

**The Nutrition Society Satellite Symposium, Nutrition Congress: Workplace diet and health**

Rachel Gibson<sup>1</sup>, Georgia A F Rogerson<sup>1</sup>, Hannah E Theobald<sup>2</sup>, Jumanah S. Alawfi<sup>3</sup>, Elena Philippou<sup>1,4</sup>, Deborah David<sup>5</sup>, Kiu Sum<sup>6</sup>, Louise R Durrant<sup>2</sup> On behalf of the Nutrition Society Workplace Diet and Health Special Interest Group

<sup>1</sup>Department of Nutritional Sciences, School of Life Course and Population Sciences, King's College London, London, UK

<sup>2</sup>Marlow Foods Ltd, Stokesley, TS9 7AB

<sup>3</sup>Department of Clinical Nutrition, College of Applied Medical Sciences, Imam Abdulrahman Bin Faisal University, 34212, Dammam, Saudi Arabia

<sup>4</sup>Department of Life Sciences, School of Life and Health Sciences, University of Nicosia, Nicosia, Cyprus

<sup>5</sup>Registered Freelance Dietitian MBDA, London, UK

<sup>6</sup>Department of Sport and Health, Solent University, Southampton, UK

**Corresponding author:** Rachel Gibson, Department of Nutritional sciences, Room 4.13 Franklin Wilkins Building, 150 Stamford Street, London SE1 9NH, UK. email [rachel.gibson@kcl.ac.uk](mailto:rachel.gibson@kcl.ac.uk)



This is an Accepted Manuscript for Proceedings of the Nutrition Society. This peer-reviewed article has been accepted for publication but not yet copyedited or typeset, and so may be subject to change during the production process. The article is considered published and may be cited using its

DOI 10.1017/S0029665124007614

Proceedings of the Nutrition Society is published by Cambridge University Press on behalf of The Nutrition Society.

## **Abstract**

The workplace is a key environmental determinant of health and wellbeing. Food choices can be influenced by several workplace related factors including, but not limited to, working hours, the workplace food environment, job roles and workplace culture. Therefore, the workplace is increasingly viewed as an important place for public health nutrition interventions. However, research in this area is fragmented and heterogeneous due to the wide range of workplace settings and occupational groups. This editorial summarises the research presented at The Nutrition Society Workplace Diet and Health Special Interest Group Satellite Symposium in July 2024 as part of the inaugural Nutrition Society congress.

**Key words** Workplace Nutrition; Public Health; Occupational Health; Sensory panel

## **Workplaces as a key determinant of public health nutrition**

A life-course approach to public health considers the changing determinants of health over the lifespan. The ‘working age’ life-stage can be up to 50 years. This is likely to increase due to an aging demographic observed in many high-income countries where statutory retirement ages are increasing. In the UK, nearly one third of working adults report living with a chronic health condition (1). This could be expected to bring certain economic and social challenges, driving the importance of maintaining a healthy workforce (2). With up to 60% of energy intake consumed during working hours (3), the workplace should be considered an important domain for public health interventions (4).

Studies have shown that workplaces influence food choices in several ways including working hours, workplace culture and workplace food environments (5–7). A large-scale meta-analysis indicated that workplace interventions can improve dietary intakes and reduce several cardiometabolic risk factors (8). However, the implementation and evaluation of programmes is ad hoc. The Nutrition Society Workplace Diet and Health Special Interest Group (SIG) was established in 2022 with the aims of bringing together researchers and practitioners within the field to understand the current state of evidence in workplace diet and health and to promote high-quality nutritional research in workplace nutrition and health. A Round Table convened by the SIG highlighted a priority to strengthen the evidence base for the implantation of workplace nutrition and health programmes with a focus on business-

related outcomes and interventions in hard-to-reach employees (e.g., shift workers, older male workers, ethnic minority employees)(9). This editorial provides an overview of the ‘*Satellite Symposium – Workplace Diet and Health*’ held at the Nutrition Society Congress in Belfast, in July 2024. The Symposium was Chaired by Dr Hannah Theobald and Dr Rachel Gibson. RG, Chair of the Special Interest Group gave an overview of Workplace Diet and Health Special Interest Group followed by a summary of research conducted in shift workers living with type 2 diabetes. Dr Louise Durrant then presented results of a project conducted in sensory panel employees followed by Georgia Rogerson who presented preliminary findings from a systematic review investigating the organisational benefits of workplace nutrition interventions. Before closing the session, there was a panel discussion with the three speakers chaired by Dr Theobald.

