White Rose Research Online

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk
Universities of Leeds, Sheffield and York

Deposited via The University of Sheffield.

White Rose Research Online URL for this paper:
https://eprints.whiterose.ac.uk/id/eprint/247755/

Version: Published Version

Article:
Crotz, M.A., Farhat, H., Gangaram, P. et al. (2026) Factors influencing healthcare professionals' lifestyle in a Middle Eastern emergency medical service: A cross-sectional study. Journal of Emergency Medicine, Trauma & Acute Care, 2026 (4). 48. ISSN: 1999-7086

https://doi.org/10.5339/jemtac.2026.48

Reuse
This article is distributed under the terms of the Creative Commons Attribution (CC BY) licence. This licence allows you to distribute, remix, tweak, and build upon the work, even commercially, as long as you credit the authors for the original work. More information and the full terms of the licence here: https://creativecommons.org/licenses/

Takedown
If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

UNIVERSITY OF LEEDS
University of Sheffield
UNIVERSITY of York

JEMTAC
Journal of Emergency Medicine Trauma & Acute Care
A PEER REVIEWED JOURNAL

OPEN ACCESS

Research Paper

Factors influencing healthcare professionals' lifestyle in a Middle Eastern emergency medical service: A cross-sectional study

Matthew Andrew Crotz[1], Hassan Farhat[1,2], Padarath Gangaram[3], Peter Willett[4], Guillaume Alinier[1,5,6,7*]

[1]Major Incident Preparedness and Ambulance Service Group, Hamad Medical Corporation, Doha, Qatar
[2]Epidemiology of Mental Illnesses, Screening and Early Management Laboratory, Faculty of Medicine "Ibn El Jazzar", University of Sousse, Sousse, Tunisia
[3]Department of Emergency Medical Care and Rescue, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa
[4]School of Information, Journalism and Communication, University of Sheffield, Sheffield, United Kingdom
[5]School of Health, Medicine, and Life Sciences, University of Hertfordshire, Hatfield, United Kingdom
[6]Weill Cornell Medicine-Qatar, Doha, Qatar
[7]Faculty of Health and Life Sciences, Northumbria University, Newcastle, United Kingdom

*Email: GAlinier@hamad.qa

https://doi.org/10.5339/jemtac.2026.48

Submitted: 28 March 2026
Accepted: 06 October 2026
Published: 15 October 2026

© 2026 Crotz, Farhat, Gangaram, Willett, Alinier, licensee HBKU Press. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Staff well-being is crucial for adequate pre-hospital care provision, with eating habits representing a critical yet understudied determinant of health outcomes amongst paramedics. This study explored factors influencing eating behaviours and their associations with body mass index (BMI) categories amongst paramedics at Hamad Medical Corporation Ambulance Service (HMCAS) in Qatar.

Methods: A quantitative cross-sectional study was conducted among 341 HMCAS paramedics using a validated online survey (Content Validity Index = 0.87; Cronbach's alpha = 0.70). Statistical analyses included descriptive statistics, Fisher's exact tests with Monte Carlo simulation, and multinomial logistic regression (MLR) with normal BMI as the reference outcome, supported by multicollinearity and sparse-data diagnostics and a penalised sensitivity analysis.

Results: The predominantly male sample (93%, n = 317) exhibited higher rates of overweight (53%) and obesity (26%) compared to females (mean BMI: 27.9 ± 3.5 versus 25.5 ± 4.5, $p = 0.001$). Marital status was significantly associated with BMI categories in the bivariate analyses. In the adjusted MLR, female sex was associated with a lower relative risk of being overweight (RRR = 0.199, 95% CI: 0.057 – 0.694), frequently having meals interrupted during shifts with a higher relative risk of being overweight (RRR = 3.364, 95% CI: 1.430 – 7.913), and employment length of 6 – 10 years with a higher relative risk of obesity (RRR = 3.822, 95% CI: 1.551 – 9.417). Fatigue-related eating showed a positive but statistically non-significant association with being overweight once sparse response categories were collapsed.

Conclusion: Sex, employment length, and shift-related meal interruption were independently associated with BMI categories. Pre-hospital care organisations need to support and remind their staff about healthy lifestyle and eating habits, so they remain in optimal shape to care for their patient and prevent diet-related health issues. Moreover, occupational health practitioners should advocate for protected meal breaks, culturally adapted nutrition education, fatigue management, and improved food facilities to reduce obesity risk in emergency medical service staff.

Keywords: Eating habits; well-being; staff safety; healthy lifestyle; paramedics; Middle East

Cite this article as: Crotz MA, Farhat H, Gangaram P, Willett P, Alinier G. Factors influencing healthcare professionals' lifestyle in a Middle Eastern emergency medical service: A cross-sectional study. *Journal of Emergency Medicine, Trauma & Acute Care*. 2026(4):48 https://doi.org/10.5339/jemtac.2026.48

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

1. INTRODUCTION

Staff well-being is a crucial determinant of effective emergency medical services (EMS), directly impacting the quality of patient care, operational efficiency, and workforce sustainability. The demanding and unpredictable nature of EMS work exposes staff to high levels of occupational stress, fatigue, and irregular work schedules, all of which can weaken physical and mental health.[1,2] Among the various organisational factors of well-being, eating habits stand out as a critical and often overlooked factor. Healthy dietary patterns are essential for maintaining energy, cognitive function, and resilience in high-pressure environments.[3] At the same time, poor eating habits are linked to increased risks of obesity, metabolic syndrome, and chronic disease, conditions that are alarmingly prevalent among EMS personnel worldwide.[3]

A growing body of research highlights the significance of dietary habits in EMS. Studies from the United States, Europe, and the Middle East consistently report that EMS providers face significant barriers to healthy eating, including unpredictable call volumes, a lack of scheduled meal breaks, limited access to nutritious food during shifts, and the pervasive influence of fatigue and stress on their food choices.[3] These challenges contribute to characteristic patterns, increased reliance on convenience foods, and a higher prevalence of overweight and obesity compared to the general population. Another study highlighted that physiological factors (i.e., hunger and fatigue), psychosocial influences (Stress, relationships with coworkers, organisational constraints, policy, and shift structure) collectively shape the eating behaviours of EMS staff, often to their detriment.[4] Similar findings have been reported in European and Middle Eastern contexts, where unhealthy dietary habits among healthcare professionals are associated with longer work experience, high workloads, and limited opportunities for meal planning.[5,6] More recently, studies from different geographic regions have further characterised the dietary behaviours of prehospital and emergency personnel. In Türkiye, emotional and eating out among emergency service workers were associated with depression, anxiety, and stress, particularly among those working 24-hour shifts,[7] and shift work was shown to adversely affect the lifestyle and well-being of emergency physicians.[8] In Germany, unfavourable health behaviours and elevated work-related stress have been documented among EMS personnel,[9] while in the United Kingdom, lifestyle factors were shown to shape the well-being of National Health Service ambulance workers.[10] Studies from the Gulf and the wider Middle East and North Africa (MENA) region have similarly reported a high prevalence of overweight and unhealthy dietary patterns among health sciences students and healthcare workers.[11–13]

Despite the global recognition of these issues, a gap remains in the literature regarding the exploration of eating habits in pre-hospital emergency care with a diverse workforce and population, such as in Qatar. Hamad Medical Corporation Ambulance Service (HMCAS), part of the public healthcare organisation Hamad Medical Corporation, is the leading EMS provider in Qatar, characterised by its cultural diversity and rapid development. HMCAS ensures the delivery of advanced pre-hospital care through a range of mobile units crewed by staff with varied and well-defined clinical privileges, including Critical Care Paramedics (CCPs) and Ambulance Paramedics (APs).[14,15] HMCAS operates in a dynamic environment, responding to scheduled interfacility calls and high-acuity emergency calls across a diverse population, which presents additional complexities in staff well-being and operational demands.[16]

To date, no published study has examined the eating habits and determinants among HMCAS staff, nor has any research addressed its specific organisational structure and workforce diversity,[17] which may influence these patterns. Considering the increasing recognition of the role of workplace health behaviours in shaping long-term outcomes for both staff and patients,[18] it is essential to understand the challenges within HMCAS to develop targeted interventions that promote healthier eating habits, enhance staff well-being, and improve patient care delivery. This study aimed to explore the eating behaviours of paramedics in the HMCAS, identify key factors influencing these behaviours, and provide evidence-based recommendations for improving HMCAS clinical staff well-being.

2. METHODS

2.1. Study design and setting, and participants

The study employed a quantitative cross-sectional design, utilising an online survey to quantify attitudes, opinions, and behaviours related to eating habits among HMCAS staff.

