI -0.04 to 1.38

Note: No data available for Teams ID 16 and 20; Team IDs have been randomly allocated; N= number in team for whom data is available.

Table 33. Five months after Challenge (T3): weight results by team

New Team ID	N	Average weight T2 (kg)	Average weight T3 (kg)	Average % weight loss per participant	Average BMI T2 (kg/m2)	Average BMI T3 (kg/m2)	Mean BMI change(kg /m2)	Mean BMI change paired t-test results
1	12	89.83 (SD 17.53)	88.31 (SD 21.04)	-1.63 (SD 12.04)	32.75 (SD 5.69)	32.22 (SD 7.30)	-0.53 (SD 4.39)	t=0.42 df=11 p=0.684 95%CI -2.26 to 3.32
2	7	84.30 (SD 11.99)	84.00 (SD 13.75)	-.54 (SD 4.44)	33.05 (SD 5.26)	33.03 (SD 6.70)	-0.02 (SD 1.69)	t=0.03 df=6 p=0.975 95%CI -1.54 to 1.58
3	8	92.09 (SD 14.39)	90.88 (SD 11.91)	-.92 (SD 5.18)	33.74 (SD 4.85)	33.37 (SD 4.71)	-0.36 (SD 1.95)	t=0.53 df=7 p=0.614 95%CI -1.26 to 1.99
4	8	90.10 (SD 17.59)	89.46 (SD 20.63)	-1.29 (SD 3.99)	35.77 (SD 7.98)	35.54 (SD 9.09)	-0.23 (SD 1.29)	t=0.51 df=7 p=0.626 95%CI -0.85 to 1.32
5	10	98.71 (SD 12.93)	98.40 (SD 13.69)	-.09 (SD 8.18)	37.09 (SD 4.99)	37.02 (SD 5.64)	-0.08 (SD 3.29)	t=0.07 df=9 p=0.943 95%CI -2.27 to 2.43
6	11	96.81 (SD 19.17)	95.08 (SD 16.82)	-1.35 (SD 5.27)	35.43 (SD 5.33)	34.93 (SD 5.47)	-0.50 (SD 1.86)	t=0.89 df=10 p=0.396 95%CI -0.75 to 1.75
7	3	108.90 (SD 36.10)	109.00 (SD 32.22)	6.40 (SD 42.90)	35.01 (SD 8.86)	35.99 (SD 11.42)	0.98 (SD 12.55)	t=-0.14 df=2 p=0.905 95%CI -32.16 to 30.20
8	12	96.25 (SD 24.58)	94.04 (SD 22.48)	-1.86 (SD 3.88)	34.34 (SD 7.55)	33.61 (SD 7.02)	-0.73 (SD 1.31)	t=1.92 df=11 p=0.081 95%CI -0.11 to 1.56
9	11	86.49 (SD 14.72)	85.43 (SD 13.45)	-.96 (SD 3.39)	31.43 (SD 4.58)	31.08 (SD 4.33)	-0.35 (SD 1.07)	t=1.09 df=10 p=0.302 95%CI -0.37 to 1.07
10	5	88.84 (SD 6.61)	89.38 (SD 6.61)	.65 (SD 2.86)	34.89 (SD 4.30)	35.09 (SD 4.26)	0.20 (SD 0.98)	t=-0.45 df=4 p=0.678 95%CI -1.42 to 1.03

New Team ID	N	Average weight T2 (kg)	Average weight T3 (kg)	Average % weight loss per participant	Average BMI T2 (kg/m2)	Average BMI T3 (kg/m2)	Mean BMI change(kg /m2)	Mean BMI change paired t-test results
11	13	98.48 (SD 20.65)	97.48 (SD 20.71)	-1.04 (SD 4.01)	36.33 (SD 7.30)	35.86 (SD 6.65)	-0.47 (SD 1.56)	t=1.08 df=12 p=0.301 95%CI -0.48 to 1.41
12	11	101.52 (SD 28.19)	92.65 (SD 17.59)	-6.42 (SD 11.39)	37.98 (SD 18.84)	33.80 (SD 9.66)	-4.18 (SD 9.65)	t=1.44 df=10 p=0.182 95%CI -2.31 to 10.66
13	7	97.59 (SD 16.31)	93.00 (SD 15.30)	-4.35 (SD 7.29)	38.55 (SD 5.86)	36.84 (SD 6.30)	-1.71 (SD 2.98)	t=1.52 df=6 p=0.180 95%CI -1.05 to 4.46
14	14	100.06 (SD 17.43)	99.69 (SD 14.73)	.11 (SD 5.48)	37.57 (SD 6.60)	37.47 (SD 5.82)	-0.10 (SD 2.03)	t=0.18 df=13 p=0.859 95%CI -1.08 to 1.27
15	7	95.59 (SD 19.50)	94.49 (SD 18.70)	-1.06 (SD 1.66)	34.89 (SD 5.25)	34.52 (SD 5.24)	-0.37 (SD 0.63)	t=1.56 df=6 p=0.170 95%CI -0.21 to 0.95
16	-	-	-	-	-	-	-	-
17	14	94.41 (SD 13.79)	95.46 (SD 10.41)	1.71 (SD 6.15)	33.21 (SD 4.19)	33.66 (SD 3.59)	0.45 (SD 1.98)	t=-0.84 df=13 p=0.416 95%CI -1.59 to 0.70
18	12	103.14 (SD 21.14)	97.42 (SD 18.88)	-5.06 (SD 6.78)	38.64 (SD 7.37)	36.47 (SD 6.18)	-2.18 (SD 3.29)	t=2.30 df=11 p=0.042 95%CI 0.09 to 4.27
19	13	88.63 (SD 15.63)	87.43 (SD 12.71)	-.79 (SD 5.81)	30.03 (SD 5.52)	29.64 (SD 4.76)	-0.39 (SD 2.03)	t=0.69 df=12 p=0.503 95%CI -0.84 to 1.62
20	-	-	-	-	-	-	-	-
21	11	110.81 (SD 18.87)	107.59 (SD 14.58)	-2.40 (SD 5.09)	39.63 (SD 6.63)	38.51 (SD 5.22)	-1.12 (SD 2.41)	t=1.54 df=10 p=0.155 95%CI -0.50 to 2.73
22	9	89.86 (SD 22.46)	91.08 (SD 23.49)	1.24 (SD 2.28)	33.25 (SD 7.86)	33.70 (SD 8.16)	0.44 (SD 0.76)	t=-1.76 df=8 p=0.117 95%CI -1.03 to 0.14

Note: No data available for Teams ID 16 and 20; Team IDs have been randomly allocated; N= number in team for whom data is available.

Table 34. Nine months after Challenge (T4): weight results by team

New Team ID	N	Average weight T3 (kg)	Average weight T4 (kg)	Average % weight loss per participant	Average BMI T3 (kg/m2)	Average BMI T4 (kg/m2)	Mean BMI change (kg/m2)	Mean BMI change paired t-test results
1	9	82.36 (SD 21.13)	82.33 (SD 18.17)	1.5 (SD 17.21)	31.08 (SD 8.14)	31.04 (SD 6.83)	-0.05 (SD 4.41)	t=0.03 df=8 p=0.975 95%CI -3.34 to 3.44
2	6	78.83 (SD 11.6)	81.33 (SD 11.86)	3.25 (SD 3.11)	29.33 (SD 2.45)	30.28 (SD 2.62)	0.95 (SD 0.89)	t=-2.6 df=5 p=0.048 95%CI -1.88 to -0.01
3	7	91 (SD 12.86)	94 (SD 15.34)	3.01 (SD 4.06)	33.64 (SD 5.02)	34.75 (SD 5.95)	1.11 (SD 1.39)	t=-2.12 df=6 p=0.078 95%CI -2.4 to 0.17