### **Shift work and type 2 diabetes**

In the UK 27% of the workforce is engaged in some form of shift work (10). Shift workers, compared to day workers, are more likely to be diagnosed with type 2 diabetes (T2D)(11). Additionally, night workers diagnosed with T2D have been observed to have higher glycated haemoglobin levels compared to day workers (12). Currently, no tailored dietary support programme is available to shift workers living with T2D or employers.

The Shift-Diabetes study is a mixed methods study with the overall aim to characterise current management of T2D in shift workers as a starting point to understanding how support could be given to improve self-management of diabetes in shift workers (13). The study was conducted in UK healthcare workers, as this is one of the largest shift working occupational groups in the UK (14). Findings from fifteen semi-structured interviews suggested that nighttime access to, and financial cost of food, were the key barriers to healthy dietary behaviours during the night shift. Other barriers included eating in response to stress, boredom and feeling tired. Potential enablers to making healthy food choices included access to staff facilities (e.g., kitchens, food storage) and the opportunity to take a break (6). To test the generalisability of the findings to healthcare workers living with T2D but without night shifts, an online survey was conducted (15). The survey findings (n = 119) supported the qualitative study, especially around the food environment and lack of tailored dietary advice for shift workers with T2D (15).

The themes generated from the qualitative studies were mapped to potential behaviour change techniques using the Theories and Techniques Tool (16). Three potential interventions

were then taken forward to a stakeholder consultation workshop (17): 1) Educational resources and structured education for shift workers living with T2D, 2) Increasing availability and accessibility of healthy food at night and, 3) Biofeedback and tailored advice to diabetes management. The workshop highlighted the need for complex multilevel interventions with a priority on addressing the nighttime food environment and shift worker-inclusive research in diabetes. The Shift-Diabetes study highlights the complexity of the drivers of food choice in the workplace. The next stages will focus on the co-design of potential interventions to take forward to feasibility testing.

### **Developing a nutrition policy for sensory panels**

Food manufacturers, such as Marlow Foods, often employ trained Sensory Panellists to conduct various types of sensory evaluations, such as profiling, discrimination, and rating tests, to assess the impact of reformulation, processing changes, or new product launches on consumer experiences (18). Sensory Panellists can regularly sample numerous food products during these evaluations, potentially influencing their overall nutritional intake. Consequently, there is a clear need to integrate nutrition considerations into sensory panel evaluations to support the health and wellbeing of these individuals (19). Using a case study from Marlow Foods (20), this presentation explored why the Nutrition Team at Marlow Foods developed a nutrition policy, how they identified priority nutrition challenges and defined guidelines, and what was developed for implementation within the nutrition policy.

Sensory evaluations at Marlow Foods primarily involve savoury products in the form of meat alternatives and, to a lesser extent, meat, which can potentially create nutritional challenges relating to total energy, saturated fat, and sodium intake. Given the known associations between prolonged excess intakes of these nutrients and negative health outcomes, developing a nutrition policy for Sensory Panellists was deemed important to ensure Panellists' dietary intakes remain within healthy limits.

Five weeks of sensory evaluation sessions were analysed to estimate average daily intakes of energy, total fat, saturated fat, sugar, fibre and salt that would then inform policy development. The data (**Table 1**) highlighted that most nutrient intakes were within acceptable ranges (proportionately aligned with public health recommendations, assuming 20% of daily energy intakes could be derived from foods consumed during sensory panel sessions), and even provided a significant amount of fibre intake: averaging 23.6% of the

recommended 30g dietary fibre/day. However, sodium intake posed a particular concern, averaging 16.6% of the maximum daily intake during sessions, primarily due to the high salt content in meat and meat alternative food products (21). This finding underscores the importance of establishing specific nutrition guidelines to ensure responsible nutrient consumption during sensory evaluations.

