Yüksek İhtisas Üniversitesi
Sağlık Bilimleri Dergisi
Yüksek İhtisas University Journal of Health Sciences
ISSN 2717-8439
E-ISSN 2717-9257

YIU Saglik Bil Derg 2025;6(3):59–64
https://doi.org/10.51261/yiu.2025.1722359

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Nutrition Status and Dietary Habits among Construction Workers in Türkiye

Türkiye'de İnşaat İşçilerinin Beslenme Durumu ve Beslenme Alışkanlıkları

Beda Büşra Özalp Çolak[1], Nilgün Seremet Kürklü[2], Sevan Çetin Özbek[1]

[1]Yüksek İhtisas University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara, Türkiye
[1]*Yüksek İhtisas Üniversitesi, Sağlık Bilimleri Fakültesi, Beslenme ve Diyetetik Anabilim Dalı, Ankara, Türkiye*
[2]Akdeniz University, Faculty of Health Sciences, Deparment of Nutrition and Dietetics, Antalya, Türkiye
[2]*Akdeniz Üniversitesi, Sağlık Bilimleri Fakültesi, Beslenme ve Diyetetik Anabilim Dalı, Antalya, Türkiye*

ABSTRACT

Introduction: This descriptive study aimed to evaluate the nutritional status and dietary habits of construction workers.

Material and Methods: A total of 382 male workers from various construction sites in Ankara, Erzurum, Antalya, and Isparta (Türkiye) participated in the study between 2020 and 2021. Dietary intake was assessed using a single 24-hour dietary recall method.

Results: The average age of the participants was 36,4±11,1 years, with an average household size of 4,4±2,1 persons; 33,2% reported incomes lower than their expenses. Overweight and obesity prevalence were found to be 41,9% and 16,8%, respectively. Tea was the most commonly consumed beverage (68,6%), and workers frequently opted for unhealthy snacks. Intake levels of energy, vitamin A, C, E, B2, B6, and folate were below the recommended daily allowances. Calcium, iodine, magnesium, and potassium were also insufficient. Protein intake was significantly lower among workers with incomes below their expenses ($p < 0,05$).

Conclusion: These findings indicate that construction workers do not meet their recommended intake levels for several macro– and micronutrients. The results may guide public health nutrition policies and provide a basis for practical recommendations.

Keywords: Construction workers, dietary habits, nutritional status

ÖZ

Amaç: Bu tanımlayıcı çalışma, inşaat işçilerinin beslenme durumunu ve beslenme alışkanlıklarını değerlendirmeyi amaçlamıştır.

Materyal ve Metodlar: Türkiye'deki Ankara, Erzurum, Antalya ve Isparta illerinde bulunan çeşitli şantiyelerde çalışan toplam 382 erkek işçi, 2020 ile 2021 yılları arasında çalışmaya katılmıştır. Besin alımı, tek seferlik 24 saatlik besin tüketim kaydı yöntemiyle değerlendirilmiştir.

Bulgular: Katılımcıların ortalama yaşı 36,4±11,1 yıl, ortalama hane halkı büyüklüğü ise 4,4±2,1 kişi olarak belirlenmiştir; katılımcıların %33,2'si gelirlerinin giderlerinden düşük olduğunu bildirmiştir. Fazla kilolu ve obez bireylerin oranı sırasıyla %41,9 ve %16,8 olarak saptanmıştır. En sık tüketilen içeceğin çay (%68,6) olduğu belirlenmiş, işçilerin sağlıksız atıştırmalıklara yönelme eğiliminde oldukları gözlemlenmiştir. Enerji, A, C, E, B2, B6 vitaminleri ve folat alımları önerilen günlük alım düzeylerinin altında olduğu gözlemlenmiştir. Kalsiyum, iyot, magnezyum ve potasyum alımları da yetersiz bulunmuştur. Geliri giderlerinden düşük olan işçilerde protein alımı anlamlı düzeyde daha düşük bulunmuştur ($p < 0,05$).

