

Nutrition interventions in the workplace: Evidence of best practice

^a Steyn NP, MPH, PhD ^a Parker W, PhD ^b Lambert EV, PhD ^a Mchiza Z, PhD

^a Knowledge Systems, Human Sciences Research Council, Cape Town ^b Sports Science Institute, Department of Human Biology, University of Cape Town

Correspondence to: Dr NP Steyn, e-mail: npsteyn@hsrc.ac.za

Keywords: workplace intervention; nutrition; physical activity; health promotion

Abstract

Aim: The aim of this desktop study was to review all workplace interventions having a nutrition component, published in peer-reviewed literature between 1995 and 2006 by WHO, and to document activities that were successful, as well as possible barriers to their success.

Methodology: A systematic review of workplace studies revealed 41 interventions, of which 30 complied with the predetermined search criteria. The following outcome measures were considered in the evaluation of the interventions: (i) changes in nutritional knowledge, attitudes, self-efficacy, intentions and stage of change; (ii) changes in dietary behaviours; (iii) changes in clinical/physical markers, such as: body weight or body-mass index (BMI), blood pressure (BP) or serum cholesterol concentrations; and (iv) process and/or policy outcomes.

Results: A large number of diverse workplace interventions were successful in changing outcomes positively in the interventions evaluated. The following were key success factors: i) there was a nutrition and physical activity component; ii) dietitians were involved in nutrition education; iii) changes occurred in the cafeteria/canteen, which increased the availability of healthy food options and advertised them accordingly; iv) tailored feedback on diet (and clinical values) was given to subjects; v) employees were involved in planning and managing programmes; vi) the reduced prices (of healthy food items) in vending machines encouraged employees to buy healthier options; and vii) the stages of change theory was most commonly associated with best practice outcomes.

Conclusions: Numerous workplace interventions have shown significant improvements in employees' health and behaviours. However, it is necessary to plan intervention programmes based on the existing evidence of best practice.

S Afr J Clin Nutr 2009;22(3):111-117

Introduction

Numerous studies have recently promoted the value of health promotion studies in the workplace.¹⁻³ Sorenson et al. cite several reasons for regarding the workplace as an ideal channel for promoting change in large segments of the population.⁴ Firstly it needs to be noted that a large percentage of adults are employed in the formal sector and are hence a captured target group. Secondly, interventions at workplaces can be offered repeatedly, which increases the likelihood of motivating behaviour change in persons who are at various stages of readiness. Thirdly, the workplace is in a position to support individual behaviour change attempts by modifying the social and physical environment. Lastly, workplaces provide access to large numbers of adults, many of whom may not be reached by means of other intervention channels.⁴

Hartman et al. subscribe additional benefits to workplace interventions.⁵ Such interventions include improved employee health, improved morale and increased productivity as reasons for offering such programmes. Additionally, some organisations have reported considerable savings resulting from the implementation of workplace health programmes that result in healthier employees. Another advantage is that follow-up is often easier in the case of workplace interventions than in the case of community-based

programmes. Generally, workplace programmes are less expensive than those offered in the community as a whole.⁵

The aim of this desktop study was to evaluate published data on workplace interventions from studies evaluated by a WHO report: (<http://www.who.int/dietphysicalactivity/summary-report-09.pdf> and the WHO <http://www.who.int/dietphysicalactivity/methods-report-09.pdf> aimed at improving diet and related health in order to identify factors leading to successful interventions and to identify barriers to success. This data will be valuable to organizations who wish to embark on such programs in future.

Methods

Objectives

The primary objective of the present study was to find evidence of effective workplace interventions aimed at preventing chronic diseases of lifestyle. Specific objectives were:

- i) To search for published peer-reviewed articles on workplace interventions in healthy populations
- ii) To evaluate the quality and feasibility of related studies, based on pre-determined criteria
- iii) To develop evidence-based, best practice summaries; and

- iv) To highlight trends, determinants, barriers and conclusions relating to the development and implementation of workplace interventions

Overall search strategy

The methods used for this review are based on the guidelines for finding studies for systematic reviews provided by the Centre for Reviews and Dissemination at the University of York,⁶ the *Schema for Evaluating Evidence for Public Health Interventions: Version 4*,⁷ and a recently published “best practice” review of material relating to the reduction of obesity in children and youth.⁸

Search strategy procedure followed (<http://www.who.int/dietphysicalactivity/methods-report-09.pdf>)

Details of studies published between January 1995 to July 2006, based largely on the schema presented in Table I, were retrieved from the following databases: PUBMED; the Cochrane Library; EMBASE; the National Research Register; the HSRProj database; the CDSR; CRD ongoing reviews; DARE; and Psychological Abstracts (PsycINFO): In the current article, the focus is on the search for nutrition-based interventions.