New Team ID	N	Average weight T3 (kg)	Average weight T4 (kg)	Average % weight loss per participant	Average BMI T3 (kg/m2)	Average BMI T4 (kg/m2)	Mean BMI change (kg/m2)	Mean BMI change paired t-test results
4	8	87.51 (SD 18.18)	88.63 (SD 16.92)	1.63 (SD 4.89)	33.87 (SD 8.77)	34.26 (SD 8.19)	0.38 (SD 1.49)	t=-0.73 df=7 p=0.489 95%CI -1.63 to 0.86
5	11	96.9 (SD 10.67)	97.64 (SD 11.22)	0.87 (SD 6.06)	36.67 (SD 5.12)	36.89 (SD 4.64)	0.21 (SD 2.15)	t=-0.33 df=10 p=0.75 95%CI -1.65 to 1.23
6	9	104.82 (SD 27.25)	110.56 (SD 23.84)	7.56 (SD 14.59)	37.72 (SD 7.56)	39.87 (SD 5.65)	2.15 (SD 3.82)	t=-1.69 df=8 p=0.13 95%CI -5.09 to 0.79
7	11	100.54 (SD 32.01)	102.36 (SD 26.39)	4.2 (SD 16.38)	37.95 (SD 12.29)	38.31 (SD 8.82)	0.36 (SD 5.19)	t=-0.23 df=10 p=0.823 95%CI -3.85 to 3.13
8	10	93.45 (SD 21.37)	91 (SD 20.17)	-2.19 (SD 8.34)	33.25 (SD 5.98)	32.58 (SD 6.59)	-0.67 (SD 2.47)	t=0.86 df=9 p=0.412 95%CI -1.1 to 2.44
9	9	87.53 (SD 11.15)	86.33 (SD 10.9)	-1.23 (SD 4.78)	32.79 (SD 4.87)	32.41 (SD 5.34)	-0.38 (SD 1.44)	t=0.78 df=8 p=0.457 95%CI -0.73 to 1.48
10	5	86.78 (SD 6.24)	79.8 (SD 9.58)	-7.6 (SD 12.98)	32.48 (SD 3.24)	29.76 (SD 3.17)	-2.72 (SD 4.81)	t=1.27 df=4 p=0.275 95%CI -3.25 to 8.69
11	10	93.73 (SD 22.97)	96.2 (SD 23.72)	2.76 (SD 4.31)	35.85 (SD 8.3)	36.79 (SD 8.59)	0.95 (SD 1.47)	t=-2.03 df=9 p=0.072 95%CI -2 to 0.11
12	7	97.49 (SD 19.52)	103.29 (SD 26.88)	5.05 (SD 10.59)	32.59 (SD 4.29)	34.31 (SD 6.08)	1.72 (SD 3.46)	t=-1.32 df=6 p=0.236 95%CI -4.92 to 1.48
13	9	101.78 (SD 24.35)	108.78 (SD 23.76)	7.91 (SD 14.08)	37.48 (SD 7.61)	40.2 (SD 8.12)	2.72 (SD 5.1)	t=-1.6 df=8 p=0.148 95%CI -6.64 to 1.2
14	8	102.2 (SD 16.89)	109.38 (SD 22.23)	7.21 (SD 15.24)	38.63 (SD 7.56)	41.44 (SD 10.08)	2.81 (SD 5.95)	t=-1.34 df=7 p=0.223 95%CI -7.79 to 2.16
15	6	89.73 (SD 23.15)	89.83 (SD 24.8)	-0.12 (SD 5.56)	32.76 (SD 6.55)	32.82 (SD 7.31)	0.06 (SD 1.59)	t=-0.09 df=5 p=0.932 95%CI -1.73 to 1.61
16	-	-	-	-	-	-	-	-
17	6	103.67 (SD 8.85)	104.83 (SD 8.75)	1.19 (SD 3.2)	36.2 (SD 3.15)	36.64 (SD 3.53)	0.44 (SD 1.2)	t=-0.89 df=5 p=0.413 95%CI -1.7 to 0.82
18	7	101 (SD 22.46)	103.71 (SD 24.17)	2.6 (SD 6.66)	36.28 (SD 6.93)	37.16 (SD 6.91)	0.88 (SD 2.3)	t=-1.01 df=6 p=0.35 95%CI -3.01 to 1.25
19	10	86.96 (SD 13.14)	88.9 (SD 18.42)	1.61 (SD 8.45)	30.2 (SD 5.16)	30.82 (SD 6.5)	0.62 (SD 2.6)	t=-0.76 df=9 p=0.47 95%CI -2.48 to 1.24
20	-		-	-	-	-	-	-
21	10	102.2 (SD 17.56)	104.7 (SD 17.26)	2.69 (SD 4.62)	37.92 (SD 9.16)	38.78 (SD 8.76)	0.86 (SD 1.55)	t=-1.75 df=9 p=0.113 95%CI -1.97 to 0.25
22	6	98.48 (SD 22.25)	97.5 (SD 21.5)	-0.93 (SD 0.89)	36.16 (SD 7.36)	35.8 (SD 7.16)	-0.36 (SD 0.36)	t=2.42 df=5 p=0.06 95%CI -0.02 to 0.73

Note: No data available for Team IDs 16 and 20; Team IDs have been randomly allocated; N=number in team for whom data is available.

Appendix 3: Weight form analysis

At T3, weight data was collected in two ways: self-report weight was collected via the Telephone Survey, and objective weight was collected via the Weight Form. This section presents results for participants who provided Weight Form data.

There were differences in weight loss when Weight Form-only Data were disaggregated from self-reported data collected in the 5 month Telephone Survey. On average, weight form-only respondents lost less weight than did Telephone Survey respondents. The differences in patterns of change between these two groups of respondents might relate to group characteristics (with weight form respondents being older on average and having more health conditions) or inaccurate reporting of weight by Telephone Survey respondents.

The average weight of weight form respondents at the start of the Challenge was 94.3kg (SD=19.2, n=63), which decreased to 92.4kg (SD=18.5, n=63) at the end of the Challenge, a mean difference of -1.9kg. The average reported weight of weight form respondents at 5 months after Challenge was 93.1kg (SD=18.7, n=63), a mean difference of +0.7kg from the end of the Challenge. Overall, weight form respondents' reported a mean loss of 1.2kg from the start of the Challenge to 5 months after the end of Challenge. A repeated measures analysis of variance showed there were no significant differences in the mean weights at the three points in time (T1, T2 and T3).

For weight form respondents, the total percentage of body weight loss between the start and end of the Challenge period was 1.9%. Respondents reported a total percentage of body weight gain between the end of the Challenge and 5 months after Challenge of +1.2 per cent body weight. The body weight loss from the start of the Challenge to 5 months after Challenge was 0.7 per cent (significant difference).

At the end of the Challenge, 61.9 per cent of weight form respondents had lost weight. One third of weight form respondents also lost weight from the end of the Challenge to 5 months after Challenge. Overall, 58.7 per cent weight form respondents had lost weight 5 months after Challenge compared to weight at the start of the Challenge, which is considerably fewer respondents in this-sub group compared to all respondents.

For weight form respondents, the proportion of those who lost weight both during the Challenge (T1-T2) and between the end of the Challenge and 5 months after Challenge (T2-T3) was 18 per cent. A much higher proportion (44%) lost weight during the Challenge (T1-T2) but gained weight between the end of the Challenge and 5 months after Challenge (Table 34).

