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# Wellbeing at work among kitchen workers during organic food conversion in Danish public kitchens: a longitudinal survey

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**Background:** In 2011, the Danish Ministry of Food, Agriculture and Fisheries launched the Danish Organic Action Plan 2020 intending to double the organic agricultural area in Denmark. This study aims to measure experienced physical and psychological wellbeing at work along with beliefs and attitudes among kitchen workers before and after participating in educational training programmes in organic food conversion. **Method:** This longitudinal study applied an online self-administered questionnaire among kitchen workers before and after the implementation of an organic food conversion programme with 1-year follow-up. The study targeted all staff members in the participating public kitchens taking part in the organic food conversion process funded by the Danish Organic Action Plan 2020. **Results:** Of the 448 eligible kitchen workers, 235 completed the questionnaire at baseline (52%) and 149 at follow-up (63% of those surveyed at baseline). No substantive differences between baseline and follow-up measurements of organic food conversion were detected on physical or psychological wellbeing at work. Kitchen workers reported a significant improvement in the perceived food quality, motivation to work and application of nutritional guidelines. Reported organic food percentages for the kitchens also increased significantly ( $P < 0.001$ ) and a shift from using ready-made food products to producing more food from base was indicated. **Conclusion:** Within 1 year, a significant increase in motivation to work among kitchen staff was observed with no substantive changes in physical or psychological wellbeing at work identified. The results support the Danish Organic Action Plan 2020 and initiatives of similar kind.

## Introduction

In line with the ambition behind the Action Plan for the future Organic Production in the European Union,<sup>1</sup> the Danish Ministry of Food, Agriculture and Fisheries launched the Danish Organic Action Plan 2020 in 2011.<sup>2</sup> The intention of the Danish Organic Action Plan 2020 is to double the organic agricultural area in Denmark and improve sustainability, biodiversity and animal welfare<sup>3–5</sup> by stimulating the demand for organic agriculture through increased public procurement of organic foods.<sup>2,6</sup> Therefore, organic food conversion projects meaning to educate and develop the skillset among kitchen workers in Danish public kitchens within organic food production continue to receive funding.<sup>6</sup>

The educational components in the organic food conversion projects funded by the Danish Organic Action Plan 2020 included training of the kitchen employees in planning menu-plans based on organic local and seasonal food products with legumes rather than meat, using and re-using all possible food elements and focusing on meals produced from base rather than convenience products.<sup>7,8</sup> Hence, implementing organic food procurement within the same budget requires transformation of public kitchen systems.<sup>9</sup> This may pose challenges to kitchen workers in terms of changes in the food supply, premium prices of organic foods and the extra workload required for menu-planning and food preparation as a result of decreased use of convenience foods.<sup>7</sup> Many public kitchens already have tight timelines and limited resources with which to meet strict nutritional recommendations and new coping mechanisms may therefore be required,<sup>7,9</sup> which can adversely affect

physical wellbeing through changes to posture, force, repetition and duration.<sup>10–13</sup> Psychological wellbeing among kitchen workers may also be adversely affected during organic food conversion unless job-control is balanced and burnout prevented.<sup>14</sup> The importance of establishing a sense of ownership of the change process among kitchen workers has therefore been emphasized to achieve a successful transition.<sup>15</sup> The actual effects of organic food conversion on public kitchen workers' wellbeing remain, however, unknown.

The aim of this study is to measure experienced physical and psychological wellbeing among kitchen workers before and after organic food conversion in public kitchens participating in the Danish Organic Action Plan 2020. Additionally, potential differences on the beliefs and attitudes of the kitchen workers in relation to the organic food conversion process will be explored.