Table I: Schema for peer-review search strategy for nutritional interventions

Behaviour	Intervention	Objectives	Outcome measure
Nutrition and healthy diet	Intervention	Health	Best practice
Diet*intake	Programme	Health promotion	Effectiveness
Fruit intake	Project	Health behaviour	Environment
Fat intake	Campaign	Health practice	Evaluation
Vegetable intake	Initiative	Health knowledge	Economic evaluation
Diet* habits	Strategy	Health education	Cost-effectiveness
Diet* knowledge		Disease prevention	Decision analysis
Diet* practices			Guideline
Nutrient intake			

Reference: <http://www.who.int/dietphysicalactivity/methods-report-09.pdf>

Types of interventions evaluated

For the purposes of this report, the following interventions were considered:

- Systematic approaches designed to improve dietary habits (e.g. increased fruit and vegetable intake; reduced dietary and, in particular, saturated fat intake, the prevention of obesity, etc.) and/or increase levels of participation in physical activity, with the *specific* aim of reducing the risk of non-communicable diseases;
- Those of the above approaches that included interventions targeting changes in awareness, knowledge and/or attitudes toward nutrition and/or physical activity, and the improvement of self-efficacy, skill or competency concerning such behaviours (with the focus on nutrition); and
- Interventions including programmes or strategies targeting changes in social norms, policy and physical environment, health services or consumer behaviour, etc, leading to, for example, increased consumption of fruits and vegetables;

reduced dietary fat intake; reduced obesity prevalence; and/or increased levels of health-enhancing physical activity.

Outcome measures

The following outcome measures were considered in the evaluation of the various intervention programmes: <http://www.who.int/dietphysicalactivity/methods-report-09.pdf>

- Changes in nutritional knowledge, attitudes, self-efficacy, and intentions, in terms of the stage of change and/or behaviours
- Changes in physical activity (when these were included in the intervention), knowledge, attitudes, self-efficacy, and intentions, in terms of stage of change and/or behaviours
- Changes in clinical markers, such as: body weight or body-mass index (BMI), blood pressure (BP) or serum cholesterol concentrations and
- Process and/or policy outcomes

In addition, factors such as intervention fidelity, sustainability, feasibility, and cost-effectiveness were considered, where measured. Further, programmes demonstrated to be effective in a broader context or in specifically under-resourced settings, were also highlighted.

Quality assessment of peer-reviewed studies for inclusion

Studies were excluded at the initial screening if they did not reflect the intervention strategies or outcomes of interest, as previously described. Subsequently, studies were potentially excluded for any of the following reasons:

- The sample size of the intervention group/s was less than 50.
- The study did not include measurable outcomes.
- The primary outcomes were not related to diet.
- The intervention did not include a dietary component.
- The study was published either prior to 1995, or after June 2006.
- The intervention was not clearly described, and therefore, reviewers were unable to attribute outcomes to dietary intervention strategies.
- The study design was insufficient to draw any meaningful conclusions as to the effectiveness of the intervention approach employed.

Four reviewers (dietitians) conducted the internal review of all the studies. The quality assessment instrument used for the review, which was adapted from Pomerleau et al⁹ enabled the reviewers to evaluate each study with respect to the selection of participants; the study design; data collection methods; intervention integrity; and attrition. All peer-reviewed studies and interventions included in the review received an overall rating of either high, medium or low for quality.

Measures of best practice

The intervention strategies were then evaluated and rated, according to the criteria listed in Table II.

Results

In total, 30 studies met the inclusion criteria.^{1-5, 10-42} Figure 1 summarises the quality ratings of the studies concerned. While

Table II: Criteria for measures of best practice defined by the World Health Organization (WHO): <http://www.who.int/dietphysicalactivity/methods-report-09.pdf>

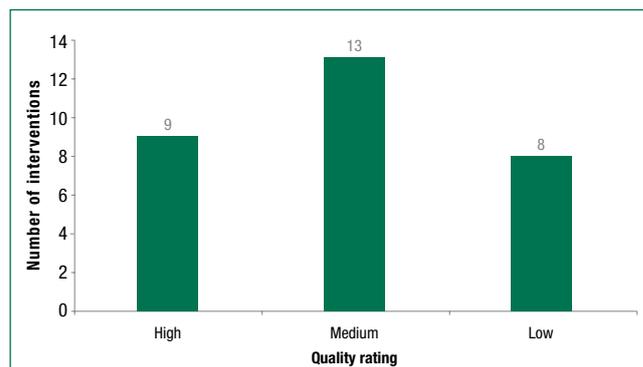
Measure	Criteria
Best practice/most likely to be effective	<ul style="list-style-type: none"> Based on formative assessment Generally robust experimental design Sufficient sample size Significant and substantive effects on specified outcomes Likely to be applicable in a wider variety of settings The meeting of all objectives set The demonstration of feasibility and sustainability in their current setting Consideration as the “gold standard” or “exemplar” for the specific outcome.
Moderately effective	<ul style="list-style-type: none"> Lacking one or other critical components stated above A sufficiently robust study design The meeting of some of the objectives.
Minimally effective	<ul style="list-style-type: none"> Significant, but not clinically relevant, effects in at least one of the outcome areas Sufficiently robust study designs unlikely to yield different or better results through additional testing.
Insufficient evidence/promise	<ul style="list-style-type: none"> Important trend or a significant effect Insufficiently robust in terms of experimental design or sample size Likely to benefit from further testing and research.
Insufficient evidence/Not likely to be effective	<ul style="list-style-type: none"> Weakness in study design Insufficiently remarkable or negative results warranting no further testing or research application.
Shown not to be effective	<ul style="list-style-type: none"> Robust designs yielding negative results or no change
Not reported/Not measured	<ul style="list-style-type: none"> Outcomes not measured, or measured but unreported.