Table 35. Weight Form Data respondents: Changes in weight and BMI at three time points and cumulative change

Measure	n	Time point T1	T2	T3	Cumulative change T1 to T3
Mean waist measurement	55	**110.02 cm** (SD 15.6)	**106.6 cm** (SD 14.5)* significant decrease (T2 vs T1) Large effect size F(1, 54)=14; p<.001 partial η^2=.21^&	**108.2 cm** (SD15.1)	**-1.8cm*** significant difference Medium effect size F(2, 108)=23; p=.004 partial η^2=.01
Mean Weight	63	**94.3 kg** (SD 19.2)	**92.4 kg** (SD 18.5)	**93.1 kg** (SD 18.7)	**-1.2 kg** (T3 vs T1)
Mean BMI	63	**35.1 kg/m²** (SD 6.9)	**34.3 kg/m²** (SD 6.6)	**34.7 kg/m²** (SD 7.1)	**-0.4 kg/m²** (T3 vs T1)
Mean proportion of total body weight change	63		**-1.9%** (SD 4.1)*significant difference in % body weight lost, (T1 to T2) vs (T2 to T3) Medium effect size F(1, 62)=5.1; p=.028 partial η^2=.08^&	**+ 1.2%** (SD 10)	**- 0.7%** (SD 10.6)
Proportion respondents lost weight	63		**61.9% lost weight** T1 to T2 Significant difference in % losing weight (T1 to T2) vs (T2 to T3) $X^2(1)$=7.6; p=.006	**33.3% lost weight** T2 to T3	**58.7% lost weight** T1 to T3

* Change statistically significant. N/A=data not available. ^ results differed significantly by team (Interaction); & planned contrast

Table 36. Weight Form Data respondents: Pattern in weight loss over time

Kinds of weight loss experienced	Returned weight form (N=76)
	Per cent
Lost weight in Challenge and maintenance	18%
Lost weight in Challenge same weight in maintenance	0%
Lost weight in Challenge gained weight in maintenance	44%
Same weight in Challenge lost weight in maintenance	0%
Same weight in Challenge same weight in maintenance	2%
Same weight in Challenge gained weight in maintenance	3%
Gained weight in Challenge lost weight in maintenance	16%
Gained weight in Challenge gained weight in maintenance	18%
Total	100%

Appendix 4: Additional data tables for physical activity at T3 and T4

Table 37. How many times a week do you usually ...

	5 month		9 month	
... do 20 minutes or more of vigorous-intensity physical activity?	**Number**	**Per cent**	**Number**	**Per cent**
3 or more times a week	99	36.9%	100	51.3%
1 to 2 times a week	95	35.4%	60	30.8%
None	74	27.6%	35	17.9%
Total	268	100%	195	100%

... 30 minutes or more of walking?	**Number**	**Per cent**	Number	Per cent
5 or more times a week	69	25.5%	54	27.7%
3 to 4 times a week	45	16.6%	49	25.1%
1 to 2 times a week	112	41.3%	70	35.9%
None	45	16.6%	22	11.3%
Total	271	100%	195	100%

... do 30 minutes or more of moderate-intensity physical activity?	**Number**	**Per cent**	Number	Per cent
5 or more times a week	22	8.1%	27	13.9%
3 to 4 times a week	52	19.3%	60	30.9%
1 to 2 times a week	113	41.9%	64	33.0%
None	83	30.7%	43	22.2%
Total	270	100%	194	100%

Table 38. Types of activities participated in during the Challenge

Activity	Per cent participated
Monthly weigh-ins	87%
Team training sessions	86%
Individual training sessions	83%
GP/ AMS/ Nurse visits	78%
Team meetings	73%
Dietitian consultations	58%
Facebook posting	36%
Contacted the Get Healthy Information & Coaching Service (ever)*	16%
Any other	2%

*Amongst those who contacted Get Healthy Information and Coaching Service during the Challenge, 34% did so before the Challenge, 43% during and 23% after Challenge (in the maintenance period)
*Maintenance strategies: 30% Follow-up participants in Pedometer Challenge and 20% in the Carnival.

Table 39. Frequency of participation in Challenge activities

How often did you participate	Number	Per cent
I participated in the Challenge every week	97	36%
I participated in the Challenge on most weeks	77	28%
I participated in the Challenge only in some weeks	70	26%
I was not very involved other than signing up	27	10%
Total	271	100%

Source: Telephone Survey 5 months after Challenge.

Appendix 5: Tables and figures for participants with complete data sets

Table 40. Body composition for participants with complete data sets

Measure	N	Outcome and SD at each time point during evaluation			
		T1 (SD)	T2 (SD)	T3 (SD)	T4 (SD)
Mean weight (kg)	123	97.87 (20.16)	95.74 (19.53)	93.58 (18.29)	95.57 (20.26)
Mean BMI (kg/m^2)	123	35.75 (6.68)	34.95 (6.26)	34.23 (6.25)	34.93 (6.85)
Mean waist circumference (cm)	352	112.12 (15.53)	108.39 (15.37)		

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

Table 41. Change in body composition for participants with complete data sets

Comparison time points	Change in mean weight (95% CI)	Change in mean BMI (95% CI)	Mean % total body weight lost (95% CI)	% respondents that lost weight (95% CI)	Change in mean waist circumf. (95% CI)
	N=123	N=123	N=123	N=123	N=352
T1-T2	**-2.12**[52]* (-2.97, -1.28)	**-0.8**[53]* (-1.12, -0.48)	-1.96% (-2.78, -1.13)	65.9% (56.8, 74.2)	**-3.73**[54]* (-4.49, -2.97)
T1-T3	**-4.29**[55]* (-5.72, -2.85)	**-1.52**[56]* (-2.03, -1.01)	-3.83% (-5.15, -2.52)	75.6% (67, 82.9)	
T1-T4	**-2.3**[57]* (-3.49, -1.1)	**-0.82**[58]* (-1.28, -0.37)	-2.21% (-3.39, -1.03)	62.6% (53.4, 71.2)	
T2-T3	**-2.16**[59]* (-3.41, -0.91)	**-0.72**[60]* (-1.15, -0.29)	-1.88% (-3.04, -0.71)	60.2% (50.9, 68.9)	
T2-T4	-0.17 (-1.32, 0.97)	-0.02 (-0.46, 0.41)	-0.15% (-1.33, 1.03)	45.5% (36.5, 54.8)	
T3-T4	**+1.99**[61]* (3.60, -0.38)	**+0.7**[62]* (0.12, 1.28)	+2.24% (0.43, 4.05)	49.6% (40.5, 58.8)	

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[52] Linear Mixed Modelling: $F(1,122)=24.760$, $p<0.001$.
[53] Linear Mixed Modelling: $F(1,122)=25.16$, $p<0.001$.
[54] Linear Mixed Modelling: $F(1,358)=99.99$, $p<0.001$.
[55] Linear Mixed Modelling: $F(1,122)=34.878$, $p<0.001$.
[56] Linear Mixed Modelling: $F(1,122)=35.45$, $p<0.001$.
[57] Linear Mixed Modelling: $F(1,122)=14.443$, $p<0.001$.
[58] Linear Mixed Modelling: $F(1,122)=12.76$, $p=0.001$.
[59] Linear Mixed Modelling: $F(1,122)=11.686$, $p=0.001$.
[60] Linear Mixed Modelling: $F(1,122)=10.90$, $p=0.001$.
[61] Linear Mixed Modelling: $F(1,122)=6.016$, $p=0.016$.
[62] Linear Mixed Modelling: $F(1,122)=5.62$, $p=0.019$.

Figure 3. Mean BMI at four points in time for participants with data at all points, N=123

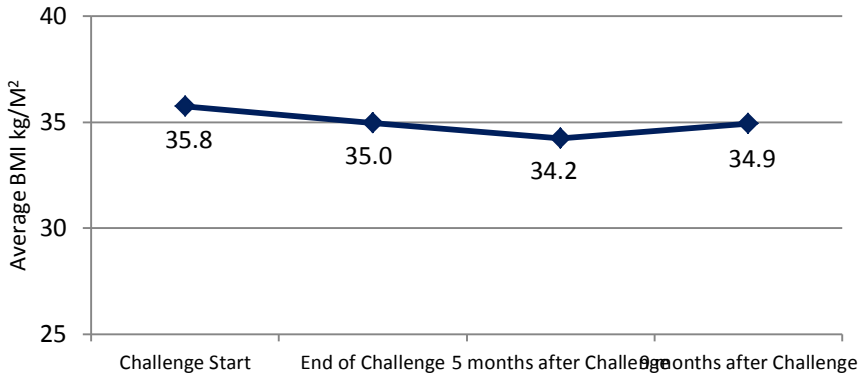


Table 42. Physical activity for participants with complete data sets

Measure	N	Outcome and SD at each time point during evaluation			
		T1 (SD)	T2 (SD)	T3 (SD)	T4 (SD)
Mean number of days active for >30mins	109	2.01 (1.83)	2.86 (1.87)	2.71 (2.16)	2.44 (1.84)
% respondents sufficiently active – 1 question	109	10.1% (3%)	16.5% (4%)	20.2% (4%)	14.7% (4%)
% respondents sufficiently active – 3 questions	179			71.5% (3%)	79.3% (3%)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