**Table 1. Current Average Nutrition Intakes in Evaluation Sessions at Marlow Foods (May-June 2023)**

	Average Daily Intake	Min.	Max.	Standard Deviation	% of Reference Intake (RI)*
Energy (kCal)	192	93	292	85	9.6
Total Fat (g)	7.3	2.7	14.5	4.5	10.4
Saturated Fat (g)	1.1	0.6	2.2	0.6	5.7
Sugar (g)	1.5	0.4	2.3	0.9	1.7
Fibre (g)	7.1	4.0	12.6	4.0	23.6
Salt (g)	1.0	0.4	1.9	0.6	16.6

Table 1 data source (20). Legend \*for the average adult aged 19-64 years (22),

Based on the findings, nutrition guidelines have been established for implementation with the following principles behind them:

- Energy: A guideline of 200 kcal per sensory session (typically 09:00-13:00) was set to align with the UK's recommended daily allowance of 400kcal for snacks and drinks (22), ensuring Sensory Panellists can consume regular meals without exceeding average daily energy requirements.
- Total and saturated fat: Guidelines were set for total and saturated fat to align with energy targets and public health recommendations, focusing on limiting saturated fat.
- Sodium: Recognising the higher sodium content in meat and meat alternatives, the sodium limit remained within reasonable limits, allowing the Sensory Panellists to perform their tasks effectively whilst also protecting their health.

The biggest challenge now is the implementation of this nutrition policy, which will present obstacles that need to be worked around and relevant factors to consider. For example, all requests for sensory evaluations will need to include the product nutrition information which

is not currently captured. There may also sometimes be time demands on sensory evaluations that make the nutrition policy challenging to adhere to. Monitoring and continuous improvements are therefore integral to the success of this policy, with opportunity to update it to ensure it is both fit for purpose but also remains aligned with current nutrition science and public health recommendations. Evaluating the impact of the policy after a 12-month period of implementation will also be key to understanding its success and impact.

Much of the discussion after this presentation was on the eating habits of Sensory Panellists outside of their evaluation sessions, particularly whether they consumed breakfast beforehand, as breakfast is often key for micronutrient intake (23). There was also interest in whether the high fibre intake during evaluations sessions might affect their appetite and dietary intake at subsequent meals. However, such data on panellist's habitual diets were not collected, making this an interesting area for future exploration to better understand the overall impact of sensory evaluation sessions on their overall nutrition intake.

### **The effectiveness of workplace dietary interventions on organisational outcomes**

For employers, workplace wellbeing provision has the potential for cost-savings related to employee absenteeism, productivity, retention, and company reputation. However, the evidence to support these benefits is fragmented. Demonstrating such organisational benefit is essential to commissioning nutrition health and wellbeing services in the private and public sectors (9).

To date, there is limited evidence to support the organisational or business benefits of nutritional interventions in the workplace. To strengthen the evidence base, a comprehensive systematic review (PROSPERO CRD42023454673) is being undertaken to address the following research questions: *i*) What organisational and business-related outcomes have been reported in workplace diet/nutrition intervention studies? *ii*) What tools have been used to measure organisational and business outcomes in workplace diet/nutrition intervention studies?, *iii*) What evidence is there to support the effectiveness of workplace diet/nutrition interventions on organisational and business outcomes?, *iv*) What are the key components of successful diet/nutrition interventions for delivering positive organisational and business outcomes?, and, *v*) What are the differences in the effectiveness of interventions between different occupational groups or types of organisation?

A systematic literature search was conducted in multiple electronic databases, Medline (Ovid), Embase (Ovid), Cochrane Library (CENTRAL), Web of Science, APA PsycINFO

(Ovid), Business Source Complete (EBSCO) up to 30<sup>th</sup> September 2023 in line with Cochrane Systematic Review Guidelines (24). Search results were limited to English language publications since 1990. Studies conducted in low- or middle-income countries were excluded. Additionally, grey literature resources were searched to identify studies investigating the impact of workplace dietary interventions on organisational and business outcomes. Summary study characteristics were presented at the symposium. The study characteristics indicate a paucity of studies in the UK and a high representation of healthcare workers. The next review stage is synthesising the extracted data to address the primary review questions.

