

Workers in the Small and Medium Industry Sector in the Anak Air Health Center Working Area: Instruction and Training on Proper Nutrition

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ABSTRACT

Nutrition training programmes for small and medium enterprises (SMEs) have great potential to improve the welfare and productivity of the workforce. This study used mixed methods research with quantitative and qualitative approaches. A total of 120 workers in the SME sector in the Anak Air health centre working area were selected as the research sample. Data were collected through a questionnaire designed based on relevant nutrition indicators, such as diet, frequency of consumption of nutritious food, and health status of workers. The quantitative data were analysed using descriptive statistical tests to describe the distribution of baseline data, as well as inferential tests to assess significant differences between pre- and post-training intervention outcomes. Qualitative in-depth interviews and focus group discussions (FGDs) were conducted to gain an indepth understanding of workers' perceptions, challenges faced, and recommendations for programme development. The results showed that the nutrition training had a significant impact on improving the knowledge, attitudes, and behaviours of workers related to healthy nutrition after attending the training. When food and macronutrient availability is closer to the proportion of healthy consumption patterns, there is a possibility of reducing stunting in the neighbourhood.

Keywords : *Nutrition Knowledge Level, Attitude, Behaviour*

INTRODUCTION

Small and Medium Industries (SMIs) play a strategic role in the national economy. This sector contributes significantly to the Gross Domestic Product (GDP), creates jobs, and supports more equitable income distribution. In Indonesia, SMEs are not only an economic driver but also the largest labour absorber. The sector accounts for 99% of all business units in Indonesia and provides more than 60% of private sector employment (Gherghina et al., 2020).

Training and education on healthy nutrition are essential for empowering these workers to make informed dietary choices that promote their well-being. Research indicates that nutrition education can lead to improved dietary behaviors, decreased risk of chronic diseases, and enhanced work performance. For instance, systematic reviews have shown that workplace nutrition



interventions significantly improve employees' dietary habits and health outcomes, thereby reducing absenteeism and healthcare costs for employers (Hassani, Amani, Haghighizadeh, & Araban, 2020)

However, SME workers face various health challenges, especially in diet and life balance. Long working hours often lead to unhealthy diets, leading to poor nutritional status such as anaemia and obesity. Research shows that poor nutritional status can reduce work productivity by up to 20 per cent due to a decrease in workers' energy and ability to focus (Petkovska, 2015).

Studies in the Anak Air health centre area show that many SME workers experience nutrition-related health problems. Based on local health reports, the prevalence of anaemia among female workers is high, while obesity is starting to trend among male workers. This reflects the lack of awareness of the importance of healthy eating and nutrition education in this sector.

Puskesmas Anak Air has a strategic role in addressing this issue through health promotion and nutrition education. However, nutrition programmes specific to SME workers are still very limited. This suggests the need for innovation in health promotion approaches, especially to improve the understanding of SME workers on the importance of a healthy diet and active lifestyle (Rathnasiri, 2015).

Various studies have shown the effectiveness of community-based nutrition training in improving people's nutrition knowledge and behaviour change. However, research specific to nutrition training-based interventions for SME workers is limited, creating an opportunity for further research (Rabie et al., 2015).

Healthy nutrition training programmes for SME workers have great potential to improve the welfare and productivity of the workforce. Collaboration between health centres, businesses, and workers can create a healthier and more productive work environment. With proper training, workers can understand the importance of a healthy diet, which in turn will increase their work productivity. This programme can also serve as a model for replication in other regions (Stanković et al., 2018).

In conclusion, addressing nutrition in the SME sector is not only important for improving worker health, but also has a direct impact on increasing productivity and national economic growth. A nutrition training-based approach involving all stakeholders is key to realising this goal.

METHODS

This study used mixed methods research with quantitative and qualitative approaches. Quantitatively, the study involved a survey to measure the level of workers' nutritional knowledge, attitudes and behaviours before and after the training intervention. Sampling was conducted using stratified random sampling to ensure a balanced representation of groups of workers with various characteristics, such as age, gender, education level, and length of employment in the SME sector.