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Conducting the study using an online survey initially offered cost, organisational, and administrative efficiency compared to paper-based collection methods. Secondly, we ensured that we aimed for the maximum number of the selected population. Thirdly, staff were able to respond to the survey using various electronic devices, including mobile phones, which was helpful given the mobile nature of paramedic work during operational hours. The survey examined five themes: demographic variables, physiological factors, environmental factors, organisational factors, and psychosocial factors. The study received ethical approval from the Hamad Medical Corporation Medical Research Centre and the University of Sheffield (MRC-01-22-115 and 662). The article structure followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for the design of cross-sectional studies.[19]

2.2. Participants and sampling

The categorisation consisted of all paramedics within the Emergency Operations Division at HMCAS, which helped ensure the homogeneity of the study population, as they shared similar work-related eating challenges. The focus on paramedics working in the emergency division is that staff in this division work under unpredictable and time-critical conditions and experience a high call volume. Emergency calls significantly impact the ability of paramedics to maintain regular eating habits. On the other hand, paramedics working in the scheduled ambulance services division operate under predictable scheduling conditions with known departure times and perform missions that are of a non-urgent nature that can be delayed or rescheduled if necessary, allowing paramedics to maintain more regular eating patterns. Administrative staff and paramedics working in LifeFlight, which is the helicopter pre-hospital care service[17] were also excluded unless they also worked clinical shifts on road ambulances and response vehicles. The study employed a non-probability sampling approach combining two complementary techniques. First, voluntary sampling was used, as participants were recruited through an opt-in mechanism following the provision of an online information sheet, ensuring informed consent and participant autonomy in decision-making. Second, snowball sampling was used to expand the reach through participant referrals, thereby accessing hard-to-reach populations within the emergency services context. Organisational lists with telephone numbers available were utilised to distribute the survey link.

The identified population consisted of 960 employees who met the inclusion criteria. The minimum required sample size was estimated using Slovin's formula, $n = N/(1 + Ne^2)$, with a finite population of $N = 960$ and a margin of error of $e = 0.05$, corresponding to a 95% confidence level. As no reliable prior estimate of overweight or obesity prevalence was available for this specific workforce, the formula's assumption of maximum outcome variability ($p = 0.5$) was retained, identifying a minimum required sample of 283 respondents.

2.3. Validation and reliability assessment

Content validity was established through an expert review panel involving various researchers who assessed the survey instrument. Expert evaluation focused on three elements: clarity of questions, relevance to the study objectives, and pertinence to the research context. Each expert rated the survey items on a 5-point Likert scale (1 = least favourable, 5 = most favourable) for each validity criterion. Where items received lower ratings, modifications were implemented based on expert recommendations to improve the instrument's clarity and relevance. The Content Validity Index (CVI) was calculated to quantify the level of agreement amongst experts. Internal consistency reliability was evaluated using Cronbach's alpha coefficient.

2.4. Variables and data preparation

R statistical software was utilised for data management and analysis in this study. The respondents' data were reorganised to reduce excessive data in their responses. The remaining dataset comprised demographic characteristics, clinical parameters, and themes related to eating habits, including nutrition knowledge, physiological factors, physical and organisational factors, and psychosocial factors (Appendix 1). Multiple Imputation by Chained Equations (MICE) was implemented to address missing data. This technique creates multiple complete datasets,

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

standardising missing values with the most suitable data values from their predicted distribution, using polynomial logistic regression for categorical variables. This MICE model executed various iterations, ranging from five to 50, according to the amount of missing data for each variable.

Body Mass Index (BMI) was calculated using the standard formula (weight in kilograms divided by height in metres squared) and categorised into four groups: underweight (‹18.5 kg/m²), normal (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obese (≥30 kg/m²).[12] Age was stratified into four categories: (25–30), (31–40), (41–50), and (51–60) years. Furthermore, nationalities were categorised into eight regional groups: South Asia (Afghanistan, Bangladesh, India, and Pakistan), Southeast Asia (Philippines), Middle East and North Africa (MENA) (Egypt, Jordan, Morocco, Palestine, Somalia, Syria, Qatar, and Tunisia), Sub-Saharan Africa (South Africa and Namibia), Eurasia (Turkey), Europe (Ireland and United Kingdom), North America (USA), and Other. The working hours per month were categorised into five groups (‹40 hours, 40–80 hours, 81–160 hours, 161–192 hours, and ›192 hours) to reflect the varying shift patterns in emergency medical services.

2.5. Statistical methods and risk of bias management

Reliability, descriptive, bivariate, and multivariate analyses were performed in this study.

First, the internal consistency (reliability) of the survey instrument was evaluated using Cronbach's alpha analysis. All Likert-scale responses were standardised using a five-point scale, where responses were coded from 1 (Strongly Disagree/Poor) to 5 (Strongly Agree/Excellent).

Second, the descriptive statistics helped provide an overview of the sample characteristics, establish baseline characteristics, and identify potential patterns in the data distribution. Continuous variables were summarised using means and standard deviations, and categorical variables were summarised using frequencies and percentages.

Third, the bivariate analysis explored the relationship between BMI categories and various factors according to their theme (Demographic, clinical, physiological, organisational, physical environment, and nutritional factors) using Fisher's test. Fisher's exact tests were employed for categorical variables, utilising a Monte Carlo simulation (10,000 replicates) to handle large contingency tables, thereby ensuring accurate and robust *p*-values, even with sparse data.[20]

Fourth, a multinomial logistic regression model (MLR), with "normal BMI" as the reference category, was fitted to identify the predictors of BMI categories. The MLR was selected due to its ability to handle categorical outcome variables with multiple levels and, at the same time, control for potential confounders.[21] The MLR results are presented as Relative Risk Ratios (RRR) with 95% confidence intervals (CI). The RRR is more robust than the Odds Ratio, as it provides a more accurate estimate of risk in common outcomes, considering respondents' BMIs in relation to their responses. In contrast, the Odds Ratio tends to overestimate the risk when outcomes are common. The model's goodness of fit was assessed using the Akaike Information Criterion (AIC).[14] Before interpreting the model, its assumptions and data-support requirements were evaluated. To prevent the sparse-data bias that arises when categorical predictors contain thinly populated levels, the five-point Likert responses were collapsed into three categories (Agree, Neutral, Disagree) and the demographic predictors were grouped (age: ≤30, 31 – 40, ≥41 years; nationality: MENA, South Asia, Southeast Asia, Sub-Saharan Africa, Other; employment length: ≤5, 6–10, 11–15 years; pre-existing medical conditions: any versus none). Cross-tabulations of every predictor against the outcome confirmed that no analysis cell was empty. Average monthly working hours were not retained as a covariate because the reported values were heavily concentrated around the standard full-time schedule (192 hours per month), providing insufficient variability for stable estimation. Multicollinearity was assessed using generalised variance inflation factors (GVIF); all GVIF^(1/(2·df)) values were below 1.25 (equivalent to VIF‹1.6), indicating no problematic collinearity (Appendix 2). Overall model fit was evaluated with the likelihood-ratio test against the null model and McFadden's pseudo-R^2, in addition to the AIC. The stability of the estimates was further verified in a sensitivity analysis using ridge-penalised (L2-regularised) multinomial regression, which produced coefficients of consistent direction and comparable magnitude. The refitted model and its diagnostics were computed in Python (statsmodels; scikit-learn for the penalised sensitivity analysis), complementing the analyses performed in R. Reference categories were normal BMI (outcome), male sex, age ≤30 years, MENA nationality group, married, employment length ≤5 years, no reported pre-existing medical condition, and "Disagree" for all eating-behaviour items.

Table 1. Demographic variables information of the survey participants.

Categorical variables			
Variable	**Female, *N* = 24**	**Male, *N* = 317**	***p*-value[1]**
Age category (Years)			0.009
25–30	7 (29.2%)	26 (8.2%)	
31–40	17 (70.8%)	248 (78.2%)	
41–50	0 (0%)	31 (9.8%)	
51–60	0 (0%)	12 (3.8%)	
Region of origin			<0.001
Europe	0 (0%)	2 (0.6%)	
Asia	0 (0%)	2 (0.6%)	
Middle East & North Africa	2 (8.3%)	137 (43.2%)	
North America	0 (0%)	1 (0.3%)	
Other	0 (0%)	2 (0.6%)	
South Asia	3 (12.5%)	88 (27.8%)	
Southeast Asia	11 (45.8%)	64 (20.2%)	
Sub-Saharan Africa	8 (33.3%)	16 (5.0%)	
Others	0 (0%)	5 (1.6%)	
Marital status			<0.001
Divorced	1 (4.2%)	2 (0.6%)	
Married	6 (25%)	277 (87.4%)	
Single	17 (70.8%)	36 (11.4%)	
Widowed	0 (0%)	2 (0.6%)	
Role			>0.999
Non-patient facing role	0 (0%)	10 (3.2%)	
Patient facing role	24 (100%)	307 (96.8%)	
Division			0.667
Administration	0 (0%)	1 (0.3%)	
Emergency operations	23 (95.8%)	279 (88.0%)	
Interfacility Transport	0 (0%)	17 (5.4%)	
National Command Centre	0 (0%)	2 (0.6%)	
Patient Transport Service	1 (4.2%)	10 (3.2%)	
Support Services	0 (0%)	2 (0.6%)	
Training	0 (0%)	1 (0.3%)	
Other	0 (0%)	5 (1.6%)	
Employment in Qatar			<0.001
1–5 years	17 (70.8%)	104 (32.8%)	
11–15 years	1 (4.2%)	55 (17.4%)	
6–10 years	4 (16.7%)	151 (47.6%)	
Less than 1 year	2 (8.3%)	7 (2.2%)	
Educational level			0.554
Bachelor's degree	17 (70.8%)	247 (77.9%)	
Diploma	3 (12.5%)	27 (8.5%)	
Postgraduate degree of higher	4 (16.7%)	43 (13.6%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 1. (Continued)

Categorical variables			
Variable	**Female, *N* = 24**	**Male, *N* = 317**	***p*-value[1]**
Body Mass Index (BMI) category			<0.001
Underweight	0 (0%)	0 (0%)	
Normal	15 (62.5%)	65 (20.5%)	
Overweight	5 (20.8%)	169 (53.3%)	
Obese	4 (16.7%)	83 (26.2%)	
Continuous variables			
Age (Years)	31.8 (3.7)[2]	36.5 (5.4)[2]	<0.001[3]
Height (Centimetres)	162 (8)[2]	174 (8)[2]	<0.001[3]
Weight (Kilograms)	68 (17)[2]	84 (14)[2]	<0.001[3]
Body Mass Index value	25.5 (4.5)[2]	27.9 (3.5)[2]	0.001[3]
Average number of working hours per month	186 (38)[2]	173 (59)[2]	0.6[3]

[1]Fisher's exact test; [2]Mean (SD); [3]Wilcoxon rank-sum test.