19 of the interventions were undertaken in the USA, three were undertaken in Holland, two in Canada, two in the UK, and one each in India, Denmark, Belgium and New Zealand. The interventions mainly comprised the use of group instruction sessions; information distribution (brochures, videos, and newsletters); restaurant/canteen changes; policy changes; the use of multimedia; and tailored computer programs. A number also made use of a steering committee, which included employees. Table III presents the results of the 12 studies^{1-5,10-22} which had best practice outcomes in one or more of three categories: knowledge and attitudes; behaviour; or clinical markers. Table III further summarises the process or policy implications of each study.

Best practice clinical outcomes

Only two workplace studies were shown to have best practice outcomes in terms of clinical markers.^{1, 5} The first intervention¹ showed a significant cholesterol decrease with a 3.5% intervention effect, while the second intervention⁵ showed a 3.8% decrease in total cholesterol, a 7.8% decrease in LDL-C and a 5.2% increase in HDL-C, with an intervention effect on total cholesterol of -0.22mmol/l. However, as the programme was only evaluated after 8 weeks, it can only be regarded as best practice in the short term. Whereas the

Figure 1: Number of workplace interventions rated as high, medium or low in terms of quality of research (N = 30 from 41 articles on workplace settings)



cost per person for the first intervention programme was USD 50, the second intervention made use of dietitians, so that it would be more expensive.

A similar study, *The Health Risk Appraisal Program*,²⁷ was undertaken in Quebec. Although the Quebec study also comprised cholesterol screening and instruction by a dietitian, it only resulted in moderately effective outcomes. After 20 weeks, no significant clinical differences existed between the intervention and control groups, except for those persons who initially had presented with high cholesterol values. Such similarities between the groups could be attributed to the education component, which consisted of only one session of 20 minutes, compared to the 8 sessions of 30 minutes each held in the previous study.⁵

The *CHIP*²² intervention also produced moderately effective clinical outcomes. Although there were significant differences in blood lipids between the intervention and control groups at 6 months, LDL-C values returned to baseline levels.

Best practice behavioural outcomes

Five studies^{3-4,14-16,18,20,22} can be regarded as best practice in terms of dietary behaviour change. The studies employed various intervention strategies, such as personalised feedback;³ pricing strategies for snacks in vending machines;¹⁸ training programmes for catering staff;²⁰ and educational components, shopping tours and cooking demonstrations.²²

Of the five interventions, only four were cost-effective,^{3-4,14-16,18,20} as they were largely organised and managed by the employees themselves, while the other was costly, as it used medical professionals and dietitians.

Best practice psychosocial outcomes

Six studies presented with best practice psychosocial outcomes. The studies consisted of the *Working Well trial (WWT)*,¹⁰⁻¹³ *The Treatwell 5-a-Day Study*,^{4,14-1} the Low Intensity Nutrition Intervention;² the Changing Risk Factors for Chronic Diseases;¹⁷ the Heart at Work Program;¹⁹ and the Interactive Multi-media Program.²¹

The studies used multi-component intervention strategies, including personalised feedback, group counselling, mass media and multimedia, among others. Two of the studies also reflected moderately effective behavioural outcomes.^{2,17} Four of the studies proved cost-effective and sustainable, as they could be used by

employees on their own.^{4,10-16,21} However, it should be noted that there are considerable costs in developing multimedia strategies, and that such strategies are at risk of becoming outdated quickly. In order to provide conclusive evidence for such studies, long-term results are still required.

The Seattle 5-a-Day Work-Site Project^{34,35} was a multi-component study, which included all the elements for effective behavioural outcomes, but which only reflected moderately effective behavioural outcomes. Such intervention can achieve important health benefits for a large population, because of its potential to reach large numbers and because it can be cost-effective for the employees to take responsibility for the administration of their own programme. The intervention was associated both with increased employee use of the intervention activities and materials, and with the increased intake of fruit and vegetables. Workplaces with average baseline intakes were the most responsive. The National 5-a-Day for Better Health campaign started during this project and, hence, there was a secular trend of increasing fruit and vegetable intake at the control sites, which possibly resulted in smaller increases than were expected.