### **Panel discussion**

A short panel discussion followed the presentations, with the audience asking questions related to the practicalities of implementing workplace nutrition programmes and the impact of workplace nutrition provisions and interventions on dietary behaviours outside the work environment. The speakers reinforced the need for organisational and senior stakeholder buy-in for a workplace nutrition programme to be successful. Individual motivations for workplace wellbeing programmes will vary between senior level executives. Benefits of workplace nutrition interventions need to be well understood and the decision to make a commitment to workplace nutrition made easy. Therefore, the use of organisational champions to advocate for and undertake workplace nutrition activities may be helpful for ensuring stakeholder buy in. Incorporating nutrition within existing health initiatives was cited as a means of increasing the chance of adoption, as mechanisms to reach employees have already been established. The inclusion of workforce nutrition education within corporate strategies and commitments would be an ideal end goal, to ensure that actions are followed through.

Barriers to workplace nutrition programmes will vary due to the diverse nature of activities that a workplace can undertake. However, common barriers to uptake discussed were a lack of understanding of the benefits of workplace nutrition initiatives, along with a lack of personnel time and financial resources as well as employee concerns around data confidentiality and their health being monitored in the workplace.

In terms of understanding the impact of workplace nutrition interventions on dietary behaviours outside of working hours, the research on sensory panel nutrient intakes solely focused on food intake during sensory evaluations and did not measure intake outside of the

role. Understanding the effect of workplace interventions on dietary intakes outside of the working environment is an important consideration when determining the wider impact of any programme, both in the short and long term.

The session was concluded by the Chair (Dr Theobald) asking each speaker to articulate their one wish for workplace nutrition programmes. The need for more research funding to understand the benefits of workplace nutrition was highlighted by two of the speakers, along with the need for a greater understanding of the return on investment and benefits of workplace nutrition programmes to support greater business stakeholder engagement and commitment.

### **Acknowledgements**

The Workplace Diet and Health Special Interest Group acknowledges The Nutrition Society for supporting the SIG and the Satellite Symposium.

The Shift-Diabetes study is supported by Diabetes UK (grant number 19/0005979). The effectiveness of workplace dietary interventions on organisational and business-related outcomes: a systematic review is funded by the British Dietetic Association GET grant 23/01 and conducted at King's College London with Rachel Gibson, Megan Whelan and Michael Clinton.

### **Conflicts of interest**

RG is a member of the British Dietetic Association Work Ready Steering Group. LD is an employee of Marlow Foods.

### **Authorship**

RG, LD, GR wrote the sections of the manuscript to summarise their respective presentations. RG, LD, GR and HT drafted the manuscript. All authors reviewed, amended and approved the final manuscript



## References

1. Public Health England (2017) Health matters: obesity and the food environment - Guidance paper. <https://www.gov.uk/government/publications/health-matters-obesity-and-the-food-environment/health-matters-obesity-and-the-food-environment--2>[accessed August 2024]
2. Ross D (2010) Ageing and work: an overview. *Occup Med* 60:169–71
3. British Dietetic Association (2015) White Paper - Work Ready Programme Supporting healthier working lives through dietitian-led wellness initiatives. <https://www.bda.uk.com/food-health/workplace-health-work-ready.html> [accessed August 2024]
4. National Institute for Health and Care Excellence. (2016). Workplace policy and management practices to improve the health and wellbeing of employees NG13.<https://www.nice.org.uk/guidance/ng13>[accessed August 2024]
5. Brogan E, Rossiter C, Duffield C &Denney-Wilson E (2021). Healthy eating and physical activity among new graduate nurses: A qualitative study of barriers and enablers during their first year of clinical practice. *Collegian* 28:489–97.
6. Gibson R, D’Annibale M, Oliver N, et al. (2023) Exploration of the individual, social and environmental factors influencing dietary behaviour in shift workers with type 2 diabetes working in UK healthcare—The Shift-Diabetes Study: A qualitative study using the theoretical domains framework. *Diabet Med.* 41:e15179
7. Anstey S, Tweedie J, Lord B (2016) Qualitative study of Queensland paramedics’ perceived influences on their food and meal choices during shift work. *Nutr Diet.* 73:43–9.
8. Peñalvo JL, Sagastume D, Mertens E et al. (2021) Effectiveness of workplace wellness programmes for dietary habits, overweight, and cardiometabolic health: a systematic review and meta-analysis. *Lancet Public Heal.* 6:e648–60.
9. Gibson R, Lewis J, Hilberink A et al. (2023) Proceedings of a roundtable event ‘Workplace Diet and Health – priorities for researchers and practitioners.’ *Nutr Bull.* 48:144–53.