## Methods

### Survey design

This was a longitudinal study applying an online self-administered questionnaire on physical and psychological wellbeing at work among kitchen workers in Danish public kitchens during an organic food conversion programme. Measurements were collected before and after the implementation of the conversion programme with baseline measurements in September 2013 and follow-up measurements 1 year later. The study was performed in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 2008.<sup>16</sup>

## Public kitchens and recruitment of study participants

Four organic food conversion projects received funding from the Danish Organic Action Plan 2020 in the spring of 2013. These projects sought to implement organic food conversion in 170 public kitchens employing 448 kitchen workers across Denmark. Kitchens were classified as childcare, school, after-school, canteen, elderly, hospital, central or residential institution according to already established categories developed by the Danish Diet and Nutrition Association.<sup>17</sup> The number of kitchen workers employed in each kitchen was recorded as were the numbers of kitchens offering breakfast, lunch, dinner and in-between meals. For each kitchen, every staff member assisting in food preparation who potentially would be involved in the organic food conversion process was invited to participate. At baseline and follow-up, kitchen workers were invited directly by email or else through contact with other staff at the institution or project managers in charge of implementing the conversion. Informed consent was obtained by email before forwarding the questionnaire.

## Data collection

Data were collected through the completion of an on-line self-administered questionnaire. The questionnaire was anonymous and included comment fields allowing respondents to provide additional information if they wished to. The online questionnaire included a total of 25 questions divided into background information, psychological wellbeing at work, physical wellbeing at work, beliefs and attitudes and extent of organic food conversion. The questions in the first three sections were derived from established and internationally validated questionnaires<sup>17–19</sup> and the questions in the two final sections were developed specifically for this project through field visits and pilot-testing in a sample of three childcare kitchens, three elderly care kitchens and one canteen kitchen. The background section included questions on age and gender of the kitchen worker, years of experience in the workplace, type of kitchen employed in and number of colleagues in the kitchen workplace.

All measurements were made in the same fashion at baseline and follow-up except for four questions on the personal considerations of the kitchen workers in relation to the organic food conversion process which were only recorded at the follow-up visit.

## Outcomes

The psychological working environment was measured as 12 dimensions: quantitative demands, tempo (work pace), emotional demands, influence at work, possibilities for development, meaning of work, commitment to the workplace, predictability, rewards (recognition), role clarity, 'vertical trust' (between management and employees) and justice and respect. Each dimension was evaluated by two questions, each of which had five possible responses (0–4 on an ordinal scale). The physical working environment was measured as six dimensions with one question in each. The questions included self-rated physical fatigue after a normal day of work in back, neck, shoulder, arms, wrists and legs, with similar 0–4 ordinal scale response options for each question.

To complement measures of psychological and physical wellbeing, kitchen workers were asked about their beliefs and attitudes towards the food quality, experiences with kitchen user recognition, motivation to work, application of nutritional guidelines and food flavouring practices at baseline and follow-up. In addition, four questions were added to the follow-up measurement directly asking the kitchen workers to consider their experiences with the organic food conversion process in relation to their work satisfaction, joy and workload, all with five response options for each question.

The extent of organic food conversion was defined as the proportion of food estimated to be organic by the kitchen

workers. During the organic food conversion, public kitchens mainly applied the official Danish Organic Cuisine Label method<sup>8,20</sup> to register the proportion of organic food within one of the four intervals: 0–30% (no label), 30–60% (bronze label), 60–90% (silver label) and 90–100% (gold label). The amount of processed food products was also measured as a possible indicator of the conversion process.

## Analysis

Primary analyses were based upon all responses obtained at baseline and all responses obtained at follow-up (unpaired). A secondary set of analyses were restricted to only those individuals with data obtained at both baseline and follow-up (paired). For the physical and psychological measures of wellbeing, the ordinal responses were treated as continuous variables and the mean values were estimated at baseline and follow-up and differences in the mean and 95% CI between baseline and follow-up were also calculated. Tests of difference between baseline and follow-up were made using unpaired *t*-tests for the primary analysis and paired *t*-tests for the secondary analysis. Where the data were proportions the comparisons were made using chi-squared tests.

Differences in organic food percentage following the organic food conversion programme were estimated by comparing the reported proportions within the different intervals relevant for the Organic Cuisine Label (0–30%, 30–60%, 60–90% and 90–100%). In addition the baseline metrics and the questions relating to the kitchen workers' views on the transition that were recorded only at follow-up were summarised as proportions.

Given the large number of comparisons made, and in an effort to limit the risk of drawing false-positive conclusions, a *P* value of 0.01 was considered significant and the findings were interpreted in light of the broad pattern of observations recorded rather than single findings being considered in isolation. *T*-tests and chi-squared statistical analyses were done using RStudio statistical software package version 0.98.1103 (R Inc., Boston, MA).