Interventions that showed best practice in two or three of the outcomes measured

The Treatwell 5-a-Day Study^{4,14-16} undertaken in Massachusetts was the only intervention that successfully reflected both behavioural and psychosocial outcomes. The study had two intervention arms, one including a workplace (only) component, while the other group was exposed to workplace changes, together with a family component.

Elements of success in workplace interventions

Many of the diverse types of interventions described above resulted in improved outcomes. The studies that reflected best practice outcomes had one or more of the following success factors in common:

- The interventions were based on the different stages in the change model.^{3,10-13,17,21}
- The employees were involved in the planning, implementation and management of the programme concerned.^{4, 10-17, 20}
- Dietitians provided nutrition education to the participants.^{2,5,22}
- Changes took place in the cafeteria/canteen to increase the availability of healthy food options^{10-13,17, 19,20}
- Healthier food items in vending machines were preferentially priced.^{18,19}
- Tailored feedback was provided^{2- 4,14-16,19}
- Multi-media was used in the presentation of the programme^{1-2,4-5,10-16,19,21}

Although some key success factors were evident in the interventions that did not reflect best practice outcomes, the authors of such studies either provided reasons for why they were ineffective or provided insufficient evidence to warrant the inclusion of these studies in the current paper. The barriers to such inclusion included the following:

- The units of analysis were inappropriately selected, consisting of self-selected volunteers, rather than worksites²³
- General nutrition education was provided, instead of education tailored to meet the needs of individual target groups²⁴
- The intervention component was of insufficient duration²⁷

- Advice, regarding how to overcome barriers to change, was lacking³³
- Motivation, in terms of feedback on the performance of specific goals, was lacking³³
- The participants lacked commitment and failed to comply fully with the requirements of the programme³⁶

Conclusion

In order to reproduce effective interventions, studies should take cognisance of both the key success factors and the barriers listed above.

Acknowledgements

The authors would like to acknowledge the Medical Research Council, as well as Jacqueline Anderson, for their contribution to this study.

Declaration: No conflict of interest.