3. RESULTS

A total of 341 responses were received between March 28th to May 28th 2022. The CVI was determined to be 0.87, indicating adequate content validity. The reliability coefficients demonstrate acceptable to good internal consistency across organisational and psychosocial subscales, with alpha values above the conventional threshold of 0.70. However, the physiological subscale ($\alpha = 0.61$) and environmental subscale ($\alpha = 0.53$) exhibited questionable reliability, falling below the generally accepted minimum threshold of 0.70. The reliability of the survey instrument was assessed using Cronbach's alpha, which was calculated to evaluate internal consistency. Guttman's lambda-6 coefficient was also computed to account for the multidimensional nature of the scale, demonstrating good reliability (G6 = 0.82). The scale's precision was evaluated through the average inter-item correlation (r = 0.06) and signal-to-noise ratio (S/N = 2.32), with a small standard error of measurement (ASE = 0.025), indicating that score estimation within the instrument's domains is reliable.[22]

Tables 1 and 2 present the descriptive analysis results. 24 females (7%) participated in the survey, compared to 317 males (93%). The age distribution showed that female participants were predominantly younger, with 70% in the 31-40 age group and 30% in the 25-30 age group, whereas male participants had a broader age distribution ($p = 0.009$). For the nationalities, female respondents were primarily from Southeast Asia (46%) and Sub-Saharan Africa (33%), while male staff were predominantly from the MENA (43%) and South Asia (28%). Furthermore, 70% of female respondents were single compared to 88% of married males. Employment length also differed significantly, with most female staff (71%) having 1–5 years of service, while 48% of male respondents had 6–10 years of service. Overall, the participants' sample was representative of the organisation's paramedic population from a demographic point of view. The mean BMI was significantly lower in females (25.5 ± 4.5) than in males (27.9 ± 3.5, $p = 0.001$). BMI categories revealed significant gender differences, with 63% of females in the normal BMI category, while males showed higher rates of overweight (53%) and obesity (26%).

For the comorbidities, the prevalence of medical conditions was similar between genders ($p = 0.561$), with 83% of male and female staff reporting no comorbidities. Hypertension was emphasised as prevalent among those with medical conditions (7.6% in males, 4.2% in females), followed by diabetes (5.1% in males, 4.2% in females).

Tables 3, 4, and 5 represent the bivariate analysis results. Marital status was significantly associated with BMI categories, with married individuals having higher proportions in the overweight (87%) and obese (89%) categories. Employment length also showed significant differences, with longer-serving staff (6-10 years) having higher proportions of overweight (46%) and obesity. In organisational and psychosocial factors, only meal interruption during shifts approached statistical significance, with overweight individuals reporting more frequent meal interruptions (28%

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 2. Comorbidities reported by the survey participants.

Co-morbidities combinations	Female, *N* = 24	Male, *N* = 317	*p*-value[1] = 0.561
Acidity	0 (0%)	1 (0.3%)	
Asthma	1 (4.2%)	0 (0%)	
Back pain	0 (0%)	1 (0.3%)	
Chronic obstructive pulmonary disease (COPD)	0 (0%)	2 (0.6%)	
Diabetes	1 (4.2%)	16 (5.0%)	
Diabetes; Heart disease	0 (0%)	1 (0.3%)	
Diabetes; thyroid	0 (0%)	1 (0.3%)	
Gastric ulcer	0 (0%)	1 (0.3%)	
Gastritis and weight loss	0 (0%)	1 (0.3%)	
Heart disease	0 (0%)	1 (0.3%)	
Haemorrhoids	0 (0%)	1 (0.3%)	
High cholesterol	0 (0%)	1 (0.3%)	
Hypertension	1 (4.2%)	24 (7.6%)	
Hypertension; Diabetes	0 (0%)	1 (0.3%)	
Hypertension; Heart disease	0 (0%)	1 (0.3%)	
Irritable bowel syndrome	0 (0%)	1 (0.3%)	
Migraine and gastrointestinal problem	0 (0%)	1 (0.3%)	
Migraine	0 (0%)	1 (0.3%)	
None	20 (83.3%)	251 (79.2%)	
Osteoarthritis	0 (0%)	1 (0.3%)	
Ovaries syndrome	1 (4.2%)	0 (0%)	
Thyroid	0 (0%)	5 (1.6%)	
Varicose	0 (0%)	1 (0.3%)	
Other	0 (0%)	3 (0.9%)	

[1]Fisher's exact test.

agreed) compared to normal-weight (12%) and obese (17%) individuals. No significant associations were found between BMI categories and nutrition knowledge, physiological, physical environment factors, or most psychosocial factors, suggesting that weight status in this population might be more strongly influenced by demographic and clinical factors rather than workplace-related eating behaviours (Table 5).

Table 6 shows the results of the revised MLR analysis (full model), using normal BMI as the reference outcome. The overall model was statistically significant (likelihood-ratio $x^2(34) = 69.5$, $p < 0.001$; McFadden pseudo-$R^2 = 0.098$; AIC = 709.0), and the multicollinearity diagnostics were satisfactory (all GVIF^(1/(2·df))<1.25; Appendix 2). After adjustment, female staff had a significantly lower relative risk of being overweight than male staff (RRR = 0.199, 95% CI: 0.057 – 0.694, $p = 0.011$). Agreement with often having meals interrupted during shifts was associated with a more than threefold higher relative risk of being overweight (RRR = 3.364, 95% CI: 1.430 – 7.913, $p = 0.005$). Employment length of 6 – 10 years was associated with a significantly higher relative risk of obesity compared with ≤5 years (RRR = 3.822, 95% CI: 1.551 – 9.417, $p = 0.004$), with a similar but non-significant tendency for 11 – 15 years (RRR = 3.111, 95% CI: 0.922 – 10.494, $p = 0.067$). Agreement with "eating more when tired" showed a positive but statistically non-significant association with being overweight (RRR = 2.835, 95% CI: 0.652 – 12.320, $p = 0.164$); the extreme estimate for this item in the initial model (RRR>2000 with a correspondingly wide confidence interval) was attributable to sparse cells in the five-point response scale, as only seven participants selected "strongly agree", and it did not persist once the response categories were collapsed. No other covariate, including nationality group, marital status, pre-existing medical conditions, and

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 3. Bivariate analysis of the participants' demographic and clinical factors with BMI categories.

Demographic Factors	Normal, *N* = 81	Overweight *N* = 172	Obese, *N* = 88	*p*-value[1]
Sex				<0.001
Female	15 (18.5%)	5 (2.9%)	4 (4.5%)	
Male	66 (81.5%)	167 (97.1%)	84 (95.5%)	
Age category (years)				
25–30	14 (17.3%)	12 (7.0%)	7 (8.0%)	
31–40	60 (74.1%)	137 (79.7%)	66 (75.0%)	
41–50	3 (3.7%)	15 (8.7%)	13 (14.8%)	
51–60	2 (2.5%)	8 (4.7%)	2 (2.3%)	
Region of origin				
Europe	1 (1.2%)	1 (0.6%)	0 (0%)	
Asia	0 (0%)	1 (0.6%)	1 (1.1%)	
Middle East & North Africa	22 (27.2%)	74 (43.0%)	43 (48.9%)	
North America	0 (0%)	0 (0%)	1 (1.1%)	
Other	2 (2.5%)	3 (1.7%)	0 (0%)	
South Asia	22 (27.2%)	52 (30.2%)	17 (19.3%)	
Southeast Asia	24 (29.6%)	32 (18.6%)	19 (21.6%)	
Sub-Saharan Africa	10 (12.3%)	7 (4.1%)	7 (8.0%)	
Education level				0.1
Bachelor's degree	66 (81.5%)	133 (77.3%)	65 (73.9%)	
Diploma	10 (12.3%)	14 (8.1%)	6 (6.8%)	
Postgraduate degree or higher	5 (6.2%)	25 (14.5%)	17 (19.3%)	
Employment in Qatar				
1–5 years	42 (51.9%)	63 (36.6%)	16 (18.2%)	
11–15 years	8 (9.9%)	29 (16.3%)	19 (21.6%)	
6–10 years	26 (32.1%)	79 (45.9%)	50 (56.8%)	
Less than 1 year	5 (6.2%)	1 (0.6%)	3 (3.4%)	
Number of working hours per month				0.8
<40 hours	7 (8.6%)	19 (11.0%)	10 (11.4%)	
40–80 hours	1 (1.2%)	4 (2.3%)	1 (1.1%)	
81–160 hours	1 (1.2%)	0 (0%)	0 (0%)	
161–192	67 (82.7%)	136 (79.1%)	74 (84.1%)	
>192	5 (6.2%)	13 (7.6%)	3 (3.4%)	
Marital status				0.003
Divorced	0 (0%)	3 (1.7%)	0 (0%)	
Married	57 (70.4%)	148 (86.0%)	78 (88.6%)	
Single	22 (27.2%)	20 (11.6%)	9 (10.2%)	
Widowed	1 (1.2%)	0 (0%)	1 (1.1%)	
Role				0.8
Non-patient-facing role	3 (3.7%)	5 (2.9%)	2 (2.3%)	
Patient-facing role	78 (96.3%)	167 (97.1%)	86 (97.7%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 3. (Continued)