The sample size was determined based on statistical calculations to achieve a 95% confidence level with a 5% margin of error, so as to obtain a minimum number of respondents that reflects the population of workers in the region. From the results of this calculation, a total of 120 workers were selected as the research sample, consisting of predetermined strata. Data were collected through a questionnaire designed based on relevant nutrition indicators, such as diet, frequency of consumption of nutritious food, and health status of workers.



The collected quantitative data were analysed using descriptive statistical tests to describe the distribution of baseline data, as well as inferential tests, such as paired t-tests, to assess significant differences between pre- and post-training intervention outcomes. This approach provides strong empirical evidence of the effectiveness of nutrition training in improving workers' knowledge, attitudes and healthy behaviours.

Qualitative in-depth interviews and *focus group* discussions (FGDs) were conducted to gain an in-depth understanding of workers' perceptions, challenges faced, and recommendations for programme development. Key informants included workers, SME employers, health workers at the Anak Air health centre, and other relevant parties. Qualitative data was analysed using a thematic approach to identify relevant patterns and themes.

The implementation of the intervention involved group-based nutrition training designed according to the needs of SME workers. The training materials included an introduction to balanced nutrition, practice in developing healthy menus, and management of nutritious food at affordable costs. The training was conducted over 4 weeks with weekly sessions involving simulations and hands-on practice.

The study population was workers in the SME sector in the Anak Air health centre working area. The sampling technique was conducted using stratified random sampling, with strata based on job type (production, administration, or distribution) and age group (18-30 years, 31-45 years, and >45 years). This approach ensured that each subgroup in the population was proportionally represented in the study sample.

Evaluation of the intervention outcomes was conducted through pre-test and post-test to measure changes in nutrition knowledge, attitude, and behaviour. Knowledge was measured using a validated nutrition indicator-based questionnaire, such as healthy eating patterns and nutritious food consumption recommendations. Attitudes were measured using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) that included 10 statements related to the perceived importance of a healthy diet and balanced nutrition, with a maximum total score of 50. Behaviour was assessed using a 10-item questionnaire that measured the frequency of consumption of nutritious foods, the application of a healthy diet, and the habit of reading food labels, using a 0-5 scale (0 = never to 5 = always), with a maximum total score of 50.

The data obtained were analysed to compare pre-test and post-test results using paired t-test to assess significant changes in knowledge, attitude, and behaviour after the training. The use of this standardised instrument allows replication of the study in populations with similar characteristics.

The results of this study are expected to provide evidence-based recommendations that are applicable to the development of nutrition education programmes in the SME sector, as well as a model that can be applied in other areas with similar characteristics.

RESULTS

This study produced data that showed a significant increase in the level of knowledge, attitudes, and behaviour of workers related to healthy nutrition after attending the training. Data were obtained through pre-test and post-test analyses and in-depth interviews.