References

- Byers T, Mullis R, Anderson J, et al. The costs and effects of a nutritional education program following work-site cholesterol screening. *Am J Public Health* 1995; 85(5):650-655.
- Braeckman L, De Bacquer D, Maes L, De Backer G. Effects of a low-intensity workplace-based nutrition intervention. *Occup Med (Lond)* 1999; 49(8):549-555.
- Armitage CJ, Conner M. Efficacy of a minimal intervention to reduce fat intake. *Soc Sci Med* 2001; 52(10):1517-1524.
- Sorensen G, Stoddard A, Peterson K, et al. Increasing fruit and vegetable consumption through workplaces and families in the Treatwell 5-a-day study. *Am J Public Health* 1999; 89(1):54-60.
- Hartman TJ, Himes JH, McCarthy PR, Kushi LH. Effects of a low-fat, workplace intervention on blood lipids and lipoproteins. *J Occup Environ Med* 1995; 37(6):690-696.
- Centre for Reviews and Dissemination, University of York. Finding studies for systematic reviews: a checklist for researchers. Updated July 2005. URL: <http://www.york.ac.uk/inst/crd/revs.htm>
- Rychetnik L, Frommer M. Schema for Evaluating Evidence for Public Health Interventions: Version 4; National Public Health Partnership, Melbourne, [homepage on the Internet]. c2002. Updated 2002 June 12. Available from <http://www.nphp.gov.au>.
- Flynn MA, McNeil DA, Maloff B, et al. Reducing obesity and related chronic disease risk in children and youth: A synthesis of evidence with 'best practice' recommendations. *Obes Rev* 2006; 7 (Suppl 1):7-66.
- Pomerleau J, Lock K, Knai C, McKee M. Interventions designed to increase adult fruit and vegetable intake can be effective: A systematic review of the literature. *J Nutr* 2005; 135:2486-2495.
- Glanz K, Patterson RE, Kristal AR, et al. Impact of work site health promotion on stages of dietary change: the Working Well Trial. *Health Educ Behav* 1998; 25(4):448-463.
- Sorensen G, Thompson B, Glanz K, et al. Work site-based cancer prevention: primary results from Working Well Trial. *Am J Public Health* 1996; 86(7):939-947.
- Biener L, Glanz K, McLerran D, et al. Impact of the Working Well Trial on the workplace smoking and nutrition environment. *Health Educ Behav* 1999; 26(4):478-494.
- Patterson RE, Kristal AR, Glanz K, et al. Components of the Working Well Trial intervention associated with adoption of healthful diets. *Am J Prev Med* 1997; 13(4):271-276.
- Sorensen G, Stoddard A, Macario E. Social support and readiness to make dietary changes. *Health Educ Behav* 1998; 25(5):586-598.
- Hunt MK, Lederman R, Stoddard A, Potter S, Phillips J, Sorensen G. Process tracking results from the Treatwell 5-a-Day Workplace Study. *Am J Health Promot* 2000; 14(3):179-187.
- Hunt MK, Lederman R, Potter S, Stoddard A, Sorensen G. Results of employee involvement in planning and implementing the Treatwell 5-a-Day work-site study. *Health Educ Behav* 2000; 27(2):223-231.
- Cook C, Simmons G, Swinburn B, Stewart J. Changing risk behaviours for non-communicable disease in New Zealand working men--is workplace intervention effective? *N Z Med J* 2001; 114(1130):175-178.
- French SA, Jeffery RW, Story M, et al. Pricing and promotion effects on low-fat vending snack purchases: The CHIPS Study. *Am J Public Health* 2001; 91:112-117.
- Pegus C, Bazzarre TL, Brown JS, Menzin J. Effect of the Heart At Work program on awareness of risk factors, self-efficacy, and health behaviors. *J Occup Environ Med* 2002; 44(3):228-236.
- Lassen A, Thorsen AV, Trolle E, Elsig M, Ovesen L. Successful strategies to increase the consumption of fruits and vegetables: Results from the Danish '6 a day' Work-site Canteen Model Study. *Public Health Nutr* 2004; 7(2):263-270.
- Irvine AB, Ary DV, Grove DA, Gillfillan-Morton L. The effectiveness of an interactive multimedia program to influence eating habits. *Health Educ Res* 2004; 19(3):290-305.
- Aldana SG, Greenlaw RL, Diehl HA, Salberg A, Merrill RM, Ohmine S. The effects of a workplace chronic disease prevention program. *J Occup Environ Med* 2005; 47(6):558-564.
- Glasgow RE, Terborg JR, Hollis JF, Severson HH, Boles SM. Take Heart: Results from the initial phase of a work-site wellness program. *Am J Public Health* 1995; 85(2):209-216.
- Brug J, Steenhuis I, van Assema P, de Vries H. The impact of a computer-tailored nutrition intervention. *Prev Med* 1996; 25(3):236-242.
- Glasgow RE, Terborg JR, Strycker LA, Boles SM, Hollis JF. Take Heart II: Replication of a workplace health promotion trial. *J Behav Med* 1997; 20:143-159.
- Sorensen G, Stoddard A, Hunt MK, et al. The effects of a health promotion-health protection intervention on behavior change: The WellWorks Study. *Am J Public Health* 1998; 88(11):1685-1690.
- Strychar IM, Champagne F, Ghadirian P, Bonin A, Jenick M, Lasater TM. Impact of receiving blood cholesterol test results on dietary change. *Am J Prev Med* 1998; 14(2):103-110.
- Buller DB, Morrill C, Taren D, et al. Randomized trial testing: the effect of peer education at increasing fruit and vegetable intake. *J Natl Cancer Inst* 1999; 91(17):1491-1500.
- Buller D, Buller MK, Larkey L, et al. Implementing a 5-a-day peer health educator program for public sector labor and trades employees. *Health Educ Behav* 2000; 27(2):232-240.
- Tilley BC, Glanz K, Kristal AR, et al. Nutrition intervention for high-risk auto workers: Results of the next step trial. *Prev Med* 1999; 28:284-292.
- Kristal AR, Glanz K, Tilley BC, Li S. Mediating factors in dietary change: Understanding the impact of a workplace nutrition intervention. *Health Educ Behav* 2000; 27(1):112-125.
- Emmons KM, Linnan LA, Shadel WG, Marcus B, Abrams DB. The Working Healthy Project: A workplace health-promotion trial targeting physical activity, diet and smoking. *J Occup Environ Med* 1999; 41(7):545-555.

References 33-42 continued on page...

Table III: Summary of results from best practice workplace interventions (Source: <http://www.who.int/dietphysicalactivity/tables-WW.pdf>)