Table 43. Change in physical activity for participants with complete data sets

Comparison time points	Change in mean number of days active for >30mins (95% CI)	Change in % respondents sufficiently active – 1 question (95% CI)	% respondents that increased number of days active (95% CI)	Change in % respondents sufficiently active – 3 questions (95% CI)
	N=109	N=109	N=109	N=179
T1-T2	**0.85**[63]* (0.4, 1.3)	6.4% (2.6, 12.8)	52.3% (42.5, 61.9)	
T1-T3	**0.69**[64]* (0.26, 1.13)	**10.1**[65]%* (5.1, 17.3)	42.2% (32.8, 52)	
T1-T4	0.43 (-0.01, 0.86)	4.6% (1.5, 10.4)	42.2% (32.8, 52)	
T2-T3	-0.16 (-0.64, 0.33)	3.7% (1, 9.1)	32.1% (23.5, 41.7)	
T2-T4	-0.42 (-0.88, 0.04)	-1.8% (-6.5, -0.2,)	35.8% (26.8, 45.5)	
T3-T4	-0.27 (-0.68, 0.14)	-5.5% (-11.6, -2)	30.3% (21.8, 39.8)	7.8% (4.3, 12.8)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.
95% confidence intervals around proportions calculated using the exact binomial distribution.

Table 44. Diet for participants with complete data sets

Measure	N	Outcome and SD at each time point during evaluation			
		T1 (SD)	T2 (SD)	T3 (SD)	T4 (SD)
Mean number serves of vegetables per day	109	2.55 (1.41)	2.94 (1.43)	2.67 (1.41)	2.44 (1.46)
% eat recommended daily serves of vegetables	109	9.2% (3%)	15.6% (3%)	14.7% (3%)	6.4% (2%)
Mean number serves of fruit per day	109	1.57 (1.04)	1.9 (1.14)	1.94 (1.12)	1.91 (1.04)
% eat recommended daily serves of fruit	109	49.5% (5%)	69.7% (4%)	70.6% (4%)	67.9% (4%)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.
Note: Recommended daily serves of vegetables is calculated on age and gender. Age is used from start of the Challenge.

[63] Linear Mixed Modelling: $F(1,108)=14.12$, $p<0.001$.
[64] Linear Mixed Modelling: $F(1,108)=10.08$, $p=0.002$.
[65] McNemar's Test: $\chi^2=7.843$, $p=0.005$.

Table 45. Change in diet for participants with complete data sets

Comparison time points	Change in mean number daily serves vegetables (95% CI)	Change in % eat recommended daily serves vegetables (95% CI)	% respondents that increased vegetable intake (95% CI)	Change in mean number daily serves fruit (95% CI)	Change in % eat recommended daily serves fruit (95% CI)	% respondents that increased fruit intake (95% CI)
	N=109	N=109	N=109	N=109	N=109	N=109
T1-T2	**0.38**[66]* (0.11, 0.66)	6.4% (2.6, 12.8)	41.3% (31.9, 51.1)	**0.33**[67]* (0.06, 0.59)	**+20.20%**[68]* (13.1, 28.9)	43.1% (33.7, 53)
T1-T3	0.12 (-0.2, 0.44)	5.5% (2, 11.6)	39.4% (30.2, 49.3)	**0.37**[69]* (0.12, 0.62)	**+21.10%**[70]* (13.9, 30)	42.2% (32.8, 52)
T1-T4	-0.11 (-0.41, 0.18)	-2.8% (-7.8, -0.6)	33% (24.3, 42.7)	**0.34**[71]* (0.09, 0.59)	**+18.40%**[72]* (11.6, 26.9)	41.3% (31.9, 51.1)
T2-T3	-0.27 (-0.6, 0.07)	-0.9% (0, 5)	33% (24.3, 42.7)	0.04 (-0.19, 0.27)	0.9% (0, 5)	31.2% (22.7, 40.8)
T2-T4	**-0.49**[73]* (-0.81, -0.18)	**-9.20%**[74]* (-16.2, -4.5)	25.7% (17.8, 34.9)	0.01 (-0.24, 0.26)	-1.8% (-6.5, -0.2)	32.1% (23.5, 41.7)
T3-T4	-0.23 (-0.52, 0.07)	**-8.30%**[75]* (-15.1, -3.8)	27.5% (19.4, 36.9)	-0.03 (-0.23, 0.18)	-2.7% (-7.8, -0.6)	25.7% (17.8, 34.9)

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

[66] Linear Mixed Modelling: $F(1,108)=7.57$, $p=0.007$.
[67] Linear Mixed Modelling: $F(1,108)=5.97$, $p=0.016$.
[68] McNemar's Test: $\chi^2=10.023$, $p=0.002$.
[69] Linear Mixed Modelling: $F(1,108)=8.37$, $p=0.005$.
[70] McNemar's Test: $\chi^2=27.268$, $p<0.001$.
[71] Linear Mixed Modelling: $F(1,108)=7.20$, $p=0.008$.
[72] McNemar's Test: $\chi^2=22.081$, $p<0.001$.
[73] Linear Mixed Modelling: $F(1,108)=9.95$, $p=0.002$.
[74] McNemar's Test: $p=0.021$.
[75] McNemar's Test: $p=0.023$.

Table 46. Smoking and alcohol intake for participants with complete data sets

Measure	N	Outcome and SD at each time point during evaluation			
		T1 (SD)	T2 (SD)	T3 (SD)	T4 (SD)
% smoke daily	107	26.2% (4%)	20.6% (4%)	17.8% (4%)	20.6% (4%)
% smoke occasionally	107	3.7% (2%)	6.5% (2%)	6.5% (2%)	6.5% (2%)
% tried it a few times but never smoked regularly	107	6.5% (2%)	2.8% (2%)	5.6% (2%)	4.7% (2%)
% ex-smoker	107	27.1% (4%)	26.2% (4%)	28% (4%)	27.1% (4%)
% never smoked	107	36.4% (5%)	43.9% (5%)	42.1% (5%)	41.1% (5%)
Mean number of days per week drink alcohol	182			0.53 (1.08)	0.49 (0.94)
Mean number of standard drinks on an alcohol day	39			6.95 (4.73)	6.77 (4.25)

Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge.

Table 47. Change in smoking for participants with complete data sets

Comparison time points	Change in % smoke daily (95% CI)	Change in % smoke occasionally (95% CI)	Change in % ex-smoker (95% CI)	Change in % tried it a few times (95% CI)	Change in % never smoked (95% CI)
	N=107	N=107	N=107	N=107	N=107
T1-T2	-5.6% (-11.8, -2.1)	2.8% (0.6, 8)	-0.9% (-5.1, 0)	-3.7% (-9.3, -1)	7.5% (3.3, 14.2)
T1-T3	**-8.4%**[76]* (-15.4, -3.9)	2.8% (0.6, 8)	0.9% (0, 5.1)	-0.90% (-5.1, 0)	5.7% (2.1, 11.8)
T1-T4	-5.6% (-11.8, -2.1)	2.8% (0.6, 8)	0.0%	-1.8% (-6.6,- 0.2)	4.7% (1.5, 10.6)
T2-T3	-2.8% (-8, -0.6)	0.0%	1.8% (0.2, 6.6)	2.8% (0.6, 8)	-1.80% (-6.6,-0.2)
T2-T4	0.0%	0.0%	0.9% (0, 5.1)	1.9% (0.2, 6.6)	-2.80% (-8, -0.6)
T3-T4	2.8% (0.6, 8)	0.0%	-0.9% (-5.1, 0)	-0.90% (-5.1, 0)	-1.00% (-5.1, 0)

[76] McNemar's Test: p=0.012

**p<0.05* Source: Start of Challenge and end of Challenge forms, Telephone Surveys at 5 months and 9 months after Challenge. Note: Statistical significance not adjusted to accommodate multiple comparisons.