10. Office for National Statistics (2023). The night-time economy, UK: 2022. [https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/articles/the-night-time-economy-uk/2022](https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/articles/the-night-time-economy-uk-2022) [accessed August 2024]
11. Health and Social Care Information Centre (2014) Health Survey for England – 2013 <https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/health-survey-for-england-2013> [accessed August 2024]
12. Manodpitipong A, Saetung S, Nimitphong H, et al. (2017) Night-shift work is associated with poorer glycaemic control in patients with type 2 diabetes. *J Sleep Res.* 26(6):764–72.
13. Gibson R, Oliver N, McGowan B, et al. (2022) Towards targeted dietary support for shift workers with type 2 diabetes (Shift-Diabetes study): A mixed-methods case study protocol. *Diabet Med.* 39:1–9.
14. Trade Union Congress (2018) Number of people working night shifts up by more than 150,000 in 5 years <https://www.tuc.org.uk/news/number-people-working-night-shifts-more-150000-5-years> [accessed August 2024]
15. Rubner S, Annibale MD, Oliver N et al. (2023) Individual , social and environmental factors influencing dietary behaviour in shift workers with type 2 diabetes working in UK healthcare : A cross - sectional survey Study design. *J Hum Nutr Diet.* 36:1992-2009.
16. Carey RN, Connell LE, Johnston M, et al. (2018) Behavior Change Techniques and Their Mechanisms of Action: A Synthesis of Links Described in Published Intervention Literature. *Ann Behav Med.* 53:693–707.
17. Gibson R, Oliver N, McGowan B, et al (2024). Developing an intervention to support dietary change for shift workers living with type 2 diabetes: A stakeholder consultation. *Diabet Med.* 41:e15318
18. Institute of Food Science and Technology. Sensory and Consumer Science. Food Fact Sheet. Available from: [https://www.ifst.org/sites/default/files/Sensory and Consumer Science-.pdf](https://www.ifst.org/sites/default/files/Sensory%20and%20Consumer%20Science-.pdf) [accessed August 2024]
19. Institute of Food Science and Technology (2020) Guidelines for Ethical and Professional Practices for the Sensory Analysis of Foods.

<https://www.ifst.org/membership/networks-and-communities/special-interest-groups/sensory-science-group/ifst-guidelines> [accessed August 2024]

20. Durrant L, Moran VH, Readman C et al. (2024) Proceedings of the Nutrition Society, (Nutrition Society Congress 2024, 2-5 July 2024) Ahead of print
21. Alessandrini R, Brown MK, Pombo-Rodrigues S, et al (2021) Nutritional Quality of Plant-Based Meat Products Available in the UK: A Cross-Sectional Survey. *Nutrients*. 13:4225.
22. Public Health England (2018). A Quick Guide to the Government's Healthy Eating Recommendations.  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/742746/A\\_quick\\_guide\\_to\\_govt\\_healthy\\_eating\\_update.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/742746/A_quick_guide_to_govt_healthy_eating_update.pdf) [accessed August 2024]
23. Coulthard JD, Palla L, Pot GK. (2017) Breakfast consumption and nutrient intakes in 4–18-year-olds: UK National Diet and Nutrition Survey Rolling Programme (2008–2012). *Br J Nutr* 118:280–90.
24. Cochrane Training. Cochrane Handbook for Systematic Reviews of Interventions.  
<https://training.cochrane.org/handbook> [accessed August 2024]