Sonuç: Bu bulgular, inşaat işçilerinin birçok makro ve mikro besin öğesini önerilen düzeylerde almadığını göstermektedir. Verilerimiz, halk sağlığı beslenme politikaları için yol gösterici olabilir ve önerilere temel oluşturabilir.

Anahtar Sözcükler: İnşaat işçileri, beslenme alışkanlıkları, beslenme durumu

Cite this article as: Özalp Çolak BB, Seremet Kürklü N, Çetin Özbek S. Nutrition Status and Dietary Habits among Construction Workers in Türkiye. YIU Saglik Bil Derg 2025;6(3):59–64 https://doi.org/10.51261/yiu.2025.1722359

Introduction

Nutrition is one of the basic requirements for sustaining life and protecting health. Adequate and balanced nutrition is an important factor in preventing non-communicable chronic diseases and delay in recovery from diseases, and in reducing costs by decreasing the duration of hospitalization (1). The construction industry plays a key role in economic development and employment generation worldwide. However, this sector faces numerous challenges, including inconsistent worker productivity and a lack of standardized health practices, which are compounded by inadequate nutritional status among the workforce.

***Yazışma Adresi/ Correspondence Address:** Beda Büşra Özalp Çolak , Department of Nutrition and Dietetics, Faculty of Health Sciences, Yüksek İhtisas University, Ankara, Türkiye;
E-posta: bedaozalp@gmail.com; B.B.Ö.Ç.: 0000-0002-7923-842X; N.S.K.: 0000-0003-1394-0037; S.Ç.Ö.: 0000-0002-3451-9834

Geliş Tarihi/Received: 19.06.2025, **Kabul Tarihi/Accepted:** 02.09.2025, **Çevrimiçi Yayın Tarihi/ Available Online Date:** 19.12.2025

Occupational health encompasses all practices aimed at ensuring worker safety and maintaining health (2). The International Labour Organization (ILO) defines occupational diseases as conditions arising from workplace exposures, leading to increased morbidity within the affected population compared to others (3).

The physically demanding nature of construction work increases energy and nutrient requirements, yet studies indicate that many workers do not meet their daily dietary needs, potentially leading to reduced productivity and increased risk of chronic illnesses (4). Inadequate intake of macro and micronutrients can impair concentration, increase the risk of workplace accidents, and contribute to higher rates of absenteeism. Construction workers often struggle to meet their nutritional needs due to the physically demanding of their work. Inadequate nutrition negatively affects worker productivity and health. Insufficient intake of energy and nutrients could cause decreased concentration, increasing the risk of occupational accidents (5).

Jensen (6) reported a positive association between optimal nourishment and productivity. An adequate and balanced diet reduces the risk of chronic diseases such as cardiovascular diseases and health costs. A study conducted in Ireland found that workers with bad dietary habits had a higher risk of obesity, emphasising the necessity of nutrition education to protect worker health (7). Studies conducted in Türkiye have also highlighted unhealthy eating habits among workers, suggesting that both workers and their families need education on adequate and balanced nutrition (8,9).

The most important problem in worker nutrition is that the calorie intake from food does not meet the energy expenditure. Workers working in heavy-activity occupations, such as construction workers, have high energy and nutrient requirements (10). The energy of food menus provided at the workplace should be adjusted to be half of the energy that a worker needs in a day. In addition, the muscle mass of heavy workers increases; dietary protein intake should be sufficient and of high quality to maintain muscle mass. It is recommended that at least 12% of total daily energy intake comes from protein. Additionally, 55–60% of energy intake should come from carbohydrates to prevent muscle loss and metabolic disorders associated with low carbohydrate intake (11).

The health status of the labor force, which plays a pivotal role in national economic development, is intrinsically linked to the adequacy of their energy and nutrient intake. Optimal nutrition is particularly important for workers in physically demanding industries such as construction (12). In the literature, there are not enough studies to date have examined on the nutrition of construction workers. Therefore, this study aims to address this gap by evaluating the nutritional status and habits of construction workers in Türkiye.