Appendix 6: Measurement tool templates

Form 2 - Knockout Health Challenge

Challenge Team Name: _____

General Practice Details

Contact (please circle): Dr/Practice Nurse	
First Name:	Surname:
Address:	
Phone Number:	Fax Number:
Email	

GENERAL PRACTICE STAMP HERE

Patient Details (please print)

First Name:	Surname:		
Address:			
Preferred Phone Number:	(hm):	(wk):	(mb):
DOB:	Gender: (please tick)	❑ Female	❑ Male

When is the best time and day for the Get Healthy Information and Coaching Service to call? (please tick)

❑ Monday ❑ Tuesday ❑ Wednesday ❑ ❑ Friday

❑ am ❑ pm

Primary Issue for referral:

❑ Healthy eating ❑ Physical activity ❑ Weight Management

Other considerations:

Have you been in hospital in the last 6 months for serious illness or injury?	❑ Yes	❑ N
- Have fully recovered?	❑ Yes	❑ N
Have you had an injury or illness related to the heart, lungs or brain within the last 12 months?	❑ Yes	❑ N
- Have fully recovered?	❑ Yes	❑ N

Have you been diagnosed with or are you currently being treated for:

❑ Type 2 Diabetes ❑ Arrhythmia ❑ High Cholesterol ❑ High Blood Pressure

❑ UnsSectionle Asthma ❑ Emphysema ❑ Mild Stroke ❑ Multiple Sclerosis

❑ Angina/Ischaemic Heart Disease ❑ Neurological disorder (eg Parkinson's Disease)

Do you have a pacemaker or similar?	❑ Yes	❑ N
Do you have any physical conditions or impairments that limit how you are able to be physically active?	❑ Yes	❑ N
Do you have any special dietary requirements?	❑ Yes	❑ N
Are you currently being treated for a mental illness?	❑ Yes	❑ N
- is it currently well managed?	❑ Yes	❑ N
Are there any other reasons why your doctor or practice nurse thinks you should not increase physical activity levels or change your current eating habits?	❑ Yes	❑ N o
Are you over the age of 80 years?	❑ Yes	❑ N
(if female) Are you currently pregnant or breastfeeding?	❑ Yes	❑ N

Waist circumference (current): _____ cm	Weight (current): _____ kg	Height: _____ cm

Which of the following best describe your current smoking status?

❑ Smoke daily ❑ Smoke occasionally ❑ Ex-smoker

❑ I've tried it a few times but never smoked regularly ❑ I've never smoked

In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate. This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of	
How many serves of fruit do you usually eat each day? _____ serves per day	❑ don't eat fruit daily
How many serves of vegeSectionles do you usually eat each day? _____ serves per day	❑ don't eat veg daily

NOTE - Patient Consent and Signature:

❑ I consent to this information being sent to the Get Healthy Information and Coaching Service, and consent for the Service staff to call me at a time that has been suggested on this form.

❑ I understand that the General Practice named above will receive written

Signature: _____ Date: _____

NSW GOVERNMENT Health

get healthy Information & Coaching Service 1300 806 258

GP/Practice Nurse Siganture:

❑ I am monitoring any medical conditions that are detailed above.

Name: _____

Signature: _____

Please provide a copy to your Team Manager who needs to submit your team's forms by Friday 1 March 2013.

NSW Knockout Health Challenge 2013 Evaluation
4 Month Follow-Up Weight Measurement Form

This form is to be completed by your GP or Practice Nurse before December 20, 2013

Part A: To be completed by Challenge Participant:
I agree to have my weight, height, and waist circumference measured for the 2013 Knockout Health Challenge Evaluation on the following basis:

1. I have received the Participant Information Statement and have had the opportunity to ask questions. I understand the purpose of the research and my involvement in it.
2. I have the right to withdraw my consent and cease any further involvement in the research project at any time without giving reasons and without any penalty. This will not affect any services that I receive.
3. Any information I provide during the course of this research will remain confidential. Where the results of the research are published, my involvement and my personal results will not be identified.
4. I understand that if I have any complaints or questions concerning this evaluation I can contact an Associate Researcher, Ms Louise Maher on (02) 9391 9087 or the Executive Officer of the Aboriginal Health and Medical Research Councils Ethics Committee on (02) 9212 4777

Participant: *Name*:…… *Signature* ……..… *Date* ……..……...

Witness: *Name*: ……*Signature* ……..… *Date* ……..……...

Part B: To be completed by General Practitioner or Practice Nurse:
Your patient recently participated in the NSW Knockout Health Challenge 2013 and has agreed to participate in the evaluation of the Challenge, which requires an objective measure of weight, height, and waist circumference taken by a GP or Practice Nurse. Please take these measures, complete this form, and post this from back to us in the return addressed envelope provided. If you have any questions please telephone (TBC- External Evaluation Organisation Representative)

Patient Name:	
Date of Birth:	
WEIGHT (1 decimal point):	
WAIST CIRCUMFERENCE (nearest cm):	
HEIGHT (nearest cm):	
GP / NURSE NAME:	
GP / NURSE SIGNATURE:	
PRACTICE NAME:	
DATE:	

NSW Knockout Health Challenge 2013
Telephone Survey for Challenge Participants

PART 1: INTRODUCTION

Making contact:
Good morning/ afternoon. Can I please speak to _____

(If asked: My name is [INTERVIEWER NAME] calling from McNair Ingenuity Research on behalf of the NSW Ministry of Health about the Knockout Health Challenge Evaluation).

When speaking to participant:
Hello, my name is [INTERVIEWER NAME] calling from McNair Ingenuity Research on behalf of the NSW Ministry of Health about a survey we are conducting with Knockout Health Challenge participants, to assist in the evaluation of the program. .
You may have recently received a letter from the Ministry of Health about this evaluation.
The survey consists of a few questions, mostly about your experiences of participating in the Challenge, and also questions about your current health.
It should only take about ten minutes to complete and your answers are absolutely confidential.

S1. Do you agree to participate in the evaluation? (DNRO/SR)

Yes 1
No ..... 2 TERMINATE

S2. Is now a good time to do the survey? (DNRO/SR)

Yes 1
No 2

[MAKE APPOINTMENT TO CALL BACK IF NECESSARY]

PART 2: SURVEY QUESTIONS

A. Knockout Health Challenge Participation:

Q1. Why did you become involved in the Knockout Health Challenge? (MR) (ROTATE)

To lose weight 1
To get healthy..... 2
To be with my friends and family..... 3
To meet new people..... 4
To have some fun..... 5
Recommended by family or friend……... 6
Recommended by healthcare provider……..... 7
Other (specify)…….9
None of these **(DNRO)**……10

Q2. Which statement best describes your level of participation in the Knockout Health Challenge 2013? (SR)

I participated in the Challenge every week……... 1
I participated in the Challenge on most weeks……..… 2
I participated in the Challenge only in some weeks……... 3
I was not very involved other than signing up……. 4

Q3. Did you participate in any of the following activities as part of the Challenge in 2013? (MR) (ROTATE)

Monthly weigh-ins…….…… 1
Team meetings……..2
Facebook posting……..3
GP/ AMS/ Nurse visits……..4
Dietitian consultations……..5
Challenge Carnival ……...6
Pedometer Challenge …….. 7
Other activities (Specify) ……. 8
None of these **(DNRO)**…… 10

Q4. How often did you participate in team training sessions during the Knockout Health Challenge? (SR)

Multiple times per week…….…… 1
At least once a week……..2
Once every couple of weeks…… 3
Once a month…… 4
Less often than once a month…… 5
Never……... 6
Refusal **(DNRO)** …… 7
Don't know **(DNRO)** …….. 8

Q5. How many times did you train on your own during the Knockout Health Challenge? (SR)

Multiple times per week…….…… 1
At least once a week……..2
Once every couple of weeks…… 3
Once a month…… 4
Less often than once a month…… 5
Never……... 6
Refusal **(DNRO)** …… 7

Don't know **(DNRO)** …….. 8

Q6a. Have you continued to train with your team since the Challenge ended? (SR)