## Results

Of the 170 public kitchens from which kitchen workers were invited to participate, 83 were represented at baseline (49%) and 71 at follow-up (86% of those surveyed at baseline). More than half of the public kitchens included at baseline were childcare kitchens (58%) followed by residential institutions (14%), canteens (12%) and elderly care kitchens (6%). School and hospital kitchens were each represented by 4% of the participating public kitchens while after-school and central kitchens each were represented by 1% (table 1). In terms of meals produced, 76% of the public kitchens included at baseline reported preparing breakfast, 98% lunch, 27% dinner and 87% in-between meals. The proportions of different kitchen types included at follow-up and the types of meals produced were not significantly different from baseline. Of the 87 eligible public kitchens not included, 84% were childcare kitchens.

Of the 448 eligible kitchen workers, 235 completed the questionnaire at baseline (52%) and 149 at follow-up (63% of those surveyed at baseline). The majority of the participants were female and aged 40–49 years (table 2). Most participants had been working in the kitchen workplace for 1–4 years (32%) as an employee (58%), and at either a hospital (31%) or a childcare kitchen (23%). Participants surveyed at follow-up were similar to those included at baseline.

## Primary analysis

For the primary unpaired analysis presented in table 3, there were no significant differences between baseline and follow-up measures of psychological wellbeing. In terms of the six parameters measuring physical wellbeing, there were no significant differences observed except for general body fatigue. Here, the follow-up score was

**Table 1** Characteristics of public kitchens included in the study at baseline ( $n=83$ ) and follow-up ( $n=71$ )

Characteristics	Baseline (%)	Follow-up (%)
<b>Kitchen type<sup>a</sup></b>		
Childcare	58	56
School	4	4
After-school	1	1
Canteen	12	14
Elderly	6	7
Hospital	4	4
Central	1	1
Residential	14	11
<b>Kitchens producing main meals<sup>b</sup></b>		
Breakfast	76	75
Lunch	98	97
Dinner	27	27
<b>Kitchens producing in-between meals<sup>c</sup></b>	87	82

a: Childcare includes all childcare institutions such as nurseries, kindergartens and integrated institutions; School includes school canteens and school-cooking classes; After-school covers institutional after-school care; Canteen includes canteens or cafés associated with workplaces, universities, activity centres or cultural venues; Elderly includes homes for elderly; Hospital covers patient procurement; Central includes large-scale food production kitchens delivering procurement for receiving kitchens; Residential includes institutions in which consumers live permanently (i.e. social care facilities, university boarding schools and barracks).

b: Proportions of kitchens producing breakfast, lunch and dinner, self-reported. Kitchen types open for production 5 d/week: childcare, school food, after-school and canteen. Institution types open 7 d/week: elderly, hospital, central and residential.

c: Proportions of kitchens producing in-between meals, self-reported. Kitchen types open 5 d/week: childcare, school, after-school and canteen. Institution types open 7 d/week: elderly, hospital, central and residential.

significantly ( $P=0.004$ ) higher than the baseline score with a difference in mean (95% CI) of 0.32 (0.11, 0.53). Significantly higher scores from baseline to follow-up were also identified in three parameters measuring beliefs and attitudes including perceived food quality ( $P<0.001$ ), motivation to work with organic food production ( $P=0.01$ ) and application of nutritional guidelines in food production ( $P<0.001$ ) with differences in means (95% CI) of 0.25 (0.41, 0.35), 0.22 (0.05, 0.39) and 0.56 (0.37, 0.76), respectively.

Self-rated organic food percentage was reported according to the levels of the Organic Cuisine Label. At baseline 144 (61%) participants reported a procurement level between 0 and 30%, which is below the lowest level required to be awarded an Organic Cuisine Label. The number of participants reporting an organic food percentage between 30 and 60% (bronze) at baseline was 39 (17%), 26 (11%) reported a percentage at 60–90% (silver) and 5 (2%) at 90–100% (gold). At baseline 21 (9%) participants reported not knowing the level of organic food procurement in their kitchen. At follow-up the number of participants reporting not knowing the level of organic food procurement had significantly decreased to 4 (2.5%) and the proportion of participants reporting organic food percentage had shifted towards higher levels: 31.5% at the 0–30% level, 25.5% at bronze level, 31.5% at silver level and 9% at gold level. The increase in organic food percentage was significant ( $P<0.001$ ) with a difference in means (95% CI) of 0.68 (0.49, 0.88). Measurements of the production methods of selected foods indicated a shift from applying more ready-made food products at baseline to more food being produced from base at follow-up (Supplementary table S1). This effect was significant for one food item (Pâté,  $P=0.004$ ).