Demographic Factors	Normal, *N* = 81	Overweight *N* = 172	Obese, *N* = 88	*p*-value[1]
Division				0.14
Administration	0 (0%)	1 (0.6%)	0 (0%)	
Emergency operations	73 (90.1%)	148 (86.0%)	81 (92%)	
Interfacility Transport	6 (7.4%)	7 (4.1%)	4 (4.6%)	
National Command Centre	0 (0%)	2 (1.2%)	0 (0%)	
Patient Transport Service	1 (1.2%)	10 (5.8%)	0 (0%)	
Support Services	0 (0%)	1 (0.6%)	1 (1.1%)	
Training	0 (0%)	(0%)	1 (1.1%)	
Clinical Factors				
How would you rate your current health?				
Excellent	10 (12.3%)	15 (8.7%)	12 (13.6%)	
Fair	10 (12.3%)	28 (16.3%)	10 (11.4%)	
Good	32 (39.5%)	79 (45.9%)	35 (39.8%)	
Poor	3 (3.7%)	1 (0.6%)	6 (6.8%)	
Very good	26 (32.1%)	49 (28.5%)	25 (28.4%)	
Do you suffer from any of the following medical diseases?				0.003
Asthma	1 (1.2%)	0 (0%)	0 (0%)	
Back pain	1 (1.2%)	0 (0%)	0 (0%)	
Chronic obstructive pulmonary disease (COPD)	0 (0%)	2 (1.2%)	0 (0%)	
Diabetes	1 (1.2%)	11 (6.4%)	5 (5.7%)	
Diabetes; Heart disease	0 (0%)	1 (0.6%)	0 (0%)	
Diabetes; Thyroid	0 (0%)	1 (0.6%)	0 (0%)	
Gastric ulcer	0 (0%)	1 (0.6%)	0 (0%)	
Gastritis and weight loss	1 (1.2%)	0 (0%)	0 (0%)	
Gout	0 (0%)	2 (1.2%)	0 (0%)	
Heart disease	0 (0%)	1 (0.6%)	0 (0%)	
Haemorrhoids	0 (0%)	0 (0%)	1 (1.1%)	
High cholesterol	0 (0%)	1 (0.6%)	0 (0%)	
Hypertension	3 (3.7%)	9 (5.2%)	13 (14.8%)	
Hypertension; Diabetes	0 (0%)	1 (0.6%)	0 (0%)	
Hypertension; Heart disease	0 (0%)	1 (0.6%)	0 (0%)	
Hyperthyroidism	1 (1.2%)	0 (0%)	0 (0%)	
Hypothyroidism	0 (0%)	1 (0.6%)	0 (0%)	
Irritable bowel syndrome (IBS)	1 (1.2%)	0 (0%)	0 (0%)	
Migraine and gastrointestinal problems	0 (0%)	1 (0.6%)	0 (0%)	
Migraine	0 (0%)	1 (0.6%)	0 (0%)	
None	68 (84%)	135 (78.5%)	67 (76.1%)	
Acidity	1 (1.2%)	0 (0%)	0 (0%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 3. (Continued)

Demographic Factors	Normal, *N* = 81	Overweight *N* = 172	Obese, *N* = 88	*p*-value[1]
Overweight	0 (0%)	1 (0.6%)	0 (0%)	
Osteoarthritis	1 (1.2%)	0 (0%)	0 (0%)	
Polycystic ovary syndrome (PCOS)	0 (0%)	0 (0%)	1 (1.1%)	
Thyroid	0 (0%)	0 (0%)	1 (1.1%)	
Varicose	1 (1.2%)	0 (0%)	0 (0%)	

[1]Fisher's exact test.

Table 4. Bivariate analysis of participants' nutrition knowledge and psychosocial factors with BMI categories.

Nutrition Knowledge	Normal *N* = 81	Overweight *N* = 172	Obese *N* = 88	*p*-value[1]
How important do you think healthy eating is?				>0.9
Extremely Important	2 (2.5%)	3 (1.7%)	2 (2.3%)	
Important	7 (8.6%)	14 (8.1%)	7 (8.0%)	
Neutral	12 (14.8%)	30 (17.4%)	11 (12.5%)	
Not important	28 (34.6%)	53 (30.8%)	24 (27.3%)	
Extremely not important	32 (39.5%)	72 (41.9%)	44 (50.0%)	
How would you rate your knowledge about nutrition and healthy eating?				0.7
Excellent	8 (9.9%)	19 (11.0%)	7 (8.0%)	
Very Good	21 (25.9%)	52 (30.2%)	20 (22.7%)	
Good	31 (38.3%)	54 (31.4%)	36 (40.9%)	
Fair	12 (14.8%)	23 (13.4%)	16 (18.2%)	
Poor	9 (11.1%)	24 (14.0%)	9 (10.2%)	
My current eating habits during clinical shifts are healthy.				0.3
Strongly agree	7 (8.6%)	8 (4.7%)	10 (11.4%)	
Agree	27 (33.3%)	60 (34.9%)	27 (30.7%)	
Disagree	19 (23.5%)	33 (19.2%)	16 (18.2%)	
Neutral	21 (25.9%)	48 (27.9%)	29 (33.0%)	
Strongly disagree	7 (8.6%)	23 (13.4%)	5 (5.7%)	
I eat the food that I have brought from home.				0.3
Strongly agree	25 (30.9%)	54 (31.4%)	32 (36.4%)	
Agree	38 (46.9%)	82 (47.7%)	42 (47.7%)	
Neutral	11 (13.6%)	27 (15.7%)	8 (9.1%)	
Disagree	6 (7.4%)	7 (4.1%)	2 (2.3%)	
Strongly disagree	1 (1.2%)	1 (0.6%)	4 (4.5%)	
I often eat other food that I have brought from home.				0.8
Strongly agree	11 (13.6%)	32 (18.6%)	17 (19.3%)	
Agree	29 (35.8%)	73 (42.4%)	35 (39.8%)	
Neutral	15 (18.5%)	24 (14.0%)	15 (17.0%)	
Disagree	20 (24.7%)	35 (20.3%)	16 (18.2%)	
Strongly disagree	6 (7.4%)	8 (4.7%)	5 (5.7%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 4. (Continued)

Nutrition Knowledge	Normal *N* = 81	Overweight *N* = 172	Obese *N* = 88	*p*-value[1]
I often eat other food even though I have brought my own food from home.				0.2
Strongly agree	20 (24.7%)	39 (22.7%)	28 (31.8%)	
Agree	31 (38.3%)	86 (50%)	30 (34.1%)	
Disagree	10 (12.3%)	17 (9.9%)	9 (10.2%)	
Neutral	13 (16.0%)	20 (11.6%)	18 (20.5%)	
Strongly disagree	7 (8.6%)	10 (5.8%)	3 (3.4%)	
Psychosocial Factors				
Does the partner I work with influence my eating positively?				0.4
Strongly agree	13 (16.0%)	43 (25%)	14 (15.9%)	
Agree	20 (24.7%)	49 (28.5%)	25 (28.4%)	
Disagree	13 (16.0%)	26 (15.1%)	10 (11.4%)	
Neutral	31 (38.3%)	46 (26.7%)	34 (38.6%)	
Strongly disagree	4 (4.9%)	8 (4.7%)	5 (5.7%)	
Does the partner I work with influence my eating negatively?				0.2
Strongly agree	22 (27.2%)	64 (37.2%)	23 (26.1%)	
Agree	30 (37.0%)	71 (41.3%)	35 (39.8%)	
Neutral	20 (24.7%)	22 (12.8%)	21 (23.9%)	
Disagree	5 (6.2%)	11 (6.4%)	5 (5.7%)	
I often sit and share my meals with colleagues.				0.7
Strongly agree	9 (11.1%)	24 (14.0%)	9 (10.2%)	
Agree	20 (24.7%)	40 (23.3%)	19 (21.6%)	
Neutral	27 (33.3%)	53 (30.8%)	25 (28.4%)	
Disagree	18 (22.2%)	39 (22.7%)	19 (21.6%)	
Strongly disagree	7 (8.6%)	13 (7.6%)	14 (15.9%)	
Missing data	0 (0%)	3 (1.7%)	2 (2.3%)	
Stress during my clinical shifts is often too much for me to handle.				0.3
Strongly agree	5 (6.2%)	18 (10.5%)	11 (12.5%)	
Agree	10 (12.3%)	30 (17.4%)	22 (25%)	
Neutral	16 (19.8%)	35 (20.3%)	17 (19.3%)	
Disagree	13 16.0%)	21 (12.2%)	12 (13.6%)	
Strongly disagree	7 (8.6%)	18 (10.5%)	3 (3.4%)	
Missing data	30 (37.0%)	50 (29.1%)	23 (26.1%)	
Stress has an effect on my eating behaviour?				0.2
Strongly agree	12 (14.8%)	39 (22.7%)	11 (12.5%)	
Agree	22 (27.2%)	60 (34.9%)	33 (37.5%)	
Neutral	20 (24.7%)	26 (15.1%)	23 (26.1%)	
Disagree	5 (6.2%)	7 (4.1%)	4 (4.5%)	
Strongly disagree	1 (1.7%)	7 (4.1%)	2 (2.3%)	
Unknown	21 (25.9%)	33 (19.2%)	15 (17.0%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 4. (Continued)