Yes 1
No 2

Q6b. (IF Q6a = 1) Do you train with your team: (SR)

Multiple times per week…… 1
At least once a week……..2
Once every couple of weeks…… 3
Once a month…… 4
Less often than once a month…… 5
Never……... 6
Refusal **(DNRO)** …… 7
Don't know **(DNRO)** …….. 8

Q7a. Have you continued to train on your own since the Challenge ended? (SR)

Yes 1
No 2

Q7b. (IF Q7a = 1) Do you train on your own: (SR)

Multiple times per week…… 1
At least once a week……..2
Once every couple of weeks…… 3
Once a month…… 4
Less often than once a month…… 5
Never……... 6
Refusal **(DNRO)** …… 7
Don't know **(DNRO)** …….. 8

Q8a. Have you ever contacted the Get Healthy Information and Coaching Service? (SR)

Yes 1
No 2

Q8b. (IF Q8a=1) When did you contact the Get Healthy Information and Coaching Service? (SR)

Before the Challenge …… 1
During the Challenge …… 2
After the Challenge (in the maintenance period) ……... 3
Don't know **(DNRO)** ……... 4

Q8c. (IF Q8a=1) What best describes you participation in the Get Healthy Information and Coaching Service? (SR)

I received information only …… 1
I enrolled in the coaching service (but did not commence)…..…… 2
I received some coaching (but did not complete) ……..… 3
I am continuing to receive coaching…… 4
I completed the 6 month coaching service and graduated…….. 5
Don't know **(DNRO)** …….. 6

B. Impact of the Knockout Health Challenge

Q9. Could you please describe some of the major impacts for you from participating in the Knockout Health Challenge? These could be personal or community impacts, and may be positive or negative. [OPEN ENDED - record 3 maximum].

……
……
……

Q10. Have you noticed any of the following personal benefits since taking part in the Knockout Health Challenge?

(**ROTATE**)	**Yes**	**No**	**Don't know (DNRO)**
Improved health (weight loss, fitness, general health)	1	2	3
Improved quality of life (happiness, family life, stress)	1	2	3
Improved knowledge of nutrition and physical activity	1	2	3
Improved confidence to be more physically active	1	2	3
Improved confidence to eat healthy	1	2	3
Change to better diet	1	2	3
Reduced medication use	1	2	3
Improved chronic disease management	1	2	3
Improved smoking habits or quitting smoking	1	2	3
Reduced stress or anxiety levels	1	2	3

Q11. Have you noticed any of the following community benefits as a result of having the Challenge in town?

(**ROTATE**)	**Yes**	**No**	**Don't know (DNRO)**
Improved awareness of health in the community	1	2	3
More community activities occurring	1	2	3
Increase in community pride and connectedness	1	2	3

Q12. Are you aware of any negative effects of the Challenge? (MR) (DNRO)

Physical injuries
Stigma associated with being overweight
Stigma associated with unhealthy behaviours
Community Issues
Other (specify)
None

Q13. During the Challenge, what were the main barriers to achieving your lifestyle goals? (MR) (DNRO)

Feel tired
Feel stressed
Have lots of demands at home/work
Feel depressed
Have been medically unwell
Have physical conditions or limitation preventing doing physical activity
Other factors (specify)
Not aware of any barriers
Don't know
Refused

Q14. Has participating in the Knockout Challenge this year helped you become more aware of, or linked into, your local Aboriginal Medical Service? (SR)

Yes 1
No 2
Don't know **(DNRO)** 3

C. Health status

Q15. Thinking back to before the Knockout Health Challenge, would you say that your health was excellent, very good, good, fair or poor? (SR)

Excellent..... 1
Very good..... 2
Good..... 3
Fair..... 4
Poor.....5
Refusal **(DNRO)** 6
Don't know **(DNRO)**..... 7

Q16. In general, would you say that your current health is excellent, very good, good, fair or poor? (SR)

Excellent..... 1
Very good..... 2
Good..... 3
Fair..... 4
Poor.....5
Refusal **(DNRO)** 6
Don't know **(DNRO)**..... 7

Q17. Have you been diagnosed with or are you currently being treated for…? (MR) (ROTATE)

Type 2 diabetes..... 1
High cholesterol..... 2
High blood pressure..... 3
Unstable asthma..... 4
Emphysema..... 5
Angina/ Ischaemic Heart Disease..... 6
Refusal **(DNRO)** 7
None of these **(DNRO)**..... 8

Q18. Do you have any physical conditions or impairments that limit how you are able to be physically active? (SR)

Yes 1
No 2
Don't know **(DNRO)** 3
Refusal **(DNRO)** 4

Q19. (If Female) Are you currently pregnant or breastfeeding? (SR)

Yes 1
No 2
Refusal **(DNRO)** 3

Q20. What is your current weight (in kgs or pounds)

____ (kgs) or ____ (pounds)

Don't know **(DNRO)** …….. 1
Refusal **(DNRO)** 2

E. Lifestyle

INTERVIEWER READ OUT: *The next few questions are about your recent levels of physical activity.*

Q21. How many times a week do you usually do 20 minutes or more of vigorous-intensity physical activity that makes you sweat or puff and pant? (e.g., heavy lifting, digging, jogging, aerobics or fast bicycling)? (SR)

3 or more times a week…….. 1
1 to 2 times a week……..... 2
None…… 3
Don't know **(DNRO)** …….. 4
Refusal **(DNRO)** 5

Q22. How many times a week do you usually do 30 minutes or more of walking? (e.g., walking from place to place for exercise, leisure or recreation) (SR)

5 or more times a week…….. 1
3 to 4 times a week……..... 2
1 to 2 times a week…….. 3
None…….. 4
Don't know **(DNRO)** …… 5
Refusal **(DNRO)** 6

Q23. How many times a week do you usually do 30 minutes or more of moderate-intensity physical activity that increases your heart rate or makes you breathe harder than normal? (e.g., carrying light loads, bicycling at a regular pace or doubles tennis) (SR)

5 or more times a week…….. 1
3 to 4 times a week……..... 2
1 to 2 times a week…….. 3
None…….. 4
Don't know **(DNRO)** …… 5
Refusal **(DNRO)** 6

INTERVIEWER READ OUT: *The final physical activity question is to get a summary overview for your level of weekly exercise*

Q24. In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate. This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job

____days

Q25. How many serves of fruit do you usually eat each day?

[1 serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces]
___ serves per day (Score 0 = I don't eat fruit daily)

Q26. How many serves of vegetables do you usually eat each day?

[1 serve = one small handful or ½ cup of cooked vegetables or 1 cup of salad vegetables]

___ serves per day (Score 0 = I don't eat veg daily)

Q27. On how many days per week do you usually drink alcohol?

_____Number of days / week

Don't know **(DNRO)** 1
Refusal **(DNRO)** 2

Q28. (If Q27>0) On a day when you drink alcohol, how many standard drinks do you usually have?

[A standard drink is equal to 1 middy of full-strength beer, 1 schooner of light beer, 1 small glass of wine, or 1 pub-sized nip of spirits]

_____Number of drinks

Don't know **(DNRO)** 1
Refusal **(DNRO)** 2

Q29. Which of the following best describes your current smoking status? (SR)

I smoke daily..... 1
I smoke occasionally 2
I am an ex-smoker 3
I've tried it a few times but never smoked regularly..... 4
I've never smoked..... 5
Refusal **(DNRO)** 6

Q30. Did you participate in the Knockout Challenge in 2012? (SR)

PART 3: CONCLUSION

Thank you for giving us your time and answering these questions. This Telephone Survey is the first part of the evaluation. The second component of the evaluation is for you to visit a GP or nurse to have your height, weight and waist circumference measured. Everyone who does this and returns the form will receive a $60 shopping voucher to reimburse you for any costs your may incur.