**Table 2** Characteristics of kitchen workers included in the study at baseline ( $n=235$ ) and follow-up ( $n=149$ )

Characteristics	Baseline (%)	Follow-up (%)	$P$ value <sup>a</sup>
<b>Age (years)</b>			0.818
<30	9	7	
30–39	19	19	
40–49	39	37	
50–59	29	34	
>60	4	3	
<b>Gender</b>			0.197
Female	79	86	
Male	8	6	
Unknown <sup>b</sup>	13	8	
<b>Experience (years)<sup>c</sup></b>			0.077
<1	11	3	
1–4	32	33	
5–9	26	34	
10–14	13	14	
15–20	7	4	
>20	11	12	
<b>Position<sup>d</sup></b>			0.192
Leader	28	36	
Employee	58	56	
Trainee	14	8	
<b>Workplace<sup>e</sup></b>			0.480
Childcare	23	32	
School	3	3	
After-school	1	1	
Canteen	16	12	
Elderly	9	13	
Hospital	31	26	
Central	3	2	
Residential	14	11	

a:  $\chi^2$  statistical test for proportions.

b: Proportion of respondents for who gender could not be established.

c: Number of years the respondent has been working in the respective kitchen.

d: Work position of the respondent in the respective kitchen.

e: Workplace of the respondent in terms of kitchen type.

Kitchen workers' considerations on the recent organic food conversion process are presented in Table 4. Half of the kitchen workers (50%) reported that the conversion process had had a positive/very positive impact on their job satisfaction whereas 44% reported no change. Similar numbers were reported with regard to joy with work and motivation to work, 53% and 54% reported positive/very positive impact, respectively, and 41% and 36% reported no change, respectively. Finally for workload, 24% reported positive/very positive impact and 60% no change.

### Secondary analysis

The results from the secondary paired analysis ( $n=92$ ) were similar to the primary analysis with only a few differences. Of the parameters measuring psychological wellbeing, a borderline significant decrease in scores was detected in 'Influence' and 'Recognition (rewards)' at  $P=0.04$  with a difference in mean (95% CI) of  $-0.33$  ( $-0.63, -0.02$ ) and  $P=0.03$  with a difference in mean of  $-0.29$  ( $-0.56, -0.03$ ) respectively (Supplementary table S2). In terms of physical wellbeing, the significant increase in scores for general body fatigue was not found but a significant negative difference on self-rated physical work ability was detected at  $P=0.01$  with a difference in mean (95% CI) of  $-0.24$  ( $-0.42, -0.06$ ) (Supplementary table S2). Of the three significant differences between baseline and follow-up measurements of the parameters measuring beliefs and attitudes identified in the primary analysis, only the increase in scores for food quality was still significant ( $P=0.01$ ) with a difference in mean (95% CI) of 0.14 (0.04, 0.24) (Supplementary table S2).

**Table 3** Changes in parameters on psychological and physical wellbeing at work and beliefs and attitudes amongst kitchen workers during organic food conversion at baseline ( $n=235$ ) and follow-up ( $n=149$ )