Material and Methods

Study Design

This descriptive cross-sectional study aimed to assess the nutritional status and dietary behaviors of construction workers. The research was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from the Yüksek İhtisas University Non-Interventional Research Ethics Committee (Ref. No. 2020/16/02). The study took place across various construction sites in Ankara, Erzurum, Antalya, and Isparta, Türkiye, between 2020 and 2021. All participants received an information sheet, and informed consent was obtained prior to data collection.

Sampling

The study included 382 male construction workers who volunteered to participate and met the inclusion criteria. The estimated construction worker population across the study regions was approximately 50.000. The sample size was determined based on a similar previous study (9), using a 5% margin of error and a 95% confidence level. Only male participants were included, reflecting the gender distribution typical of the construction industry.

Data Collection

For general information about the individuals participating in the study (age, education, occupation, etc.), a questionnaire form was applied by the researcher with the "face-to-face interview method". For the evaluation of nutritional status, food consumption records were taken by the researcher with the 24-hour dietary recall method.

The body weights of the individuals were measured at regular intervals with a calibrated precision balance (sensitive to ±0.1 kg) without shoes and wearing as light clothing as possible. Height was measured with a stadiometer. When the individuals were in a standing posture and the head was in the Frankfurt plane, the slide of the stadiometer was brought to the highest point of the upper part of the head and the measurement was taken. Body Mass Index (BMI) was calculated as kg/m² using the formula body weight/square of height squared (m²) and evaluated according to the World Health Organization (WHO) classification (13).

The food consumption of the individuals was determined by using a food consumption form prepared in advance with a 24-hour reminder method (re-call) on weekdays and by using photographic atlas of food portion size and amounts, and the data obtained from the food consumption records were analysed with the Nutrition Information Systems Package Program (BEBIS) using Standard Recipes, and daily energy and nutrient intakes and food group consumption amounts were calculated (14). Since the study was conducted in multiple centers, data were collected in both winter and summer seasons. The average daily energy and nutrient intakes were compared with the

recommended daily intakes for the corresponding age group, gender, and physical activity level (heavy activity), as specified in the Türkiye Dietary Guidelines 2022 by the Ministry of Health, and the percentages of intake (%) were calculated accordingly (5). The nutritional habits of the participants were recorded questionnaire. Questions include the number of meals, the presence of skipped meals and which ones, the reason for skipped meals, consumption, and type of beverages at work and snack preferences at work are questioned.

Data Analysis

In the study, descriptive statistics (mean, lower value, upper value, standard deviation, median) were calculated for data such as anthropometric measurements, daily food group consumption, energy and nutrient intakes, food consumption amounts and energy and nutrient intake rates (%), number of meals. Bivariate associations between socio-demographic variables and energy and macronutrient intakes were examined using Analysis of Variance (ANOVA).

The analyses of the study were made in IBM Statistical Package for Social Sciences (SPSS) program version Statistics for Windows version 23.0 (IBM Corporation, Armonk, New York, USA).

Results

This study was conducted among 382 construction workers between the ages of 18–64 working on construction sites. Their sociodemographic characteristics are given in Table 1. The mean age of the construction workers was 36,4±11,1 years and all the individuals were male. When the educational status of the individuals was analyzed, it was found that 31,2% of them were literate. It was observed that more than half of the individuals smoked (58,1%) and did not drink alcohol (67,6%). While 7,3% of the workers have diabetes, 3,7% have hypertension and 3,1% have cardiovascular diseases.

According to their body mass indexes, construction workers were generally normal (40,3%) and slightly overweight (41,9%) (Table 2). The mean body mass index was found to be 26,4±4,3 kg/m^2.

As shown in Table 3, two thirds of the construction workers (79,6%) usually consume 3 meals, while half of them sometimes (31,4%) or constantly (17,3%) skip their main meals. It was observed that the most frequently skipped meal was breakfast. Tea was the most preferred beverage and packaged foods such as biscuits, cakes and crackers were the most consumed snacks.