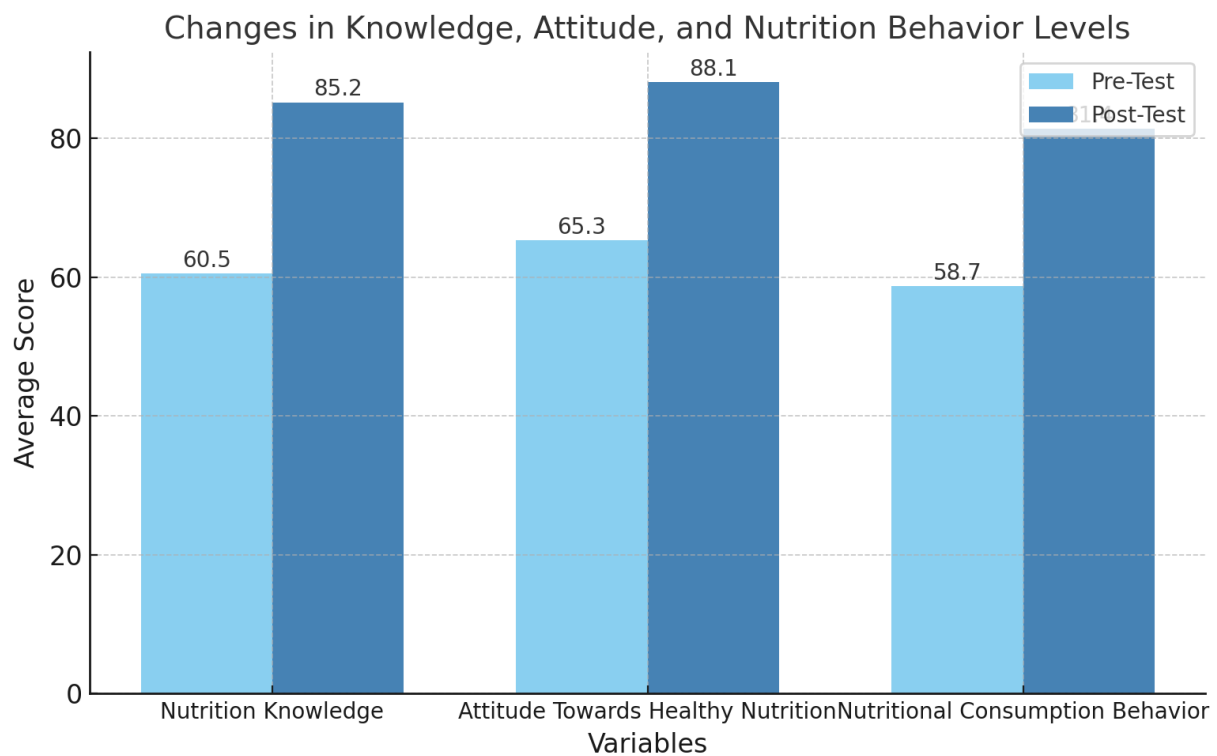


1. Changes in Nutrition Knowledge Level, Attitude and Behaviour

Table 1. Changes in Nutrition Knowledge, Attitude and Behaviour

Variables	Pre-Test Average Score	Post-Test Average Score	Change (%)	P-Value
Nutrition Knowledge	60,5	85,2	+40,7	< 0,01
Attitude towards Healthy Nutrition	65,3	88,1	+34,9	< 0,01
Nutrition Consumption Behaviour	58,7	81,4	+38,6	< 0,01

Based on Table 1, the changes in nutritional knowledge, attitudes and behaviours showed an increase in the average score of 40,7%, indicating that the training was successful in improving workers' understanding of the concept of balanced nutrition. This includes the introduction of nutritious foods, the importance of a regular diet, and the impact of nutritional deficiencies on productivity. The increase in attitude score by 34,9% indicates a positive shift in the way workers view the importance of healthy nutrition. Most respondents began to prioritise nutritious food in their daily lives. The 38,6% increase in nutrition consumption behaviour reflects a noticeable change in workers' diets. Respondents reported increased consumption of vegetables, fruits and quality protein sources after the training.



Picture 1. Graphics Changes in Nutrition Knowledge, Attitude and Behaviour

The graph above shows a comparison of the pre-test and post-test mean scores for workers' nutritional knowledge, attitudes, and behaviour after the training. Significant improvements were seen in all three variables, reflecting the effectiveness of the training.

2. In-depth Interview Analysis

Table 2. Results of In-depth Interview Analysis

Theme	Key Findings	In-depth interview
Nutrient consumption constraints	Limited time to prepare healthy meals; lack of access to food.	<p>Most respondents cited limited time as the main constraint in preparing healthy meals. One respondent stated:</p> <p>“With a high workload, I often do not have time to cook healthy food, so I often choose fast food”.</p> <p>In addition, access to nutritious food is also a challenge. One worker revealed:</p> <p>“It is difficult to find fresh vegetables and fruits near where I live, let alone affordable ones”.</p>
Training Impact	Increased awareness of the importance of healthy menus; some workers started meal-prep.	<p>The training was successful in raising respondents' awareness of the importance of a healthy diet. One respondent reported:</p> <p>“I started preparing meals for the next few days to make it easier, so now I eat vegetables and fruits more often”.</p> <p>Another respondent adds:</p> <p>“I have reduced instant food and cook my own side dishes more often. It's healthier and more economical”.</p>
Recommendations from Workers	Additional healthy cooking practice sessions in the next training.	<p>Most respondents suggested adding practical sessions to the training. One respondent stated:</p> <p>“If there is a practical session on cooking healthy food, we can immediately learn how to make a simple but nutritious menu”.</p> <p>Another suggested the involvement of community health centres:</p>