Parameters	Baseline		Follow-up		Difference Mean (95%CI)	P values T-test <sup>b</sup>
	Mean	SD	Mean	SD		
<b>Psychological<sup>a</sup></b>						
Quantitative demands	3.8	(0.9)	4.0	(0.8)	0.15 (-0.02,0.33)	0.096
Work pace	3.2	(1.2)	3.0	(1.5)	-0.20 (-0.48,0.07)	0.147
Emotional demands	4.9	(1.5)	4.8	(1.7)	-0.15 (-0.47,0.18)	0.379
Influence	5.4	(1.8)	5.3	(1.8)	-0.09 (-0.46,0.29)	0.650
Possibilities for development	5.8	(1.4)	5.9	(1.3)	0.14 (-0.14,0.41)	0.336
Meaning of work	6.5	(1.1)	6.7	(1.1)	0.18 (-0.05,0.41)	0.117
Commitment to the workplace	5.6	(1.4)	5.6	(1.6)	0.01 (-0.30,0.32)	0.942
Predictability	5.1	(1.4)	5.2	(1.5)	0.05 (-0.25,0.35)	0.725
Rewards (recognition)	5.8	(1.3)	5.6	(1.6)	-0.12 (-0.41,0.17)	0.424
Role clarity	6.1	(1.2)	6.0	(1.4)	-0.05 (-0.32,0.21)	0.681
Trust regarding management	6.0	(1.3)	5.9	(1.5)	-0.04 (-0.33,0.24)	0.772
Justice and respect	5.1	(1.3)	5.1	(1.5)	-0.03 (-0.31,0.26)	0.855
<b>Physical</b>						
Body fatigue (general)	2.1	(1.1)	2.4	(0.9)	0.32 (0.10,0.54)	<b>0.004</b>
Back fatigue	2.4	(1.2)	2.6	(1.1)	0.20 (-0.04,0.44)	0.100
Neck and shoulder fatigue	2.3	(1.2)	2.5	(1.1)	0.23 (-0.01,0.47)	0.064
Arm and wrist fatigue	2.6	(1.3)	2.8	(1.1)	0.22 (-0.03,0.46)	0.084
Leg fatigue	2.5	(1.3)	2.7	(1.1)	0.20 (-0.04,0.50)	0.106
Self-rated physical work ability	2.8	(0.9)	2.7	(1.0)	-0.16 (-0.35,0.03)	0.089
<b>Beliefs and attitudes</b>						
The food quality is good	3.5	(0.6)	3.8	(0.4)	0.25 (0.13,0.26)	<b>&lt;0.001</b>
Motivation to work	3.1	(0.9)	3.3	(0.8)	0.22 (0.05,0.40)	<b>0.012</b>
Kitchen user recognition	3.4	(0.6)	3.4	(0.7)	0.02 (-0.11,0.14)	0.811
Nutritional guideline application	2.7	(1.1)	3.3	(0.8)	0.56 (0.36,0.77)	<b>&lt;0.001</b>
Food flavouring before serving	3.7	(0.5)	3.7	(0.5)	0.07 (-0.04,0.17)	0.230

a: Psychological scales/parameters included two dimensions per scale whereas physical and emotional scales/parameters only included one dimension. Dimensions were scored from 0 to 4 where high scores in all scales/parameters indicate beneficial/positive development.

b: Unpaired, two-sided t-test.

**Table 4** Considerations by kitchen workers on the impact of organic conversion process in four areas at follow-up ( $n=149$ )

Answer options	Job satisfaction (%)	Joy with work (%)	Motivation to work (%)	Workload (%)
Very positively	20	17	18	3
Positively	30	36	36	21
No change	44	41	36	60
Negatively	1	1	4	8
Very negatively	0	0	0	1
Unknown	5	5	5	7

## Discussion

This study showed no significant negative differences in the psychological or physical wellbeing of kitchen workers following the organic food conversion but significant positive changes were detected in reported beliefs and attitudes in terms of perceived food quality, motivation to work and application of nutritional guidelines. These results are supported by the reported considerations of the kitchen workers, where half or more reported experiencing a positive/very positive impact of the organic food conversion process on their job satisfaction, joy with work and motivation. Finally, results show a significant shift towards higher reported organic food percentages.

The present results suggest that despite of additional job demands associated with implementing organic food conversion, Danish public kitchen workers experience greater job satisfaction and motivation to work. The results indicate that it is possible to increase the organic food percentage in Danish public kitchens while avoiding negative changes in the experienced wellbeing at work through training, at least during the first year. Results from

this study are supported by recent research on implementing whole school food programmes, during which kitchen worker involvement resulted in greater motivation and job satisfaction despite new challenges.<sup>21</sup> Former research on food service employees also found that stress from additional job demands can be balanced by job-control and support from managers.<sup>14</sup> With none of the funding from the Danish Organic Action Plan 2020 being available to cover additional costs of purchasing organic food products, crucial success criteria for the organic food conversion projects is to increase the knowledge of organic food among kitchen employees and their motivation to prioritize it.<sup>15</sup> Through training on practical food preparation and application of organic food production systems, organic food conversion projects seem to upgrade the professional competencies of the kitchen employees, resulting in increased empowerment and wellbeing at work.