When the average daily calorie and nutrient intake of individuals was evaluated according to TÜBER 2022, worker below the recommend allowance their energy (53,4%), protein (55,8%), carbohydrate (41,9%) and fat (72,4%) requirements. We determined that vitamin A, C, E, B2, B6 and folate consumption of construction workers were below the recommendation. Calcium, iodine, magnesium, and potassium were also found to be lower than the recommended amounts.

Energy and macronutrient values were analyzed according to income status in Table 5, participants whose income was equal to their expenses had significantly higher protein intake compared to those whose income was less than their expenses.

Table 1. Sociodemographic characteristics of construction workers (%) (n=382)

General Features	n	%
Age (years) (Mean ± SD)	36,4±11,1	
Gender		
Male	382	100,0
Education status		
Illiterate	20	5,2
Only Literate	119	31,2
Middle school	93	24,3
High school	94	24,6
University	50	13,1
Postgraduate	6	1,6
Marital status		
Married	256	67,0
Single	126	33,0
Income status		
My income is less than my expenses	127	33,2
My income is equal to my expenses	143	37,5
My income is more than my expenses	112	29,3
Number of households (Mean ± SD)	4,4±2,1	
Cigarette consumption		
Yes	222	58,1
No	132	34,6
Sometimes	28	7,3
Alcohol consumption		
Yes	38	9,9
No	258	67,6
Sometimes	86	22,5
Diseases		
Hypertension	14	3,7
Cardiovascular disease	12	3,1
Diabetes mellitus	28	7,3
Chronic obstructive respiratory disease	2	0,8

SD: Standard deviation.

Table 2. Body mass index classification of construction workers (%) (n=382)

Body Mass Index (BMI) (kg/m^2) Classification	n	%
Body mass index (Mean ± SD)	26,4±4,3	
Underweight (<18.5 kg/m^2)	4	1,0
Normal (18.5–24.9 kg/m^2)	154	40,3
Overweight (25–29.9 kg/m^2)	160	41,9
Obese (≥30 kg/m^2)	64	16,8

SD: Standard deviation.

Table 3. Distribution of individuals meal consumption (%) (n=382)

Meal consumption	n	%
Number of main meals		
1	2	0,5
2	46	12,0
3	304	79,6
4 meals and more	30	7,9
Main meal skip		
Yes	66	17,3
No	196	51,3
Sometimes	120	31,4
Skipped main meal†		
Breakfast	122	65,6
Lunch	30	16,1
Dinner	34	18,3
Reason for skipping meals†		
No appetite	73	39,2
No habit	23	12,4
To lose weight	11	5,9
I do not have time	43	23,1
Difficult to prepare	16	8,6
Irregular work	20	10,8
Consumption of beverages during breaks at work		
Yes	354	92,7
No	28	7,3
Drinks consumed in snacks at work‡		
Tea	262	68,6
Coffee	55	14,4
Sweetened beverage	103	27,0
Dairy product	4	1,0
Mineral water	22	5,8
Herbal tea	12	3,1
Consumption of snacks at work		
Yes	234	61,3
No	148	38,7
Foods consumed in snacks at work‡		
Biscuits, cakes, crackers	182	47,6
Bagels, pastries, toast	62	16,2
Fruit	18	4,7
Nuts	18	4,7
Yoghurt, buttermilk, kefir	6	1,6

†Percentages (%) are calculated based on the number of people who skipped a main meal (n=186; 66 "Yes", 120 "Sometimes")
‡Evaluation was made over more than one answer. Percentages (%) were calculated based on the number of people consuming snacks.