Nutrition Knowledge	Normal *N* = 81	Overweight *N* = 172	Obese *N* = 88	*p*-value[1]
Stress makes me eat less?				0.2
Strongly agree	2 (2.5%)	7 (4.1%)	3 (3.4%)	
Agree	3 (3.7%)	11 (6.4%)	10 (11.4%)	
Neutral	29 (35.8%)	54 (31.4%)	34 (38.6%)	
Disagree	18 (31%)	30 (17.4%)	13 (14.8%)	
Strongly disagree	7 (12%)	32 (18.6%)	8 (9.1%)	
Missing data	22 (27.2%)	38 (22.1%)	20 (22.7%)	
Stress makes me eat more?				0.2
Strongly agree	17 (21.0%)	44 (25.6%)	23 (26.1%)	
Agree	23 (28.4%)	66 (38.4%)	31 (35.2%)	
Neutral	21 (25.9%)	30 (17.4%)	23 (26.1%)	
Disagree	15 (18.5%)	26 (15.1%)	6 (6.8%)	
Strongly disagree	5 (6.2%)	6 (3.5%)	5 (5.7%)	
Stress makes me eat unhealthy food?				0.084
Strongly agree	20 (24.7%)	63 (36.6%)	25 (28.4%)	
Agree	21 (25.9%)	52 (30.2%)	27 (30.7%)	
Neutral	18 (22.2%)	24 (14.0%)	23 (26.1%)	
Disagree	18 (22.2%)	21 (12.2%)	9 (10.2%)	
Strongly disagree	4 (4.9%)	12 (7.0%)	4 (4.5%)	
Stress makes me eat healthy food?				0.2
Strongly agree	2 (2.5%)	7 (4.1%)	3 (3.4%)	
Agree	3 (3.7%)	11 (6.4%)	10 (11.4%)	
Neutral	29 (35.8%)	54 (31.4%)	34 (38.6%)	
Disagree	18 (22.2%)	30 (17.4%)	13 (14.8%)	
Strongly disagree	7 (8.6%)	32 (18.6%)	8 (9.1%)	
Missing data	22 (27.2%)	38 (22.1%)	20 (22.7%)	
Stress during clinical shifts carries over to my personal life and affects my eating habits at home?				0.2
Strongly agree	17 (21.0%)	44 (25.6%)	23 (26.1%)	
Agree	23 (28.4%)	66 (38.4%)	31 (35.2%)	
Neutral	21 (25.9%)	30 (17.4%)	23 (26.1%)	
Disagree	15 (18.5%)	26 (15.1%)	6 (6.8%)	
Strongly disagree	5 (6.2%)	6 (3.5%)	5 (5.7%)	
I have or I am eating according to a specific eating plan diet and I fail to follow this plan diet due to work conditions?				0.088
Strongly agree	20 (24.7%)	63 (36.6%)	25 (28.4%)	
Agree	21 (25.9%)	52 (30.2%)	27 (30.7%)	
Neutral	18 (22.2%)	24 (14.0%)	23 (26.1%)	
Disagree	18 (22.2%)	21 (12.2%)	9 (10.2%)	
Strongly disagree	4 (4.9%)	12 (7.0%)	4 (4.5%)	

[1]Fisher's Exact test for count data with simulated *p*-value (based on 10000 replicates); Pearson's Chi-squared test.

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 5. Bivariate analysis of participants' organisational and physical factors according to their Body Mass Index categories.

Organisational Factors	Normal *N* = 81	Overweight *N* = 172	Obese *N* = 88	*p*-value[1]
I often have no time to eat while working a clinical shift?				>0.9
Agree	31 (38.3%)	70 (40.7)	35 (39.8%)	
Disagree	0 (0%)	4 (2.3%)	1 (1.1%)	
Neutral	15 (18.5%)	25 (14.5%)	11 (12.5%)	
Strongly agree	34 (42.0%)	69 (40.1%)	40 (45.5%)	
Strongly disagree	1 (1.2%)	4 (2.3%)	1 (1.1%)	
I often have my meal interrupted during my shift.				0.052
Agree	10 (12.3%)	48 (27.9%)	15 (17.0%)	
Disagree	17 (21.0%)	33 (19.2%)	17 (19.3%)	
Neutral	36 (44.4%)	60 (34.9%)	36 (40.9%)	
Strongly agree	1 (1.2%)	9 (5.2%)	7 (8.0%)	
Strongly disagree	17 (21.0%)	22 (12.8%)	13 (14.8%)	
I often rush through my meal or eat my meal quickly while on a clinical shift.				0.13
Agree	30 (37.0%)	32 (18.6%)	27 (30.7%)	
Disagree	11 (13.6.0%)	33 (19.2%)	12 (13.6%)	
Neutral	30 (37.0%)	77 (44.8%)	38 (43.2%)	
Strongly agree	4 (4.9%)	8 (4.7%)	3 (3.4%)	
Strongly disagree	6 (7.4%)	22 (12.8%)	8 (9.1%)	
I often buy or prepare my meal and then don't eat as I get called out to a case?				>0.9
Agree	4 (4.9%)	9 (5.2%)	3 (3.4%)	
Disagree	4 (4.9%)	5 (2.9%)	2 (2.3%)	
Neutral	10 (12.3%)	18 (10.5%)	12 (13.6%)	
Strongly agree	1 (1.2%)	3 (1.7%)	1 (1.1%)	
Strongly disagree	1 (1.2%)	4 (2.3%)	3 (3.4%)	
Missing data	61 (75.3%)	133 (77.3%)	67 (76.1%)	
In general, eating during the night shift is much easier than during the day shift.				0.4
Agree	10 (12.3%)	30 (17.4%)	18 (20.5%)	
Disagree	16 (19.8%)	48 (27.9%)	19 (21.6%)	
Neutral	40 (49.4%)	64 (37.2%)	32 (36.4%)	
Strongly agree	3 (3.7%)	3 (1.7%)	5 (5.7%)	
Strongly disagree	12 (14.8%)	27 (15.7%)	13 (14.8%)	
Missing data	0 (0%)	0 (0%)	1 (1.1%)	
Physical Environment				
I often eat inside the ambulance as there is no time to eat anywhere else.				0.6
Agree	4 (4.9%)	2 (1.2%)	1 (1.1%)	
Disagree	23 (28.4%)	53 (30.8%)	24 (27.3%)	
Neutral	9 (11.1%)	20 (11.6%)	9 (10.2%)	
Strongly agree	0 (0%)	3 (1.7%)	3 (3.4%)	
Strongly disagree	45 (55.6%)	94 (54.7%)	51 (58.0%)	

(*Continued*)

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 5. (Continued)

Organisational Factors	Normal *N* = 81	Overweight *N* = 172	Obese *N* = 88	*p*-value[1]
I often eat inside the facilities provided by my employer.				0.3
Agree	27 (33.3%)	58 (33.7%)	28 (31.8%)	
Disagree	1 (1.2%)	11 (6.4%)	6 (6.8%)	
Neutral	21 (25.9%)	26 (15.1%)	15 (17.0%)	
Strongly agree	28 (34.6%)	72 (41.9%)	34 (38.6%)	
Strongly disagree	4 (4.9%)	5 (2.9%)	5 (5.7%)	
All types of food are available to me while on a clinical shift?				0.4
Agree	26 (32.1%)	61 (35.5%)	31 (35.2%)	
Disagree	4 (4.9%)	9 (5.2%)	0 (0%)	
Neutral	14 (17.3%)	22 (12.8%)	18 (20.5%)	
Strongly agree	35 (43.2%)	74 (43.0%)	37 (42.0%)	
Strongly disagree	2 (2.5%)	6 (3.5%)	2 (2.3%)	
Is healthy food easily obtainable while I am on clinical shift?				0.8
Agree	29 (35.8%)	50 (29.1%)	21 (23.9%)	
Disagree	0 (0%)	2 (1.2%)	1 (1.1%)	
Neutral	5 (6.2%)	16 (9.3%)	10 (11.4%)	
Strongly agree	46 (56.8%)	99 (57.6%)	53 (60.2%)	
Strongly disagree	1 (1.2%)	5 (2.9%)	3 (3.4%)	
I often find myself near unhealthy food choices as the ambulance drives around between calls.				0.9
Agree	24 (29.6%)	46 (26.7%)	24 (27.3%)	
Disagree	1 (1.2%)	2 (1.2%)	2 (2.3%)	
Neutral	6 (7.4%)	6 (3.5%)	5 (5.7%)	
Strongly agree	49 (60.5%)	113 (65.7%)	54 (61.4%)	
Strongly disagree	1 (1.2%)	5 (2.9%)	2 (2.3%)	
Missing data	0 (0%)	0 (0%)	1 (1.1%)	

[1]Fisher's Exact test for count data with simulated *p*-value (based on 10000 replicates); Pearson's Chi-squared test

stress-related eating, was independently associated with BMI category. The ridge-penalised sensitivity analysis produced estimates of consistent direction and magnitude, confirming the stability of the final model.