Intervention	Best practice outcomes	Process or policy implications
Best practice clinical outcomes		
<p>Workplace Cholesterol Screening with Nutrition Education¹</p> <ul style="list-style-type: none"> - Colorado, Minnesota, Missouri and Washington, USA - Aimed at lowering cholesterol levels - Conducted in 40 workplaces - Clients with cholesterol > 200 mg (IG = 225; CG = 268) - 1-month intervention; post-tests at 6 and 12 months <p>Intervention:</p> <ul style="list-style-type: none"> - Usual care - Group sessions (2 hours over 1 month) - 30-minute video - (CG: Usual care = Screening; 5-minute training; brochure) - Behaviourally-based nutrition education programme 	<p>Clinical markers:</p> <ul style="list-style-type: none"> - Overall intervention had a 3.5% reduction effect. - After 12 months, cholesterol decreased by 6.5% in IG, compared to 3% in CG. 	<ul style="list-style-type: none"> - Cost per person ± 50 USD. - Longer time periods may be necessary to measure changes in cholesterol.
<p>Low Fat Workplace Intervention on Blood Lipids⁵</p> <ul style="list-style-type: none"> - Phoenix, Arizona, USA - Aimed at decreasing blood lipid levels by reducing dietary fat intake - Conducted in 15 workplaces - Adults with cholesterol level > 5.2 mmol/l - (IG = 119 at 9 sites; CG = 112 at 6 sites) - 8-week intervention; post-test <p>Intervention:</p> <ul style="list-style-type: none"> - 8 x 30-minute sessions provided by dietitians advising on the consumption of low-fat foods - Complemented by use of printed materials and media - Eating pattern messages to promote behaviour change 	<p>Clinical (in short term):</p> <p>Intervention effect on total cholesterol was - 0.22mmol/l.</p> <ul style="list-style-type: none"> - IG showed a 3.8% decrease in total cholesterol, 7.8% decrease in LDL-C and a 5.2% increase in HDL-C. 	<ul style="list-style-type: none"> - Programme only focused on nutrition. - Programme not re-evaluated over a longer period. - Costly in terms of the use of a health professional. - Might be worthwhile for a company to employ a health professional, if long-term results indicate significant improvements.
Best practice behavioural outcomes		
<p>Minimal Intervention to Reduce Fat Intake³</p> <ul style="list-style-type: none"> - UK - Aimed at decreasing dietary fat intake - Conducted with hospital workers (N = 517), mostly females - Once-off intervention, post-test at 5 months <p>Intervention:</p> <ul style="list-style-type: none"> - General information leaflets - Personalised feedback regarding current dietary fat intake - (CG = General information leaflets) - Stages of change model used 	<p>Behaviour:</p> <ul style="list-style-type: none"> - Reduced fat intake in high-fat consumers and prevented low-fat consumers from increasing their fat intake. - Total fat decreased by 8.6% in the IG versus 0.2% in CG. - Saturated fat decreased by 9.3% in the IG versus 1.7% in the CG. 	<ul style="list-style-type: none"> - Relatively quick and inexpensive - Could be administered by a trained individual.
<p>The CHIPS Study: Changing Individuals' Purchase of Snacks¹⁸</p> <ul style="list-style-type: none"> - Minneapolis, USA - Aimed at increasing use of low-fat snacks from vending machines - Conducted using 55 vending machines in 12 secondary schools and 12 workplaces - 12-month intervention; each treatment lasting 4 weeks <p>Intervention:</p> <ul style="list-style-type: none"> - 4 pricing levels (equal price, 10%, 25% and 50% reduction) - 3 promotional conditions on labels (none; low-fat label [3 g or less per package]; low-fat, plus promotional sign) 	<p>Behaviour:</p> <ul style="list-style-type: none"> - Price reductions (10%, 25% and 50%) of low-fat snack options associated with increases in low-fat snack sales. - Increase in percentages of low-fat snack sales by 9%, 39% and 93% respectively. - Promotional signage, although less successful than price reductions, weakly associated with increases in low-fat snack sales. 	<ul style="list-style-type: none"> - Need for healthy food choices to be made available at attractive prices, while maintaining overall financial viability. - Possibility of increasing pricing on high-fat snacks. - No effect of intervention on average profits per machine. - Similar effects of pricing and promotion for adolescent and adult populations. - Possible confusion regarding public health messages about nutrition, i.e. possibility of interpreting low-fat message to mean portion size not important, which might lead to increased energy intake.
<p>Danish 6-a-day Workplace Canteen Model Study²⁰</p> <ul style="list-style-type: none"> - Denmark - Aimed at increasing daily fruit and vegetable intake of employees using canteens - Conducted in 5 workplaces with canteens (N = 909 customers) - 12-month intervention; post-test at 4 months <p>Intervention:</p> <ul style="list-style-type: none"> - Cafeteria/food services changes - 8-hour training of canteen staff - Goal-setting - 3 to 4 interim support visits - Environmental and structural strategies used in canteens 	<p>Behaviour:</p> <ul style="list-style-type: none"> - Significant increases in total fruit and vegetable consumption. - Average increase of 95 g per customer per day. 	<ul style="list-style-type: none"> - Cost-effective. - Canteen managers and staff allowed the freedom to be creative in achieving their goals.