Table 4. Individuals' daily average energy and nutrient intake (%)

Energy, macro and micronutrients	Consumption amount (X̄ ± SD)	Coverage amount according to TÜBER (% ± SD)
Energy (kcal/day)	2137±337	53,4±13,3
Protein (g/day)	78,1±13,7	55,8±15,0
Protein %	15,2±2,4	
Fat (g/day)	86,4±11,3	72,4±9,6
Fat %	36,2±5,9	
Carbohydrate (g/day)	256,9±71,3	41,9±17,4
Carbohydrate %	48,3±7,7	
Vitamin A (µg)	764,9±326,2	82,9±41,7
Vitamin E (mg)	16,1±5,2	82,1±26,6
Vitamin B1 (mg)	0,9±0,2	94,3±42,4
Vitamin B2 (mg)	1,2±0,3	46,7±27,2
Vitamin B6 (mg)	1,1±0,9	74,3±29,1
Folate (µg)	313,9±95,4	66,3±14,5
Vitamin C (mg)	63,5±73,3	60,7±13,2
Potassium (mg)	2130,2±438,5	60,9±12,5
Calcium (mg)	647,8±205,2	64,7±20,5
Magnesium (mg)	285,9±62,9	79,8±17,9
Phosphorus (mg)	1174,9±184,9	162,8±29,7
Iron (mg)	11,1±3,1	110,7±30,7
Zinc (mg)	10,7±2,7	107,3±27,0
Iodine (µg)	85,8±43,7	43,7±22,8

Table 5. Energy and macronutrient intakes by socioeconomic status (n=382)

Energy and Macronutrients	My income is less than my expenses (n=127)	My income is equal to my expenses (n=143)	My income is more than my expenses (n=112)	*p**
Energy (kcal/day)	1875,3±286,0[a]	2200,6±383,0[a]	2053,5±476,9[a]	0,118
Carbohydrates (g/day)	232,0±44,3[a]	278,0±79,9[a]	252,0±56,1[a]	0,193
Protein (g/day)	66,5±13,2[a]	88,2±11,4[b]	75,6±24,6[ab]	0,011
Fat (g/day)	73,6±22,6[a]	79,5±18,5[a]	80,3±27,2[a]	0,735

Different letters (a, b) indicate significant differences between groups (Tukey HSD, p<0.05).

(p<0,05). No significant differences were observed between other income groups regarding protein intake. There were no statistically significant differences in energy, carbohydrate, or fat intakes among the groups (p>0,05).

Discussion

Nutrition is a necessary action not only to suppress the feeling of hunger, but also to take the nutrients the body needs in sufficient and balanced amounts to protect and maintain health and to improve the quality of life (5).

One of the most important goals of a society is to be healthy and productive. For the permanency of productivity, it should be aimed to ensure that workers have a well-developed body structure physically, mentally, spiritually, and socially and to maintain a healthy state. Poor nutrition increases the risk of occupational accidents, decreases production and consequently leads to an increase in expenditures on health and education (5).

In this study assessing the nutritional status of construction workers, the mean age of participants was 36,4±11,1 years. While the average age of construction workers working in the USA was 42,6 years, the average age of construction workers in Türkiye was 48 years (15,16). All participants in this study were male. This reflects the gender distribution in the construction sector in Türkiye, where the workforce is overwhelmingly male dominated. One study has shown that approximately 99% of construction workers in Türkiye are men (17).

A study conducted on workers observed that they generally have low income levels, large family sizes, and educational attainment limited to primary school and below. (9). The number of family members of the workers was found to be 4,4±2,1 and their wages were equal to or lower than their income. When the educational status of the individuals was analyzed, it was observed that 31,2% of them had only literate education. Considering the number of households and educational status of the individuals, it is concluded that their economic status is inadequate. Strickland et al., (18) found that 34,3% of construction workers smoked cigarettes and 83,6% consumed alcohol. It was observed that

the workers who participated in the study generally smoked cigarettes (58,1%) but did not drink alcohol (67,5%). This may be attributed to the high prevalence of smoking in Türkiye and religious traditions (19).