There was a weight measurement form was in the survey package we mailed to you. Do you have a copy of that form? If no, can I arrange to post one out to you? **(CONFIRM ADDRESS)**
Please take that form and the return envelope to a GP or nurse, who will take your measurements and sign the form. Your GP or nurse can post the form back to us, and then we will send out the shopping voucher.
Do you have any final questions or comments?
Again, I am [INTERVIEWER NAME] from McNair Ingenuity Research, and we assure you that your answers are used only for statistical purposes and cannot be identified back to you. In case my supervisor needs

to check my work, can I just have your first name and check that the phone number I have reached you on is...
Respondent First Name:_____
Respondent Phone No.: _____

If you have any queries you can call us on 1800 669 133. Thank you and good night.

NSW Knockout Challenge 2013, Team Manager Telephone Interview Discussion Guide

A. Introduction (5 mins)

Interviewer will introduce the topic of discussion and explain the process, including how the interview works:

- Relaxed/informal chat
- No right/wrong answers
- Privacy/confidentiality
- Audio-recording
- Any questions

The interviewer will obtain verbal consent from the Team Manager to undertake the interview.

B. Background

1. How did you first hear about the Knockout Challenge?
2. Why did you become involved?
   PROBE: whether Rugby League connection was influential
3. Did you have any concerns about joining the Challenge?
4. Can you explain what your role is as team manager?
5. Are you also a member of the team? How well has this worked?

C. Start-up

I want you to think back to when you were organising a team for the Challenge.

6. Tell me about this process. What did you have to do?
7. What would make this process easier?

D. The weight loss team

8. What aspects of the team worked well? How did this work?
9. What aspects of the team didn't work well? Why was this?
10. How was the team supported by the following organisations?
    - Town committee
    - NRL
    - AMS
    - Ministry of Health
    - Local Health District

E. The Challenge

11. Did your team participate in any of the following components of the Challenge?
    For each of the following, probe strengths and weaknesses:
    - Monthly weigh-ins
    - Team training
    - Team meetings
    - Facebook
    - Community events
    - GP / AMS visits (probe whether participants are more engaged with their local health service)
    - Additional training
    - Dietitian consultations
    - Gym visits
    - Team incentives
    - Challenge Carnival

- Pedometer Challenge
- Other activities

12. What parts of the Challenge were the most helpful to the team? What parts were most helpful to weight loss outcomes?
13. What parts of the Challenge were the least helpful to the team? What parts were least helpful to weight loss outcomes?
14. What else would have been helpful to the team as part of the Challenge? Including services, support, resources.

F. Maintaining the Knockout team since the Challenge ended

15. Has the team continued to do any of the following since the end of the Challenge:
    - Monthly weigh-ins
    - Team training
    - Team meetings
    - Facebook
    - Community events
    - GP/ AMS visits
    - Additional training
    - Dietitian consultations
    - Gym visits
    - Team incentivies
    - Other activities

    If none of the above go to section G

16. Have you kept your role as team manager since the Challenge ended?
    If yes, what has this entailed?

17. Has the town committee stayed together?
    If yes, what has it done?

18. Has it been easy to keep the team together?
    What needed to be done?

19. Do you think the team will stay together over the next 6 months?
    If yes, what will need to be done to keep it together?

20. Have people continued to lose weight?

G. Materials

21. Did your team use any resources during the Challenge?
    - Knockout Challenge pack
    - Knockout Challenge handbook
    - Non-knockout resources – what were they?
    - Locally produced resources – what were they? Can we have a copy?
22. What was most helpful? Why?

H. Additional consequences

23. Have you noticed any positive personal benefits since joining the Challenge?
24. Have there been any positive impacts on the community as a result of having the Challenge in your town? *Probe: community awareness of health, involvement, community initiatives*
25. Have there been any negative impacts on you? If so, what are they?
26. Have there been any negative impacts on your team members? If so, what are they?
27. Have there been any negative impacts on the community? If so, what are they?

I. Other comments

28. Is there anything you would like to add in relation to the Knockout Challenge?

Thank you and close

NSW Knockout Health Challenge 2013
9 Month Telephone Survey for Challenge Participants

PART 1: INTRODUCTION

Making contact:
Good morning/ afternoon. Can I please speak to _____
(If asked: My name is _____ and I am calling on behalf of the NSW Ministry of Health about the Knockout Health Challenge Evaluation).

When speaking to participant:
Hello, my name is _____. I'm calling on behalf of the NSW Ministry of Health about a survey we are currently conducting with participants from the 2013 Knockout Health Challenge, to assist in the evaluation of the program. The evaluation involves a follow up Telephone Survey at 5 months and 9 months after the Challenge concluded - we conducted the 5 months survey last year, and we would now like to invite you to participate in the 9 month survey. The 9 month survey aims to understand if there have been any longer term benefits of the Challenge for participants.

You should have recently received a letter from the Ministry of Health about this evaluation. We are inviting all Challenge participants to complete the 9 month survey, whether or not they participated in the 4 month survey.

The survey consists of a few questions, mostly about exercise, nutrition and health and should only take about ten minutes to complete. If you participate your answers will remain absolutely confidential.

Do you agree to participate in the evaluation? Yes/No
Is now a good time to do the survey? Yes / No

Note to Survey Implementers:

- For those participants who DID NOT complete the 4 month Telephone Survey, ASK ALL SURVEY QUESTIONS from Part 2, Part 3 and Part 4.
- For those participants who DID complete the 4 month Telephone Survey, SKIP PART 2 QUESTIONS, and only ask Part 3 and Part 4 Questions.

Identify through evaluation records: Did the respondent complete the 4 month Telephone Survey?
NO: Go to Part 2
YES: Go to Part 3

PART 2: SURVEY QUESTIONS – Only for Participants who DID NOT complete the 4 month Telephone Survey

A. Knockout Health Challenge Participation:

Q6. Why did you become involved in the Knockout Health Challenge?

a) To lose weight
b) To get healthy
c) To be with my friends and family
d) To meet new people
e) To have some fun
f) Recommended by family or friend
g) Recommended by healthcare provider
h) Other reason

Q7. Which statement best describes your level of participation in the Knockout Health Challenge in 2013 (please tick one)

a) I participated in the Challenge every week __
b) I participated in the Challenge on most weeks __
c) I participated in the Challenge only in some weeks __
d) I was not very involved other than signing up __

Q8. Did you participate in any of the following activities as part of the Challenge in 2013?

a) Monthly weigh-ins Yes__ No__
b) Team meetings Yes__ No__
c) Facebook posting Yes__ No__
d) GP/ AMS/ Nurse visits Yes__ No__
e) Dietitian consultations Yes__ No__
f) Challenge Carnival Yes __ No__
g) Pedometer Challenge Yes No__
h) Other activities _____

Q9. How often did you participate in team training sessions during the Knockout Health Challenge?

a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal
h) Don't know

Q10. How many times did you train on your own during the Knockout Health Challenge?

a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

Q11. After the Challenge was completed until the end of last year, did you continue to train with your team?

Yes__ No___

If yes, did you train with your team:

a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

Q12. After the Challenge was completed until the end of last year, did you continue to train on your own?

Yes No__

If yes, did you train on your own:

a) Multiple times per week
b) At least once a week

c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

B. Impact of the Knockout Health Challenge

Q13. Could you please describe some of the major impacts for you from participating in the Knockout Health Challenge? These could be personal or community impacts, and may be positive or negative. [OPEN ENDED - record 3 maximum].