4. DISCUSSION

This study examined the determinants of eating behaviour and weight status among paramedics in Qatar. The findings, based on 341 staff responses, who were appropriately representative of the HMCAS workforce, provide a comprehensive understanding of how demographic, occupational, and psychosocial factors interact to influence dietary patterns and health outcomes in this high-risk occupational group (Tables 1 and 3).

The physiological and environmental themes reflect the complexity of these constructs for paramedics (Table 4). These psychometric properties are consistent with recent studies in the region, which have highlighted the challenges of capturing the complex nature of eating behaviours in Middle Eastern populations, where rapid social and economic changes have influenced dietary habits and health outcomes.[23] This review study of nutrition-related risk factors in the Eastern Mediterranean emphasised the need for robust, context-specific measurement tools to accurately assess the interplay between lifestyle, environment, and health.

Demographically, the sample of HMCAS paramedics who participated in this study was predominantly male, with significant gender differences in age, nationality, marital status, and

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Table 6. Multinomial logistic regression of factors associated with BMI category (full model). Reference outcome: normal BMI; reference categories: male sex, age ≤30 years, MENA nationality group, married, employment length ≤5 years, no pre-existing medical condition, and "Disagree" for eating-behaviour items.

BMI Category	Variable	Relative Risk Ratio	95% CI		*p*-value
			Lower	Upper	
Overweight	(Intercept)	0.799	0.213	2.999	0.740
Overweight	Sex: Female	0.199*	0.057	0.694	0.011
Overweight	Age group: 31–40 years	2.061	0.750	5.659	0.161
Overweight	Age group: ≥41 years	3.109	0.644	14.996	0.158
Overweight	Nationality group: South Asia	1.187	0.524	2.685	0.681
Overweight	Nationality group: Southeast Asia	0.777	0.325	1.856	0.569
Overweight	Nationality group: Sub-Saharan Africa	0.486	0.133	1.772	0.274
Overweight	Nationality group: Other	0.411	0.086	1.967	0.266
Overweight	Marital status: Not married	0.832	0.355	1.948	0.671
Overweight	Employment length: 6–10 years	1.264	0.600	2.665	0.538
Overweight	Employment length: 11–15 years	1.177	0.403	3.436	0.766
Overweight	Pre-existing medical condition: Any	1.197	0.545	2.627	0.655
Overweight	I eat more when I am tired: Agree	2.835	0.652	12.320	0.164
Overweight	I eat more when I am tired: Neutral	0.776	0.249	2.415	0.661
Overweight	I often have my meal interrupted during shift: Agree	3.364*	1.430	7.913	0.005
Overweight	I often have my meal interrupted during shift: Neutral	1.242	0.643	2.399	0.519
Overweight	Stress makes me eat more: Agree	1.252	0.587	2.672	0.561
Overweight	Stress makes me eat more: Neutral	0.708	0.288	1.741	0.452
Obese	(Intercept)	0.485	0.105	2.247	0.355
Obese	Sex: Female	0.406	0.103	1.597	0.197
Obese	Age group: 31–40 years	0.679	0.202	2.284	0.532
Obese	Age group: ≥41 years	1.030	0.175	6.060	0.974
Obese	Nationality group: South Asia	0.682	0.264	1.766	0.431
Obese	Nationality group: Southeast Asia	1.027	0.390	2.702	0.957
Obese	Nationality group: Sub-Saharan Africa	1.067	0.280	4.060	0.924
Obese	Nationality group: Other	0.353	0.061	2.036	0.244
Obese	Marital status: Not married	0.551	0.197	1.541	0.256
Obese	Employment length: 6–10 years	3.822*	1.551	9.417	0.004
Obese	Employment length: 11–15 years	3.111	0.922	10.494	0.067
Obese	Pre-existing medical condition: Any	1.491	0.638	3.484	0.356
Obese	I eat more when I am tired: Agree	1.374	0.260	7.264	0.709
Obese	I eat more when I am tired: Neutral	0.590	0.169	2.058	0.408
Obese	I often have my meal interrupted during shift: Agree	2.142	0.815	5.632	0.123
Obese	I often have my meal interrupted during shift: Neutral	1.170	0.552	2.479	0.681
Obese	Stress makes me eat more: Agree	1.578	0.626	3.977	0.333
Obese	Stress makes me eat more: Neutral	1.715	0.594	4.950	0.318

Model fit: Likelihood-ratio $x^2(34) = 69.5$, $p < 0.001$; McFadden pseudo-$R^2 = 0.098$; AIC = 709.0. Multicollinearity: all GVIF^(1/(2·df))<1.25 (Appendix 2). *$p < 0.05$.

Reference outcome: Normal BMI. Reference categories: Sex = Male; Age group = ≤30 years; Nationality group = MENA; Marital status = Married; Employment length = ≤5 years; Pre-existing medical condition = None; all eating-behaviour items = Disagree. A ridge-penalised sensitivity analysis yielded estimates of consistent direction and magnitude.

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

employment length (Table 1). Female paramedics were younger, more likely to be single, and had shorter employment durations, while males exhibited higher rates of overweight and obesity. These findings align with broader trends in EMS professionals and students, where gender disparities in weight status and health behaviours are well-documented.[11] For instance, a recent study from Saudi Arabia found that male university students were more likely to be overweight or obese compared to females, with dietary patterns and cultural factors contributing to these differences.[11,13] These gender-based patterns are also evident in EMS populations worldwide, where male paramedics often report higher BMI and a greater risk of metabolic disorders than their female counterparts.[7]

The prevalence of comorbidities among HMCAS staff was low and similar across genders, with hypertension and diabetes being the most common conditions (Table 2). An organisational explanation is provided by the demanding nature of emergency medical work, which is often associated with an increased risk of developing chronic diseases (Table 5). However, the observed rates of overweight and obesity remain a concern. Findings from regional and international studies highlighted the elevated risk of non-communicable diseases among EMS personnel due to irregular eating patterns, high stress, and shift work.[7,24–27]

Bivariate analyses also revealed that marital status and employment length were significantly associated with BMI categories (Table 3), with married and longer-serving staff more likely to be overweight or obese. This cumulative impact of occupational and lifestyle factors over time is consistent with global research, which has shown that the duration of service and personal life circumstances can influence health behaviours and outcomes among EMS workers.[28,29] In the Middle East, similar associations have been reported based on a study involving the general public, with longer employment and marital status being linked to higher BMI and increased risks of metabolic syndrome.[30]

Unexpectedly, in this study, most workplace-related factors, including nutrition knowledge, physiological and physical environment factors, and the majority of psychosocial variables, were not significantly associated with BMI categorisation (Table 5). Organisational or psychosocial factors approaching statistical significance were meal interruption during shifts, with overweight individuals reporting more frequent interruptions. This finding is explained by the disruptive impact of emergency work on regular meal patterns, a common finding in other similar studies from the United States and Turkey, where EMS providers consistently report that unpredictable call volumes and a lack of scheduled breaks hinder their ability to maintain healthy eating habits.[3,31] However, the lack of significant associations with organisational place factors suggests that demographic and clinical characteristics may play a more prominent role in determining weight status than previously assumed, a pattern also observed in some studies.[32,33]

Multivariate analysis provided further clarity on the predictors of being overweight or obese (Table 6). After collapsing sparse response categories and adjusting for demographic and behavioural covariates, the pattern of independent associations was more conservative than in the bivariate analyses. Employment duration emerged as the organisational factor most consistently associated with weight status: staff employed for 6 – 10 years had an almost fourfold higher relative risk of obesity than colleagues employed for five years or less, with a similar tendency among those employed for 11 – 15 years. Cumulative exposure to shift work, occupational stress, and progressive lifestyle change during mid-career employment may underline this gradient, a phenomenon reported in EMS populations globally.[7,33,34] By contrast, pre-existing medical conditions were not independently associated with BMI category once modelled as a single any-versus-no indicator, suggesting that the extreme condition-specific estimates observed in the initial model reflected very small cell counts rather than robust associations.

Nationality group was not independently associated with BMI category in the revised model. The apparent nationality effects observed in the initial analysis were driven by very small numbers of respondents within individual nationality cells and did not persist when nationalities were grouped into broader geographic regions. Nevertheless, cultural and dietary background remains a plausible influence on eating behaviour in this highly diverse workforce, as highlighted by recent multinational studies in the Middle East and North Africa region on the role of cultural background and food literacy in shaping eating behaviours and health outcomes.[23,34,35] The diversity of the HMCAS workforce thus continues to warrant culturally sensitive approaches to health promotion initiatives.