Obesity is defined as abnormal or excessive fat accumulation that poses a risk to health, and a BMI above 25 kg/m^2 is considered mildly obese and above 30 kg/m^2 is considered obese. The prevalence of obesity is rising in both developed and developing countries worldwide. Recent estimates indicate that 2,5 billion adults aged 18 years and older are overweight, among whom 890 million are classified as obese. These figures underscore the significance of obesity as a public health concern (13). One study with young adults, a U-shaped correlation between BMI and work efficiency was observed, with work efficiency is negative correlation BMI. It is also reported that excessive thinness decreases work efficiency (20). In this study, we found 41,9% of the workers were overweight and 16,8% were obese. In a study conducted in construction workers (n=36, 435), the prevalence of obesity was 51,0% and the prevalence of obesity was 15,0%, which was like our study. In addition, the study also reported that obesity had a negative effect on work efficiency (21). The high prevalence of obesity in construction workers is predicted as a reason for the need for further research in this field to prevent obesity-related health problems in the future.

Adequate daily intake of calorie and nutrients from diet, is notably important. In cases where workers with heavy physical activity such as construction workers cannot adequate their daily energy needs, working capacity and production decreases. In parallel with the increase in energy expenditure due to the high physical energy of workers, the protein requirement increases due to the nitrogen lost through fluid loss. When dietary energy is sufficient, proteins are not used as an energy source during muscle movements, but the increase in muscle mass in individuals with high physical activity leads to an increase in protein requirement. The need for minerals such as sodium and potassium increase as a result of fluid loss with sweating, and if not taken adequately, it causes dehydration (22). In one study, construction workers had low consumption of fruits and vegetables (≥4,5 cups/day). A study of construction workers in Chile found high consumption of carbonated drinks, bread, salty and red meat, and low consumption of fruits, vegetables, legumes, and fish (23). Another study reported that construction workers preferred to consume ready-to-eat foods instead of healthy foods such as fruits and vegetables due to stress (24). In this study, we observed that workers generally preferred to consume pre-packaged foods such as biscuits and cakes for snacks and less preferred healthy foods such as fruit, yoghurt, and kefir. This is due to packaged food is cheap and easy access. On the other hand, intake of essential nutrients was found to be below the requirements, especially vitamin C, and folate. It was also found that workers generally preferred diuretic drinks such as tea.

In our study, it was shown that the energy requirements and macronutrient carbohydrate, protein and fat consumption of the workers were below the cut-off values given in the Turkish Dietary Guidelines. This is because 33,2% of the respondents were individuals whose income fell short of their expenditures, while an additional 37,5% of the workforce comprised individuals whose income matched their expenditures. We observed that energy, carbohydrate, fat, and protein intakes were lower in low-income individuals compared to other groups. In addition, protein intake was significantly lower in workers with individuals with incomes less than their expenditures ($p<0,05$). The important point is how much of the household income is needed for nutrition.

Good nutrition is an important factor affecting workers' health and productivity (12). However, about half of the participants (48,7%) were shown to skip meals. In addition, 47,6% per cent of the participants consumed packaged snacks. All these factors affect the adequacy of nutrient requirements.

In a large-scale study conducted in Korea, deficiency/insufficiency of some nutrients was similarly shown, and this situation was attributed to physiological and social characteristics such as geography, lifestyle, medical conditions, long work hours (25).

Breakfast is the most important meal of the day and has been linked in weight control, cardio-metabolic risk factors and cognitive performance. Breakfast provides energy and nutritional status both from sources of macro and micronutrients (65,6%) (26). In a recent study, it was emphasized that workers who skip breakfast have lower work efficiency. In this study, it was observed that workers generally skip the breakfast (27).

This study has several limitations. First, this study could be analyzed with a larger sample. Second, this study used a single 24-hour daily food consumption record and the content of the food menus at the workplace was not asked. However, the findings provide a basis for the design of intervention programs to promote healthy eating among construction workers. On the other hand, the effect of nutrition on productivity could not be assessed in the sample group. In our study, workers' job descriptions were not collected; therefore, classification into heavy, moderate, and light work categories could not be analyzed. Despite these limitations, the study has important strengths, including the relatively large sample size, participants from different regions of Türkiye, and the comprehensive assessment of both dietary intake and eating habits. These features make the study a valuable contribution to the limited literature on the nutritional status of construction workers.