		“It would be helpful if the community health centres provide easy and cheap recipes for healthy food to be practised at home”.
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Based on the interview results in Table 2, it is known that on the theme of constraints to nutrition consumption, most respondents revealed that limited time is the main obstacle in preparing nutritious food. This is due to the high workload in the small and medium industry (SME) sector, which makes it difficult for them to take the time to prepare healthy meals. In addition, access to nutritious food, especially fresh vegetables and fruits, is still considered inadequate by some workers, especially those who live in industrial areas with limited market facilities or local food sources.

On the theme of training impact, it was found that the training was successful in increasing respondents' awareness of the importance of eating nutritious food. Some respondents reported that they have started to adopt the habit of *meal-prep*, which means preparing healthy meals for the next few days, so that time constraints can be overcome. Workers also reported starting to reduce their consumption of fast food or instant food as a practical alternative, and replacing it with healthier food ingredients such as home-cooked side dishes and fruits.

In the theme of recommendations from workers, respondents gave positive feedback on the training programme but suggested the addition of more applicable sessions. One recommendation that often arose was to include practical sessions on cooking healthy food with simple and affordable ingredients. Workers also suggested involving the health centre in providing cheap and nutritious recipes that can be implemented at home easily, according to their daily needs.

DISCUSSION

Based on the results of the study, there was a significant increase in the level of knowledge, attitudes, and behaviour of workers related to healthy nutrition after the implementation of the training programme. This discussion will link the research findings with supporting theories and research assumptions.

1. Relationship between Nutrition Knowledge and Health Education Theory

The 40.7% increase in nutrition knowledge scores after the intervention demonstrates the effectiveness of the educational approach used in the training. According to health education theory (Green & Kreuter, 2005), behaviour change begins with an increase in knowledge, which forms the basis for attitudes and actions. The training materials that were developed based on the specific needs of the workers succeeded in providing easy-to-understand information, such as an introduction to the concept of balanced nutrition, the importance of a regular diet, and the adverse effects of nutritional deficiencies on productivity (Johan, 2023).

This theory is reinforced by the findings of (Zerlina & Humayrah, 2023) which show that nutrition awareness, nutrition knowledge, and health awareness are not direct causal factors that can affect nutritional status, so it is suspected that there are other factors that directly affect

nutritional status, such as nutritional intake or health status. In this context, training programmes serve as an effective educational medium to impart new knowledge.

The 40.7% increase in knowledge supports this assumption as health education theory states that knowledge is the first step in healthy behaviour change. If workers receive comprehensive education on healthy nutrition through training, their knowledge will increase, and this will be the basis for changes in nutritional consumption behaviour.

2. Shifting Attitudes towards the Importance of Healthy Nutrition

The 34.9% increase in attitude score reflects a positive change in workers' views on nutrition. Based on the Attitude Change Theory (Ajzen, 1991), a person's attitude is influenced by knowledge, experience, and environment. The training not only provided theoretical education but also created critical awareness among workers about the long-term benefits of healthy nutrition (Mahyarni, 2013).

The results of in-depth interviews support this finding, where some workers have started to prioritise nutritious food and reduce fast food consumption. This suggests that the knowledge gained is successful in shaping positive attitudes that drive behaviour change.

The 34.9% increase in attitude score indicates a positive shift in workers' views. This assumption is supported by the Attitude Change Theory which explains that knowledge and experience shape attitudes that support healthy behaviour (Ichsan, 2022). If workers' nutrition knowledge increases and is accompanied by an understanding of the benefits of a healthy diet, their attitudes towards the importance of healthy nutrition consumption will change positively.

3. Nutrition Consumption Behaviour Change and Health Behaviour Model Theory

The 38.6% increase in nutrition consumption behaviour scores attests to the effectiveness of the programme in driving real behaviour change. Based on the Health Belief Model Rosenstock, 1974, individuals are likely to adopt healthy behaviours if they are aware of the benefits and see practical solutions to overcome barriers (Subedi et al., 2023; Wikipedia, 2019). In this study:

- a. Application of the meal-prep method by workers to overcome time constraints.
- b. Lack of access to nutritious food has been identified, but solutions from training such as simple and affordable recipes are a mitigating measure.

