Nutrition interventions in the workplace:
Evidence of best practice

Introduction
Numerous studies have recently promoted the value of health promotion studies in the workplace. Sorenson et al. cite several reasons for regarding the workplace as an ideal channel for promoting change in large segments of the population. 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.

Hartman et al. subscribe additional benefits to workplace interventions. 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.

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/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, a recently published “best practice” review of material relating to the reduction of obesity in children and youth.

**Search strategy procedure followed**

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**

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Intervention</th>
<th>Objectives</th>
<th>Outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition and healthy diet</td>
<td>Intervention</td>
<td>Health</td>
<td>Best practice</td>
</tr>
<tr>
<td>Diet*intake</td>
<td>Programme</td>
<td>Health promotion</td>
<td>Effectiveness</td>
</tr>
<tr>
<td>Fruit intake</td>
<td>Project</td>
<td>Health behaviour</td>
<td>Environment</td>
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<tr>
<td>Fat intake</td>
<td>Campaign</td>
<td>Health practice</td>
<td>Evaluation</td>
</tr>
<tr>
<td>Vegetable intake</td>
<td>Initiative</td>
<td>Health knowledge</td>
<td>Economic evaluation</td>
</tr>
<tr>
<td>Diet* habits</td>
<td>Strategy</td>
<td>Health education</td>
<td>Cost-effectiveness</td>
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<tr>
<td>Diet* knowledge</td>
<td>Disease prevention</td>
<td>Decision analysis</td>
<td></td>
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<tr>
<td>Diet* practices</td>
<td></td>
<td>Guideline</td>
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<tr>
<td>Nutrient intake</td>
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**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 al 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. Figure 1 summarises the quality ratings of the studies concerned. While
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, 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. The first intervention showed a significant cholesterol decrease with a 3.5% intervention effect, while the second intervention 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 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, 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.

The CHIP 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 psychosocial outcomes**

Six studies presented with best practice psychosocial outcomes. The studies consisted of the Working Well trial (WWT), the Low Intensity Nutrition Intervention; the Changing Risk Factors for Chronic Diseases; the Heart at Work Program; and the Interactive Multi-media Program. 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. Four of the studies proved cost-effective and sustainable, as they could be used by...
employees on their own.\textsuperscript{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\textsuperscript{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\textsuperscript{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 of the change model.\textsuperscript{3,10,13,17,21}
- The employees were involved in the planning, implementation and management of the programme concerned.\textsuperscript{4,10-17,20}
- Dietitians provided nutrition education to the participants.\textsuperscript{2,5,22}
- Changes took place in the cafeteria/canteen to increase the availability of healthy food options.\textsuperscript{10,13,17,19,20}
- Healthier food items in vending machines were preferentially priced.\textsuperscript{18,19}
- Tailored feedback was provided.\textsuperscript{2,4,14-16,19}
- Multi-media was used in the presentation of the programme.\textsuperscript{2,4,5,10,16,18,21}

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 workplaces\textsuperscript{25}
- General nutrition education was provided, instead of education tailored to meet the needs of individual target groups\textsuperscript{24}
- The intervention component was of insufficient duration\textsuperscript{27}
- Advice, regarding how to overcome barriers to change, was lacking\textsuperscript{33}
- Motivation, in terms of feedback on the performance of specific goals, was lacking\textsuperscript{29}
- The participants lacked commitment and failed to comply fully with the requirements of the programme\textsuperscript{36}

Conclusion

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

Acknowledgements

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Declaration: No conflict of interest.

References


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)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Best practice outcomes</th>
<th>Process or policy implications</th>
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</thead>
</table>
| **Workplace Cholesterol Screening with Nutrition Education**<sup>1</sup> | - Environmental and structural strategies used in canteens  
- 3 to 4 interim support visits  
- Goal-setting  
- 8-hour training of canteen staff  
- Cafeteria/food services changes | - Cost per person ± 50 USD.  
- Longer time periods may be necessary to measure changes in cholesterol. |
| **Low Fat Workplace Intervention on Blood Lipids**<sup>2</sup> | - 3 promotional conditions on labels (none; low-fat label; 3 g or less per package); low-fat, plus promotional sign  
- 4 pricing levels (equal price, 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. | - 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. |
| **Minimal Intervention to Reduce Fat Intake**<sup>3</sup> | - General information leaflets  
- Personalised feedback regarding current dietary fat intake  
- (CG = General information leaflets)  
- Stages of change model used | - Relatively quick and inexpensive  
- Could be administered by a trained individual. |
| **The CHIPS Study: Changing Individuals’ Purchase of Snacks**<sup>4</sup> | - 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. | - 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. |
| **Danish 6-a-day Workplace Canteen Model Study**<sup>5</sup> | - 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 | - Cost-effective.  
- Canteen managers and staff allowed the freedom to be creative in achieving their goals. |

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1. Intervention:  
- 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

2. Intervention:  
- 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

3. Intervention:  
- 12-month intervention; post-test at 4 months  
- Conducted in 5 workplaces with canteens  
- Aimed at increasing daily fruit and vegetable intake of employees using canteens  
- (N = 909 customers)