Conclusion

As a result of this study determine the nutritional status and food habits of construction workers, it was showed that most of the

workers were obese and overweight, prone to prefer unhealthy snacks, and did not take energy and macro-micronutrients in the recommended amounts. We recommend conducting larger studies utilizing appropriate experimental designs to test the hypothesis regarding the association between nutrient intake and work efficiency among construction workers. Besides, workers and their families should be educated about good nutrition to protect their health. The nutrition education included healthier food choices and weight control, as recommended in the lifestyle modifications of Turkish Dietary Guidelines and WHO suggestions.

Ethical Considerations: This study was approved by the Yüksek İhtisas University Non-Interventional Research Ethics Committee (Ref. No. 2020/16/02).

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the authors.

Funding: None

Consent of Patients: The participants were informed in detail, and informed consent was obtained.

Data Availability Statement: All relevant data are within the paper and they are available from the corresponding author on reasonable request.

Author Contributions: Concept - ÇÖBB, ÇÖS; Design - ÇÖBB, ÇÖS; Supervision -KSN; Data Collection and/Or Processing - ÇÖBB, ÇÖS; Providing Resources and Funding - ÇÖS; Literature Search - ÇÖBB, ÇÖS; Analysis or Interpretation - ÇÖBB, KSN; Writing - ÇÖBB; Critical Review - KSN, ÇÖS