Viewing the results from a broader perspective, the present findings suggest that organic food conversion in public kitchens holds potential to improve the sustainability of the public food production. Generally, the educational content of conversion projects emphasises strategies to increase organic, local and seasonal procurement, reduce food waste and limit meat consumption. These strategies are effectively implemented to cover the price premium of organic food and are also strongly linked to increased sustainability.<sup>7,8,22</sup> Moreover, Danish public kitchens spent 400 million DDK (~53.6 million Euro) on organic food procurement in 2013.<sup>23</sup> With the potential to increase the demand for organic produce, organic food conversion may impact environmental sustainability in terms of soil quality, water conservation, biodiversity, limiting application of antibacterial regimes and greenhouse gas emissions.<sup>3,4</sup> Adding to this the implications of potential transferability suggested by former studies,<sup>21</sup> organic food conversion may be of great relevance to other countries than Denmark in terms of sustainable food production in the future.

Regarding physical wellbeing at work measurements, the differences obtained demonstrate how physical wellbeing can be kitchen dependent with some kitchens being able to adjust and upgrade the physical kitchen facilities to meet potential additional needs of the kitchen workers. They also illustrate how motivated kitchen workers pay less attention to the potentially increased physical workloads (primary analysis) or reversely, how additional challenges may decrease perceived work ability (secondary analysis).

This study has several limitations. The relatively small sample size in terms of public kitchens and kitchen workers included resulted in limited statistical power to detect small differences in study outcomes. The study did not include control kitchens and workers that were not exposed to the organic food conversion process and is therefore unable to directly inform causality. The characteristics of the kitchen workers mirrored those of kitchen worker from a previous Danish study<sup>24</sup> and were not significantly different from baseline to follow-up, but the risk of introducing participant loss to follow-up bias cannot be excluded. Similarly, response bias can also not be excluded due to the self-administered questionnaire design. The relatively large number of participants working in a hospital kitchen can be explained by the number of workers needed in a hospital kitchen, whereas childcare kitchens often only have one or two kitchen workers employed. Finally, improvements to the data collection process should be made to avoid unknown gender specifications of the participants. This question was not sufficiently integrated in the online questionnaire design and therefore gender could not be determined in a small sample of the participants.

Nonetheless, the exploratory value of this study should be emphasized. To the best of the authors' knowledge, this is the first time wellbeing at work has been reported among kitchen workers in public kitchens during organic food conversion and complementary studies on the long-term effects are needed. The questionnaire design combined three existing questionnaires<sup>17–19</sup> with sections constructed by the authors specifically for this study, which has been done before.<sup>25</sup> However, the level of validation of the different questionnaire sections in this study varies greatly with the Copenhagen Psychosocial Questionnaire being recognized and applied internationally<sup>26–30</sup> and the author-constructed part having been developed through expert advice and pilot-testing among the target population.

In conclusion, this study found no substantive differences on either physical or psychological wellbeing at work among kitchen workers before and after organic food conversion but did find significant increases in experienced motivation to work and perceived food quality. This may add to the benefits of increasing organic public procurement by showing potential improvements to kitchen worker beliefs and attitudes. The results from this study support the Danish Organic Action Plan 2020 and initiatives of similar kind.

## Supplementary data

Supplementary data are available at *EURPUB* online.

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*Conflicts of interest:* None declared.

## Key points

- This study found no substantive differences on experienced physical or psychological wellbeing at work among kitchen workers before and after organic food conversion in Danish public kitchens
- Results from this study indicate increases in experienced motivation to work and perceived food quality by kitchen workers as well as an overall increase in organic food percentage in the public kitchens following organic food conversion.
- Policy implications following this study could include more targeted support for the Danish Organic Action Plan 2020 and similar initiatives along with additional research on the potential positive effects of organic food conversion in terms of nutrition and food quality.

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