Respondents reported increased consumption of vegetables, fruits and quality protein sources, reflecting behaviour change consistent with this model.

The 38.6% improvement in nutritional consumption behaviour proves that effective education and practical solutions such as meal-prep can help workers adopt healthier diets. This is consistent with the Health Belief Model, which emphasises the importance of practical solutions in overcoming barriers to healthy behaviour. If workers understand the benefits of healthy nutrition and are provided with practical solutions that suit their conditions, nutritional food consumption behaviour will increase.

4. Nutrition Consumption Constraints and Environmental Factors

The main constraints expressed by respondents, such as limited time and access to food, are relevant to Social Ecology Theory Bronfenbrenner, 1979. Environmental factors, including intensive working conditions in the SME sector and limited market facilities, influence workers' nutrition



consumption behaviour (Gamayanti, 2014). Therefore, the education provided in the training serves as a micro intervention to help individuals overcome these barriers.

This is in line with research conducted by Juanda et al. (2022), who found that food availability and macronutrients are environmental enablers for stunting reduction in selected Asian regions. The results showed that when macronutrient availability was lower, the prevalence of stunting was higher. In conclusion, when food and macronutrient availability is closer to the proportion of healthy consumption patterns, there is a possibility of reducing stunting in the neighbourhood.

If environmental constraints such as limited time and food access can be identified, then educational interventions that include practical solutions will be more effective in changing nutrition consumption behaviour. The main constraints expressed by respondents, such as limited time and food access, support this assumption. Solutions from training, such as low-cost recipes and meal-prep techniques, have helped workers overcome some of these barriers. Social Ecology Theory emphasises the importance of understanding the interaction between individuals and their environment to drive change.

5. Recommended Healthy Cooking Practices

The interview results also revealed the suggestion of adding healthy cooking practice sessions. This is in line with the participatory approach in adult education, where participants have an active role in designing and evaluating the programme (Kurniati et al., 2022). This recommendation shows that workers feel involved in the learning process and want solutions that are applicable and appropriate to their conditions.

If nutrition training is complemented with practical sessions on healthy cooking, workers will find it easier to apply nutrition knowledge in their daily lives. The recommendation from workers to add practical cooking sessions supports this assumption. The participatory approach in adult education states that active involvement of participants in the programme will increase the effectiveness of learning and application.

6. Implications for Productivity and Labour Productivity Theory

This finding supports research (Andiani et al., 2019) that shows there is a relationship between workload and calorie intake with job fatigue in stevedores at the Port. Workers with better diets tend to have higher energy, better endurance, and increased ability to focus, thus potentially increasing productivity in the SME sector.

If workers have a healthy diet and good nutritional status, their energy levels, focus, and productivity at work will increase. This assumption is in line with the findings of Andini et al. 2019, which showed that nutritional status is positively correlated with productivity. With increased consumption of healthy food, workers become physically and mentally healthier, resulting in improved performance in the SME sector.



CONCLUSIONS

The results showed that the nutrition training had a significant impact on improving the knowledge, attitudes and behaviours of SME sector workers in the Anak Air health centre area. This finding provides strong evidence that a health education-based approach can create positive changes that are in line with the theory of attitude change and the health behaviour model. Increased knowledge and awareness is an important foundation in encouraging the adoption of healthy behaviours.

The broader implications of these findings are highly relevant for policy makers, especially in designing training-based health programmes in areas with similar SME demographics. Strategically designed training programmes can be a tool to improve the quality of life of workers as well as the productivity of small and medium-sized enterprises. The recommendation to add healthy cooking practice sessions as part of the training programme not only strengthens the implementation of theory into daily practice, but also provides a tangible step to support programme sustainability.

By integrating applicable nutrition training programmes into occupational health policies in the SME sector, the government can expand the positive impact on public health, improve labour efficiency, and promote the sustainability of small and medium-sized industries. This suggests that such training is not only an individual health intervention, but also a strategic investment in social and economic development.

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