References

1. Behrman JR, Deolalikar AB. Health and nutrition. In: Chenery H, Srinivasan TN, editors. Handbook of Development Economics. Vol. 1. Amsterdam: Elsevier; 1988. pp. 631–711. https://doi.org/10.1016/S1573-4471(88)01017-4
2. da Silva SLC, Amaral FG. Critical factors of success and barriers to the implementation of occupational health and safety management systems: a systematic review of literature. Saf Sci. 2019;117:123–132. https://doi.org/10.1016/j.ssci.2019.03.026
3. International Labour Organization. ILO list of occupational diseases. Geneva: ILO; 2010.
4. Amani R, Gill T. Shiftworking, nutrition and obesity: implications for workforce health –a systematic review. Asia Pac J Clin Nutr [Internet]. 2013;22(4):698–708. [cited 2025 Jun 17] https://doi.org/10.6133/apjcn.2013.22.4.11
5. Türkiye Cumhuriyeti Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü. Türkiye Beslenme Rehberi (TÜBER) 2022. Ankara: Sağlık Bakanlığı; 2022.
6. Jensen JD. Can worksite nutritional interventions improve productivity and firm profitability? A literature review. Perspect Public Health [Internet]. 2011;131(4):184–192. [cited 2025 Jun 17] https://doi.org/10.1177/1757913911408263
7. Thabit H, Nicole B, Shah S, Brema I, Crowley V, Finnegan F, et al. Prevalence and predictors of diabetes and cardiometabolic risk among construction workers in Ireland: the Construction Workers Health Trust screening study. Diab Vasc Dis Res. 2013;10. https://doi.org/10.1177/1479164113479808
8. Bekar A, Ersoy AF. Sanayide çalışan işçilerin enerji harcamaları ve beslenme durumlarının değerlendirilmesi. Vocat Educ. 2011;6(3):84–108.
9. Kaner G, Soylu M, Başmısırlı E, İnanç N. Kayseri'de mobilya üretiminde çalışan işçilerin beslenme durumu ve alışkanlıklarının belirlenmesi. Beslenme Diyet Derg. 2015;43(3):191–199.
10. Bor H. The relationship between nutrition and worker efficiency. Turk J Fam Med Prim Care. 2020;14(2):305–11. https://doi.org/10.21763/tjfmpc.642063
11. Okoro CS, Musonda I, Agumba JN. A review of factors influencing construction workers' nutritional uptake. In: Proceedings of the DII-2014 Conference on Infrastructure Investments in Africa, 2014; Johannesburg, South Africa, 2028. pp. 25–26.
12. Xu X, Li S, Zhuo Q, Fang H, Guo Q, Zhao L, et al. Energy and macronutrient intakes of employees at different levels of work intensity in China from 2010 to 2012. Wei Sheng Yan Jiu. 2021;50(3):415–420. https://doi.org/10.19813/j.cnki.weishengyanjiu.2021.03.011
13. World Health Organization. Obesity and overweight [Internet]. 2025 [cited 2025 Aug 17]. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
14. Rakıcıoğlu N, Tek NA, Ayaz A, Pekcan G. Yemek ve besin fotoğraf kataloğu: ölçü ve miktarlar. Ankara: Ata Ofset; 2010.
15. Sokas RK, Dong XS, Cain CT. Building a sustainable construction workforce. Int J Environ Res Public Health. 2019;16(4):546. https://doi.org/10.3390/ijerph16214202
16. Şenel D. İnşaat sektöründe kayıt dışı istihdamın incelenmesi: Denizli ili örneği. Süleyman Demirel Üniversitesi Derg. 2019;10(23):66–83. https://doi.org/10.21076/vizyoner.448902
17. Bilim A. Demographic analysis of occupational safety in the construction sector: strategies and insights for risk reduction. Buildings. 2025;15(4):528. https://doi.org/10.3390/buildings15040528
18. Strickland JR, Wagan S, Dale AM, Evanoff BA. Prevalence and perception of risky health behaviors among construction workers. J Occup Environ Med. 2017;59(7):673–678. https://doi.org/10.1097/JOM.0000000000001051
19. Ilhan MN, Arikan Z, Kotan Z, Tunçoğlu T, Pinarci M, Taşdemir A, et al. Prevalence and socio-demographic determinants of tobacco, alcohol, substance use and drug misuse in general population in Turkey. Arch Neuropsychiatry. 2016;53(3):205. https://doi.org/10.5152/npa.2015.10050
20. Laitinen J, Näyhä S, Kujala V. Body mass index and weight change from adolescence into adulthood, waist-to-hip ratio and perceived work ability among young adults. Int J Obes [Internet]. 2005;29(6):697–702. [cited 2025 Jun 17] https://doi.org/10.1038/sj.ijo.0802936
21. Tonnon SC, Robroek SRJ, van der Beek AJ, Burdorf A, van der Ploeg HP, Caspers M, et al. Physical workload and obesity have a synergistic effect on work ability among construction workers. Int Arch Occup Environ Health [Internet]. 2019 [cited 2025 Jun 17];92(6):855-864. Available from: https://doi.org/10.1007/s00420-019-01422-7
22. Chung JW, Wong BY, Yan VC, Chung LM, So HC, Chan A. Cardiovascular health of construction workers in Hong Kong: a cross-sectional study. Int J Environ Res Public Health. 2018;15(4):759. https://doi.org/10.3390/ijerph15061251
23. Salinas J, Lera L, González C, Villalobos E, Vio F. Feeding habits and lifestyles of male construction workers. Rev Med Chil. 2014;142:833–40. https://doi.org/10.4067/S0034-98872014000700003
24. Nagler EM, Viswanath K, Ebbeling CB, Stoddard AM, Sorensen G. Correlates of fruit and vegetable consumption among construction laborers and motor freight workers. Cancer Causes Control. 2013;24:637–47. https://doi.org/10.1007/s10552-012-9998-6
25. Lee W, Jung J, Ahn J, Kim HR. Rate of inappropriate energy and micronutrient intake among the Korean working population. Public Health Nutr. 2020;23(18):3356–3367. https://doi.org/10.1017/S1368980019004075
26. Gibney MJ, Barr SI, Bellisle F, Drewnowski A, Fagt S, Livingstone B, et al. Breakfast in human nutrition: The International Breakfast Research Initiative. Nutrients. 2018;10(5):559. https://doi.org/10.3390/nu10050559
27. Dewi ABC. The effect of breakfast habits on work productivity in CV Unggul Farm Sukoharjo. J Glob Environ Dyn. 2022;3(3):1–4.