4. Intervention:  
- 12-month intervention; each treatment lasting 4 weeks  
- Conducted using 55 vending machines in 12 secondary schools  
- Aimed at increasing use of low-fat snacks from vending machines

5. Intervention:  
- 8-week intervention; post-test  
- (IG = 119 at 9 sites; CG = 112 at 6 sites)  
- Adults with cholesterol level > 5.2 mmol/l  
- (IG = 119 at 9 sites; CG = 112 at 6 sites)  
- 6-week intervention; post-test

6. Intervention:  
- 1-month intervention; post-tests at 6 and 12 months  
- Clients with cholesterol > 200 mg (IG = 225; CG = 268)  
- - 1-month intervention; post-tests at 6 and 12 months
# Review: Nutrition interventions in the workplace: Evidence of best practice

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Knowledge and attitudes:</th>
<th>Behaviour:</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-intensity Nutrition Intervention²</td>
<td>- Significant difference in nutrition knowledge score of IG versus CG.</td>
<td>- Changes in dietary stage associated with decreases in fat; increases in fibre and fruit and vegetable consumption.</td>
<td>- Successfully in obtaining some self-reported dietary changes and in decreasing cholesterol levels in high-risk men.</td>
</tr>
<tr>
<td>Changing Risk Factors for Chronic Diseases⁷</td>
<td>- Significant improvements in certain risk behaviours, due to low-level interventions regarding diet and knowledge.</td>
<td>- Significant differences between groups after 6 months on diet (energy; fat; fruit and vegetables; cholesterol; total fat; saturated fat; sodium) and physical activity.</td>
<td>- Potentially extremely cost-effective and sustainable, due to being run by employees and management.</td>
</tr>
<tr>
<td>CHIP: Coronary Health Improvement Project²²</td>
<td>- Significant improvement in nutrition knowledge at 6 and 12 months.</td>
<td>- Contests, associated with increased fibre, fruit and vegetable intake, and direct instruction, with increased fruit and vegetable consumption.</td>
<td>- Costly, due to intensity of intervention; offered off-site by a local college, in conjunction with dietitians and medical professionals.</td>
</tr>
<tr>
<td>Working Well Trial (WWT)¹⁰-¹³</td>
<td>- Attendance of more workshops associated with greater knowledge.</td>
<td>- Longer, interactive intervention efforts (contests, classes), resulting in more positive outcomes than once-off or passive activities (kickoffs and printed materials).</td>
<td>- The need for longer duration, in order to make certain physical improvements.</td>
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</tbody>
</table>

### Best practice psychosocial (knowledge and attitudes) outcomes

<table>
<thead>
<tr>
<th>Activity</th>
<th>Knowledge and attitudes:</th>
<th>Behaviour:</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising</td>
<td>- Significant improvement in nutrition knowledge at 6 and 12 months.</td>
<td>- Changes in dietary stage associated with decreases in fat; increases in fibre and fruit and vegetable consumption.</td>
<td>- Potentially extremely cost-effective and sustainable, due to being run by employees and management.</td>
</tr>
<tr>
<td>Action, decreasing fat intake, and improving BP and BMI</td>
<td>- Significant differences between groups after 6 months on diet (energy; fat; fruit and vegetables; cholesterol; total fat; saturated fat; sodium) and physical activity.</td>
<td>- Contests, associated with increased fibre, fruit and vegetable intake, and direct instruction, with increased fruit and vegetable consumption.</td>
<td>- Costly, due to intensity of intervention; offered off-site by a local college, in conjunction with dietitians and medical professionals.</td>
</tr>
<tr>
<td>Change employees’ dietary attitudes and knowledge? Appetite 2000; 35(2):179-188.</td>
<td>- Costs, due to intensity of intervention; offered off-site by a local college, in conjunction with dietitians and medical professionals.</td>
<td>- Successful in obtaining some self-reported dietary changes and in decreasing cholesterol levels in high-risk men.</td>
<td>- The need for longer duration, in order to make certain physical improvements.</td>
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### References

**Heart at Work Program (American Heart Association)**
- 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

**Intervention:**
- 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

**Knowledge and attitudes:**
- Knowledge and self-efficacy increased significantly in IG in all respects.

**Interactive Multimedia Program (IMP)**
- 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

**Intervention:**
- 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.

**Knowledge and attitudes:**
- Significant intervention effects for the following:
  - stage of change to adopt a low-fat diet
  - intention and self-efficacy to reduce dietary fat
  - attitude towards the importance of diet.

**Best practice in two or three of the outcomes measured**

**The Treatwell 5-a-Day Study**
- 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

**Intervention:**
- 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

**Knowledge and attitudes:**
- 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.

**Behaviour:**
- 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.

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CG = control group  IG = intervention group  CVD = cardiovascular disease  HDL-C = high-density lipoprotein cholesterol  LDL-C = low-density lipoprotein cholesterol