Q14. During the Challenge, what were the main barriers to achieving your lifestyle goals? [PRECODED RESPONSES. DO NOT READ OUT. Tick yes for any that are mentioned].

a. Feel tired
b. Feel stressed
c. Have lots of demands at home/work
d. Feel depressed
e. Have been medically unwell
f. Have physical conditions or limitation preventing doing physical activity
g. Other factors
h. Not aware of any barriers
i. Don't know
j. Refused

Q15. Has participating in the Knockout Challenge helped you become more aware of, or linked into, your local Aboriginal Medical Service?
Yes /No / Don't Know

C. Health status

Q16. Thinking back to before the Knockout Health Challenge, would you say that your health was excellent, very good, good, fair or poor?

a. Excellent
b. Very good
c. Good
d. Fair
e. Poor
f. Refusal
g. Don't know

Q17. Did you participate in the Knockout Challenge in 2012 Yes__ No__

PART 3: SURVEY QUESTIONS – for ALL PARTICIPANTS

Q18. In general, would you say that your current health is excellent, very good, good, fair or poor?

a. Excellent
b. Very good
c. Good
d. Fair
e. Poor
f. Refusal
g. Don't know

Q19. Have you been diagnosed with or are you currently being treated for:

a. Type 2 diabetes Yes___ No ___
b. High cholesterol Yes___ No ___

c. High blood pressure Yes___ No___
d. Unstable asthma Yes___ No___
e. Emphysema Yes___ No___
f. Angina/ Ischaemic Heart Disease Yes___ No___

Q20. Do you have any physical conditions or impairments that limit how you are able to be physically active? Yes___ No___

Q21. (if female) are you currently pregnant or breastfeeding Yes___ No___

Q22. Is your weight measured regularly, either by yourself or by someone else, for example a doctor or nurse? Yes__ No __

Q23. When was the last time your weight was measured?
a. In the last seven days
b. Between 1 and 2 weeks ago
c. Between 2 and 4 weeks ago
d. Between one and 2 months ago
e. More than 2 months ago
f. I don't remember

Q24. What was your weight last time it was measured? (in kg's or pounds) ____ (kg's) or ____ (pounds)

Q25. Have you enrolled in a team for the Knockout Health Challenge 2014?
Yes
No

If yes ask questions 21 to 24 if no, go to Q25.

Question 21- 25: For those who answered YES to Q20.

Q26. Did you train with your 2013 team since the start of 2014, before the new Challenge started?
Yes__ No___
If yes, did you train with your team:
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

Q27. Since the start of 2014, and before the new Challenge started, did you continue to train on your own?
Yes No__
If yes, did you train on your own:
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never

g) Refusal

Q28. Are you currently training with your 2014 Challenge team?
Yes__ No___
If yes, do you train with your team:
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

Q29. Are you currently training on your own?
Yes__ No___
If yes, do you train on your own99:
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

If questions 21 to 24 were completed go to question 27.

Question 25-26: For those who answered NO to Q20

Q30. Have you continued to train with your team since the start of 2014?
Yes__ No___
If yes, do you train with your team:
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

Q31. Have you continued to train on your own since the start of 2014?
Yes__ No___
If yes, do you train on your own :
a) Multiple times per week
b) At least once a week
c) Once every couple of weeks
d) Once a month
e) Less often than once a month
f) Never
g) Refusal

E. Lifestyle

The next few questions are about your recent levels of physical activity.

Q32. How many times a week do you usually do 20 minutes or more of vigorous-intensity physical activity that makes you sweat or puff and pant? (e.g., heavy lifting, digging, jogging, aerobics or fast bicycling)

a. 3 or more times a week ____
b. 1 to 2 times a week ____
c. None ____

Q33. How many times a week do you usually do 30 minutes or more of walking? (e.g., walking from place to place for exercise, leisure or recreation)

a. 5 or more times a week _____
b. 3 to 4 times a week _____
c. 1 to 2 times a week _____
d. None _____

Q34. How many times a week do you usually do 30 minutes or more of moderate-intensity physical activity that increases your heart rate or makes you breathe harder than normal? (e.g., carrying light loads, bicycling at a regular pace or doubles tennis)

a. 5 or more times a week _____
b. 3 to 4 times a week _____
c. 1 to 2 times a week _____
d. None

The final physical activity question is to get an overview of your level of weekly exercise

Q35. In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate. This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job

____days

Q36. How many serves of fruit do you usually eat each day?
[1 serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces]
___ serves per day (Score 0 = I don't eat fruit daily)

Q37. How many serves of vegetables do you usually eat each day?
[1 serve = one small handful or ½ cup of cooked vegetables or 1 cup of salad vegetables]
___ serves per day (Score 0 = I don't eat veg daily)

Q38. On how many days per week do you usually drink alcohol?
_____Number of days / week OR Refusal OR Don't know

Q39. On a day when you drink alcohol, how many standard drinks do you usually have?
[A standard drink is equal to 1 middy of full-strength beer, 1 schooner of light beer, 1 small glass of wine, or 1 pub-sized nip of spirits}.
_____Number of drinks OR Refusal OR Don't know

Q40. Which of the following best describes your current smoking status?

a. I smoke daily ___
b. I smoke occasionally ___
c. I am an ex-smoker ___

d. I've tried it a few times but never smoked regularly ___
e. I've never smoked ___

F: Long term impact of the Challenge

Q41. Thinking about now, do you think participating in the Knockout Challenge brought you any of the following benefits ? [READ OUT OPTIONS]

a. Improved health (weight loss, fitness, general health) Yes / No / Don't Know
b. Improved quality of life (happiness, family life, stress) Yes / No / Don't Know
c. Improved knowledge of nutrition and physical activity Yes / No / Don't Know
d. Improved confidence to be more physically active Yes / No / Don't Know
e. Improved confidence to eat healthy Yes / No / Don't Know
f. Change to better diet Yes / No / Don't Know
g. Reduced medication use Yes / No / Don't Know
h. Improved chronic disease management Yes / No / Don't Know
i. Improved smoking habits or quitting smoking Yes / No / Don't Know
j. Reduced stress or anxiety levels Yes / No / Don't Know

Q42. Thinking about now, do you think having the Challenge in your town brought about any of the following benefits? [READ OUT OPTIONS]

a) Improved awareness of health in the community Yes / No / Don't Know
b) More community activities occurring Yes / No / Don't Know
c) Increase in community pride and connectedness Yes / No / Don't Know

Q43. Thinking about now, are you aware of any negative effects of the Challenge [PRECODED RESPONSES. DO NOT READ OUT. Tick yes for any that are mentioned].

a) Physical injuries
b) Stigma associated with being overweight
c) Stigma associated with unhealthy behaviours
d) Community Issues
e) Other

Q44. Have you ever contacted the Get Healthy Information and Coaching Service?

Yes___No ____

If yes, continue:

a. When did you contact the Get Healthy Information and Coaching Service?
   i. Before the Challenge ___
   ii. During the Challenge ___
   iii. After the Challenge (in 2013) ___
   iv. After the Challenge (in 2014) ___

b. What best describes your participation in the Get Healthy Information and Coaching Service?
   i. I received information only ___
   ii. I enrolled in the coaching service (but did not commence) ___
   iii. I received some coaching (but did not complete) ___

iv. I am continuing to receive coaching ___
v. I completed the 6 month coaching service and graduated ___

PART 4: CONCLUSION - FOR ALL PARTICIPANTS

Thank you for giving us your time and answering these questions.
Do you have any final questions or comments?
Thank you very much for your time today.

Form 5

NSW Knockout Health Challenge 2013

FINAL WEIGHT RECORD FORM

Congratulations on completing the weight loss challenge!!
To be completed by your GP or Practice Nurse between Friday 28 June and Wednesday 3 July

TEAM NAME:

Name: DOB:

FINISH WEIGHT (1 decimal point)

FINISH WAIST CIRCUM (nearest cm)

Which of the following best describes your current smoking status?

D Smoke daily

D Smoke occasionally

D Ex-smoker

D I've tried it a few times but never smoked regularly

D I've never smoked

In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your breathing rate.

This may include sport, exercise, and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that may be part of your job

_____ days

How many serves of fruit do you usually eat each day?

[1 serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces]

_____ serves per day D don't eat fruit daily

How many serves of vegeSectionles do you usually eat each day?

[1 serve = one small handful or 1/2 cup of cooked vegies or 1 cup of salad vegeSectionles]

_____ serves per day D don't eat veg daily

Practice Nurse/GP Name:

Practice Nurse/GP Signature:

Date:

Please provide a copy to your Team Manager who needs to submit your team's forms by 2pm Wednesday 3 July 2013. Winners will be announced on Monday 8 July 2013.

Forms can be scanned & emailed to: Rachael.Havrlant@aci.health.nsw.gov.au (phone 0429 569 452)

Express post to Rachael Havrlant, Chronic Care for Aboriginal People, Agency for Clinical Innovation, PO Box 699 Chatswood NSW 2057