<p>CHIP: Coronary Health Improvement Project²²</p> <ul style="list-style-type: none"> - Illinois, USA - Aimed at improving cognitive understanding of healthy behaviours and chronic diseases risk factors - Conducted with medical care-provider employees (IG = 61; CG = 76) - 4-week intervention; post-test at 6 months <p>Intervention:</p> <ul style="list-style-type: none"> - Lectures in educational course over 4 weeks (4 x 2 hrs / week) by health professionals at a local college - Information distribution (textbook and workbooks) - Guided shopping expeditions and cooking demonstrations by a dietitian - Encouragement to follow pre-set dietary and exercise goals 	<p>Behaviour:</p> <ul style="list-style-type: none"> - Significant differences between groups after 6 months on diet (energy; fat; fruit and vegetables; cholesterol; total fat; saturated fat; sodium) and physical activity. 	<ul style="list-style-type: none"> - Costly, due to intensity of intervention; offered off-site by a local college, in conjunction with dietitians and medical professionals.
<p>Best practice psychosocial (knowledge and attitudes) outcomes</p>		
<p>Low-intensity Nutrition Intervention²</p> <ul style="list-style-type: none"> - Belgium - Aimed at decreasing dietary fat and blood cholesterol levels - Conducted in 4 workplaces - Men (IG = 272; CG = 366) - 3-month intervention; post-test <p>Intervention:</p> <ul style="list-style-type: none"> - Personal counselling session with feedback - Mass media (posters; leaflets; video; newsletters) - 2-hour group counselling by dietitians - Information distribution - Environmental changes 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - Significant difference in nutrition knowledge score of IG versus CG. 	<ul style="list-style-type: none"> - Successful in obtaining some self-reported dietary changes and in decreasing cholesterol levels in high-risk men.
<p>Working Well Trial (WWT)¹⁰⁻¹³</p> <ul style="list-style-type: none"> - 16 states, USA - Aimed at cancer prevention through addressing dietary change and smoking cessation - Conducted at 111 work sites (N = 28 000 workers) - 2-year intervention; post-tests at 3 years <p>Intervention:</p> <ul style="list-style-type: none"> - Peer/employee advisory boards - Group sessions and interactive activities - Information distribution - Multimedia - Nutrition environment changes, including cafeteria meal changes and point-of-purchase supply of information - Policy changes, in consultation with management - Based on stages of change theory and participatory strategies 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - Changes in dietary stage associated with decreases in fat; increases in fibre and fruit and vegetable consumption. 	<ul style="list-style-type: none"> - Potentially extremely cost-effective and sustainable, due to being run by employees and management. - Persons in later stages of change more likely to progress into action and maintenance stages. - Differences, though minute, significant at population level. - Longer, interactive intervention efforts (contests, classes), resulting in more positive outcomes than once-off or passive activities (kickoffs and printed materials). - Contests, associated with increased fibre, fruit and vegetable intake, and direct instruction, with increased fruit and vegetable consumption.
<p>Changing Risk Factors for Chronic Diseases¹⁷</p> <ul style="list-style-type: none"> - South Auckland, New Zealand - Aimed at increasing fruit and vegetable intake and physical activity, decreasing fat intake, and improving BP and BMI - Conducted at 2 manufacturing workplaces - Men (IG = 116; CG = 110) - 6-month intervention; post-tests at 6 and 12 months <p>Intervention:</p> <ul style="list-style-type: none"> - Key workers consulted in planning the programme - Group counselling (1 workshop; 30 mins/week for 6 months) - Cafeteria/food service changes and point-of-purchase advertising - Based on stages of change model 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - Significant improvement in nutrition knowledge at 6 and 12 months. - Attendance of more workshops associated with greater knowledge. 	<ul style="list-style-type: none"> - Significant improvements in certain risk behaviours, due to low-level interventions regarding diet and knowledge. - The need for longer duration, in order to make certain physical improvements.

(References continued)

33. Holdsworth M, Haslam C, Raymond NT. Does the heartbeat award scheme change employees' dietary attitudes and knowledge? *Appetite* 2000; 35(2):179-188.
34. Beresford SA, Shannon J, McLerran D, Thompson B. Seattle 5-a-Day Work-Site Project: Process evaluation. *Health Educ Behav* 2000; 27(2):213-222.
35. Beresford SA, Thompson B, Feng Z, Christianson A, McLerran D, Patrick DL. Seattle 5 a Day Workplace Program to increase fruit and vegetable consumption. *Prev Med* 2001; 32(3):230-238.
36. Pingle SR, Deshpande AK, Malik JS. Impact of intervention strategies for risk factor modification. *Indian J Occup Environ Med* 2001; 5(2):91-95.
37. Campbell MK, Tessaro I, DeVellis B, et al. Effects of a tailored health promotion program for female blue-collar workers: Health works for women. *Prev Med* 2002; 34(3):313-323.
38. Sorensen G, Stoddard AM, LaMontagne AD, et al. A comprehensive workplace cancer prevention intervention: Behaviour change results from a randomised controlled trial. *Cancer Causes Control* 2002; 13(6):493-502.
39. Oenema A, Brug J. Feedback strategies to raise awareness of personal dietary intake: Results of a randomized controlled trial. *Prev Med* 2003; 36(4):429-439.
40. Backman DR, Carman JS, Aldana SG. Fruits and vegetables and physical activity at the workplace. California Department of Health Services. (www.ca5aday.com)
41. Plotnikoff RC, McCargar LJ, Wilson PM, Loucaides CA. Efficacy of an e-mail intervention for the promotion of physical activity and nutrition behavior in the workplace context. *Am J Health Promot* 2005; 19(6):422-429.
42. Steenhuis I, van Assema P, van Breukelen G, Glanz K, Kok G, de Vries H. The impact of educational and environmental interventions in Dutch workplace cafeterias. *Health Promot Int* 2004;19(3):335-343.