For example, let us consider the Health Exercise Nutrition for the Really Young (HENRY) programme.[36] Initially developed in the UK as a community-based initiative to prevent early childhood obesity, its transfer required careful adaptation to local cultural norms and dietary

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

practices. The evaluation of HENRY's implementation identified that success depended on modifying educational materials, delivery methods, and engagement strategies to reflect local food traditions, language, and health beliefs.[36]

Among the behavioural factors, fatigue-related eating ("eating more when I am tired") showed a positive but imprecise association with being overweight that did not reach statistical significance once the response categories were collapsed (Table 6). The extremely large estimate observed in the initial model was a statistical artefact of sparse data, as only seven participants strongly agreed with this item, and it should not be interpreted as evidence of an effect of that magnitude. The direction of the association nevertheless remains consistent with a growing body of literature demonstrating that shift work and sleep deprivation disrupt appetite regulation and promote unhealthy eating behaviours.[31,37,38] Another study from Türkiye found that emotional and external eating were associated with depression, anxiety, and stress levels among emergency service workers, particularly those working 24-hour shifts.[7] Taken together, these findings support a hypothesised pathway in which occupational stress and shift-related fatigue promote maladaptive eating behaviours, which may in turn contribute to being overweight or obese.

The strongest behavioural association in the revised model was with meal interruption: staff who agreed that their meals were often interrupted during shifts had a more than threefold higher relative risk of being overweight (Table 5). Interrupted meals may promote rushed eating, compensatory snacking, and reliance on energy-dense convenience foods, mechanisms previously described in EMS and shift-working populations.[4,38] Stress-related eating items were not independently associated with BMI category in the revised model, and average working hours could not be modelled reliably because reported values clustered around the standard full-time schedule; the earlier estimates for these items should likewise be interpreted in light of the sparse-data problem described above.

The study's findings indicate that workplace factors, such as meal interruptions, and demographic characteristics, including sex and employment length, are independently associated with weight status among emergency paramedics, whereas most knowledge-, stress-, and environment-related items were not retained as independent predictors. The lack of significant associations between BMI and most workplace-related factors suggests that interventions should address organisational and environmental barriers, as well as individual-level determinants such as stress management, coping strategies, and cultural influences. Paramedics, as front-line healthcare workers, are prone to burnout and often leave the profession for various reasons.[39] Therefore, it is recommended that their employers take measures to mitigate the known issues, including those that promote poor eating habits. The demographic and behavioural variables demonstrated stronger statistical associations within this dataset rather than concluding that organisational factors are less important.

4.1. Implications for occupational health practice

Healthcare practitioners working in EMS are uniquely positioned to address the complex relationship between demographic factors, fatigue-induced eating behaviours, and weight management revealed in this study. Given that fatigue was associated with self-reported overeating in this sample, frontline occupational health practitioners should incorporate structured assessments of fatigue and eating behaviour into routine health surveillance programmes. They should utilise validated screening tools during pre-employment assessments, periodic health reviews, and return-to-work evaluations. Particular attention should be directed towards newly employed paramedics who demonstrated increased obesity risk despite lower overweight risk, suggesting maladaptive coping strategies during the transition period that warrant early intervention through individualised nutrition counselling and stress management training. The significant associations between nationality and obesity risk highlight the necessity for culturally adapted wellness programmes. This requires collaboration with community health workers to design nutrition education materials that respect diverse dietary traditions while promoting healthful choices. Coincidentally, Hamad Medical Corporation has now launched a weekly online well-being programme in the form of live and interactive presentations on various topics, including nutrition. Occupational health practitioners should advocate for organisational policies that address structural barriers to healthy eating. These include protected meal breaks with clear interruption protocols, adequate food storage and preparation facilities at ambulance stations, and shift scheduling policies that limit consecutive night shifts while providing sufficient recovery time. Environmental

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

modifications, such as conducting workplace food environment audits, negotiating healthier vending machine options, and establishing partnerships with local food vendors to provide nutritious meal options near ambulance stations, represent practical interventions within the scope of practice of occupational healthcare personnel. Occupational health practitioners can meaningfully improve the health and well-being of EMS personnel, enhancing workforce retention and the quality of patient care delivered by these essential frontline healthcare workers.

4.2. Limitations

This study has some limitations that must be acknowledged. The cross-sectional design precludes causal inferences, and the reliance on self-reported data may introduce reporting bias. We acknowledge that reverse causation and bidirectional relationships cannot be excluded in this study. For example, while fatigue-related overeating was strongly associated with obesity, it is equally plausible that obesity contributes to fatigue through impaired sleep quality or reduced physical fitness. Such reciprocal relationships cannot be disentangled within this cross-sectional framework. The lower reliability of the physiological and environmental subscales also suggests that further refinement of these measures may be warranted in future research. Additionally, while the findings are broadly consistent with recent studies from the Middle East and other regions, the complex organisational context of HMCAS may limit the generalisability of the results to other EMS settings. Participants were recruited using voluntary participation combined with snowball sampling. Consequently, individuals with greater interest in nutrition or health behaviours may have been more likely to participate, introducing selection bias. Therefore, the sample may not fully represent all HMCAS paramedics, limiting external validity and generalisability of the findings. The study findings are further limited by the multiple variables that impact BMI. Variables including physical activity levels, sleep duration and quality, smoking status, alcohol consumption, socioeconomic circumstances, total dietary intake, medication use, metabolic disorders and family history of obesity were not collected. Consequently, residual confounding factors were not excluded in this study. Furthermore, the sample was predominantly male (93%), reflecting the composition of the HMCAS workforce. Although sex was retained as a covariate in the regression model, the small number of female respondents ($n = 24$) limits the precision of sex-specific estimates and the generalisability of the findings to female EMS professionals; the observed association between female sex and a lower risk of being overweight should therefore be interpreted with caution. Finally, although response categories were collapsed and a penalised sensitivity analysis was performed to mitigate sparse-data bias, some analysis cells remained small, and the width of the corresponding confidence intervals should be borne in mind when interpreting the regression estimates.

5. CONCLUSION

This study analysed factors influencing eating behaviour and weight status among paramedics at HMCAS in Qatar. It highlighted that demographic and organisational characteristics, such as sex and employment length, were independently associated with BMI category within this workforce sample. The prevalence of being overweight or obese aligns with patterns observed in EMS populations, regionally and internationally, identifying the influence of cultural, occupational, and lifestyle factors. The most robust workplace-related association was meal interruption during shifts, which was linked to a higher relative risk of being overweight, suggesting that the disruption of regular eating patterns by emergency work is a tangible occupational health concern. Fatigue-related overeating showed a positive but statistically non-significant association with weight status after sparse-data adjustments, a direction consistent with global evidence on the impact of shift work on appetite regulation. Future research should build on these findings by conducting longitudinal studies with paramedics exposed to specific but different work patterns, some enabling them to eat at predetermined times without interruption, to explore causal relationships and changes in eating behaviour over time. Further refinement of measurement tools is warranted, including intervention studies evaluating fatigue management, protected meal breaks, nutrition education programmes, and organisational wellness initiatives within EMS settings. Building on this research, future research should undertake exploratory and confirmatory factor analyses, together with item reduction procedures, to further improve the psychometric properties of the identified domains in this study.

ACKNOWLEDGEMENT

The authors thank all staff working in the Major Incident Preparedness and Resilience and Ambulance Service Group who participated in this study.

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

AUTHORS' CONTRIBUTIONS

MAC: Study design, Survey development, Data Collection, Writing original draft. HF: Writing original draft, Data analysis. PG: Study design, Editing article draft. PW: Supervision, Reviewing article draft. GA: Study design, Survey development, Editing article draft, Supervision.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DISCLOSURE OF AI USE

The authors only used Microsoft Copilot as a proofreading tool for the final manuscript before submission to improve the grammar. Copilot was not used to generate the research ideas, study design, methodology, results, or substantive scientific content of the manuscript.

DATA AVAILABILITY

Aggregated data are available upon reasonable request from the corresponding author.

FUNDING

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ETHICAL APPROVAL

This study received ethical approval from the Hamad Medical Corporation Medical Research Centre and the University of Sheffield (MRC-01-22-115 and 662, respectively).

REFERENCES

[1] Al Barbari MJ, Gangaram P, Alolimat H, Kenward G, Laughton J, Alinier G. Stress and PTSD levels among Hamad Medical Corporation Paramedics before and during the COVID-19 pandemic. *Qatar Medical Journal*. 2025;2025(4):111.

[2] Szekely R, Ciobanu C. Mental health and wellbeing of Intensive Care Unit (ICU) staff: An occupational psychology perspective. *Occupational Psychology Outlook*. 2024;3(1):36–43. https://doi.org/10.53841/bpsopo.2024.3.1.36

[3] Mansouri T, Ghanatios G, Hatzinger L, Barich R, Dampha E, Temple JL, et al. Eating patterns among emergency medical service providers in the United States: A qualitative interview study. *Nutrients*. 2022;14(22):4884. https://doi.org/10.3390/nu14224884

[4] Mansouri T, Hostler D, Temple JL, Clemency BM. Eating and physical activity patterns in day and night shift EMS clinicians. *Prehospital Emergency Care*. 2021;26(5):700–707. https://doi.org/10.1080/10903127.2021.1996662

[5] Alshloul MN, Bdair IA. Obesity and its association with dietary habits among students of Al-Ghad Health Colleges-Abha. *World J Med Sci*. 2021;18(1):1–8.