<p>Heart at Work Program (American Heart Association)¹⁹</p> <ul style="list-style-type: none"> - South Eastern USA - Aimed at improving multiple risk factors for CVD - Conducted at 2 manufacturing sites - Line workers (IG = 223; CG = 410) - 1-year intervention; immediate post-tests <p>Intervention:</p> <ul style="list-style-type: none"> - Nurse programme co-coordinator - 4 modules (2 x physical activity, 1 x low-fat diets and 1 x knowledge on CVD risk) - Mass media distribution - Employee feedback - Physical activity programme - Changes in cafeteria and vending machines - Individual dietary feedback - Incentives offered - Screening of BP, cholesterol and glucose levels - Based on social cognitive theory 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - Knowledge and self-efficacy increased significantly in IG in all respects. 	<ul style="list-style-type: none"> - On-site health care coordinator a nurse responsible for programme implementation and for provision of feedback for those at CVD risk. - Ability to influence behaviour and clinical measures might require a more intensive intervention.
<p>Interactive Multimedia Program (IMP)²¹</p> <ul style="list-style-type: none"> - Colorado and Illinois, USA - Aimed at decreasing dietary fat and increasing fruit and vegetable intake - Conducted at 2 workplaces - Predominantly female, college-educated workers (IG = 260; CG = 257) - 30-day intervention; post-tests at 30 days and 60 days <p>Intervention:</p> <ul style="list-style-type: none"> - Comprising a computer program tailored to the user in terms of gender, interests, race and age, combining audio, video, graphics and printouts - Option of a guide matched in race and gender given in programme - Based on the trans-theoretical stage of change model. 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - Significant intervention effects for the following: <ul style="list-style-type: none"> • stage of change to adopt a low-fat diet • intention and self-efficacy to reduce dietary fat • attitude towards the importance of diet. 	<ul style="list-style-type: none"> - Cost-effective, and can be used by large numbers. - Easy user-friendly programme not requiring computer skills. - Possibility of being a very valuable tool for use by companies with workers with low reading skills. - Considerable costs in developing the programme, which may quickly become outdated. - Requires testing over a longer period, such as a year.
<p>Best practice in two or three of the outcomes measured</p>		
<p>The Treatwell 5-a-Day Study^{4, 14-16}</p> <ul style="list-style-type: none"> - Massachusetts, USA - Aimed at increasing fruit and vegetable, and decreasing fat, intake - Conducted at 22 community health centres (CG = 8 sites; IG1 = 7 sites; IG2 = 7 sites) - Adult workers (mainly low income; N = 1306) - 20-month intervention; post-test <p>Intervention:</p> <ul style="list-style-type: none"> - 3 intervention arms: CG, IG1 & IG2 CG: core intervention only IG1: workplace only IG2: workplace plus family - Interventions for 1 and 2 - Employee advisory boards (worker participation) - Group sessions (10 x 30-minute sessions) - Nutrition education activities - Environmental changes - Information distribution - Multimedia - Individual advice - Based on socio-ecological model 	<p>Knowledge and attitudes:</p> <ul style="list-style-type: none"> - A higher number of activities significantly correlated with greater programme awareness and greater change in fruit and vegetable intake. - Greater participation in activities significantly correlated with greater awareness, higher degree of participation and increase in fruit and vegetable consumption. <p>Behaviour:</p> <ul style="list-style-type: none"> - Significant increase in total fruit and vegetable intake, by 19% in IG2 and 7% in IG1, compared with intake of CG. - Significant increase in co-worker support in both intervention groups. 	<ul style="list-style-type: none"> - Largely organised and managed by employees. - Cost-effective, in allowing for better support by staff.
<p>CG = control group IG = intervention group CVD = cardiovascular disease HDL-C = high-density lipoprotein cholesterol LDL-C = low-density lipoprotein cholesterol</p>		