[6] Iłowiecka K, Maślej M, Czajka M, Pawłowski A, Więckowski P, Styk T, et al. Lifestyle, eating habits, and health behaviors among dietary supplement users in three European countries. *Front Public Health*. 2022;10:892233. https://doi.org/10.3389/fpubh.2022.892233

[7] Erden SC, Yilmaz BK, Kozaci N, Uygur AB, Yigit Y, Karakus K, et al. The relationship between depression, anxiety, and stress levels and eating behavior in emergency service workers. *Cureus*. 2024;15(2). https://doi.org/10.7759/cureus.35504

[8] Vural S, Vural S, Coşkun F. The impact of shift work on the lifestyle and well-being of emergency physicians: A comprehensive examination of eating habits and health behaviors. *Eurasian J Emerg Med*. 2024;23(2). https://doi.org/10.4274/eajem.galenos.2024.21548

[9] Thielmann B, Schnell J, Böckelmann I, Schumann H. Analysis of work related factors, behavior, well-being outcome, and job satisfaction of workers of emergency medical service: A systematic review. *Int J Environ Res Public Health*. 2022;19(11):6660. https://doi.org/10.3390/ijerph19116660

[10] Hutchinson LC, Forshaw MJ, McIlroy D, Poole H. The role of lifestyle on NHS ambulance workers' wellbeing. *J Workplace Behav Health*. 2021;36(2):159–171. https://doi.org/10.1080/15555240.2021.1922286

[11] Alrubaiee GG, Alqalah TA, Alkubati SA, Al-Rabeei NA. Overweight and obesity among Saudi university students and their relationships with various lifestyle habits: A cross-sectional study. *BMC Public Health*. 2025;25(1):2021. https://doi.org/10.1186/s12889-025-23164-7

[12] Al-Thani M, Al-Thani A, Alyafei S, Al-Chetachi W, Khalifa SE, Ahmed A, Ahmad A, Vinodson B, Akram H. The prevalence and characteristics of overweight and obesity among students in Qatar. *Public Health*. 2018;160:143–149. https://doi.org/10.1016/j.puhe.2018.03.020

[13] Woodman A, Coffey M, Cooper-Ryan AM, Jaoua N. The relationship between lifestyle habits and obesity among students in the Eastern province of Saudi Arabia: Using the Arab Teens Lifestyle

(ATLS) questionnaire. *BMC Public Health*. 2024;24(1):2267. https://doi.org/10.1186/s12889-024-19353-5

[14] Farhat H, Abid C, El Aifa K, Gangaram P, Jones A, Khenissi MC, et al. Epidemiological determinants of patient non-conveyance to the hospital in an emergency medical service environment. *Int J Environ Res Public Health*. 2023;20(14):6404. https://doi.org/10.3390/ijerph20146404

[15] Gangaram P, Menacho AM, Alinier G. Crisis resource management in relation to empowering people to speak up in emergency medical service clinical practice settings. *J Paramedic Pract*. 2017;9(2):60–65. https://doi.org/10.12968/jpar.2017.9.2.60

[16] Rutschman R, Alinier G, Scott G, Reimann T, Sliman Bounouh S, Castle NR, et al. Characterization of ST-elevation myocardial infarction cases: Association between specific dispatcher-assigned dispatch determinant codes and hospital-confirmed STEMI cases in Qatar. *Prehospital Emergency Care*. 2024;0(0):1–9. https://doi.org/10.1080/10903127.2024.2387721

[17] Demir S, Tunçbilek Z, Alinier G. Prehospital emergency health services in Qatar. *J Paramed Pract*. 2022;14(11). https://doi.org/10.12968/jpar.2022.14.11.456

[18] Patey AM, Fontaine G, Francis JJ, McCleary N, Presseau J, Grimshaw JM. Healthcare professional behaviour: Health impact, prevalence of evidence-based behaviours, correlates and interventions. *Psychol Health*. 2023;38(6):766–794. https://doi.org/10.1080/08870446.2022.2100887

[19] Cuschieri S. The STROBE guidelines. Saudi J Anaesth. 2019;13(Suppl 1) – S34.

[20] Perez L, Corne P, Pasquier G, Konecki C, Sadek M, Le Bihan C, et al. Population pharmacokinetics of isavuconazole in critical care patients with COVID-19-associated pulmonary aspergillosis and Monte Carlo simulations of high off-label doses. *J Fungi (Basel)*. 2023;9(2):211. https://doi.org/10.3390/jof9020211

[21] Aditya MT, Mahmud T, Nabila IJ, Shahriar MZ. Developing a model on factors affecting the mode choice in EMS. Technical Report. Department of Civil and Environmental Engineering (CEE), Islamic University of Technology (IUT), Board Bazar, Gazipur-1704, Bangladesh; 2023. http://localhost:8080/xmlui/handle/123456789/1957

[22] Alfakhry G, Kodmani R, Almasri IA. Psychometric properties of the Arabic version of PHEEM applied on a sample of medical residents in Syria. *BMC Med Educ*. 2024;24(1):728. https://doi.org/10.1186/s12909-024-05731-5

[23] Mohsen H, Sacre Y, Hanna-Wakim L, Hoteit M. Nutrition and food literacy in the MENA region: A review to inform nutrition research and policy makers. *Int J Environ Res Public Health*. 2022;19(16):10190. https://doi.org/10.3390/ijerph191610190

[24] Crowther M. Making the shift work: Changes in, interventions for, and factors associated with, health behaviours in shift working populations. Thesis. CQUniversity;2023. https://doi.org/10.25946/24590322.v1

[25] Hegg-Deloye S, Brassard P, Prairie J, Larouche D, Jauvin N, Poirier P, et al. Prevalence of risk factors for cardiovascular disease in paramedics. *Int Arch Occup Environ Health*. 2015;88(7):973 – 980. https://doi.org/10.1007/s00420-015-1028-z

[26] Sheridan S. Paramedic health status, fitness and physical tasks: A review of the literature. *Australas J Paramed*. 2019;16:1 – 7. https://doi.org/10.33151/ajp.16.580

[27] Wolska A, Stasiewicz B, Kaźmierczak-Siedlecka K, Ziętek M, Solek-Pastuszka J, Drozd A, et al. Unhealthy food choices among healthcare shift workers: A cross-sectional study. *Nutrients*. 2022;14(20):4327. https://doi.org/10.3390/nu14204327

[28] Hutchinson LC, Forshaw MJ, McIlroy D, Poole H. The role of lifestyle on NHS ambulance workers' wellbeing. *J Workplace Behav Health*. 2021;36(2):159 – 171. https://doi.org/10.1080/15555240.2021.1922286

[29] Thielmann B, Schnell J, Böckelmann I, Schumann H. Analysis of work related factors, behavior, well-being outcome, and job satisfaction of workers of emergency medical service: A systematic review. *Int J Environ Res Public Healt*h. 2022;19(11):6660. https://doi.org/10.3390/ijerph19116660

[30] Bany-yasin H, Elmor AA, Ebrahim BK, Ahmed AAM, Alarachi MR, Abedalqader L, et al. Exploration of the nutrition knowledge among general population: Multi-national study in Arab countries. *BMC Public Health*. 2023;23:1178. https://doi.org/10.1186/s12889-023-15791-9

[31] Vural S, Coşkun F, Vural S, Coşkun F. The impact of shift work on the lifestyle and well-being of emergency physicians: A comprehensive examination of eating habits and health behaviors. *Eurasian J Emerg Med*. 2024;23(2). https://doi.org/10.4274/eajem.galenos.2024.21548

[32] Johns DJ, Langley TE, Lewis S. Use of social media for the delivery of health promotion on smoking, nutrition, and physical activity: A systematic review. Lancet. 2017;390. https://doi.org/10.1016/S0140-6736(17)32984-7

[33] Ul Haq I, Mariyam Z, Li M, Huang X, Jiang P, Zeb F, et al. A comparative study of nutritional status, knowledge attitude and practices (KAP) and dietary intake between international and Chinese students in Nanjing, China. *Int J Environ Res Public Health*. 2018;15(9):1910. https://doi.org/10.3390/ijerph15091910

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

[34] Al Barbari MJ, Gangaram P, Alolimat H, Kenward G, Laughton J, Alinier G. Exploring sociodemographic factors and coping strategies before and during the COVID-19 pandemic of paramedics working in a Middle Eastern country. *Qatar Med J*. 2026;2026 press.

[35] Hoteit M, Mansour R, Mohsen H, Bookari K, Hammouh F, Allehdan S, et al, regional food literacy group. Status and correlates of food and nutrition literacy among parents-adolescents' dyads: Findings from 10 Arab countries. *Front Nutr*. 2023;10. https://doi.org/10.3389/fnut.2023.1151498

[36] Bryant M, Burton W, Collinson M, Martin A, Copsey B, Groves-Williams D, et al. Effectiveness and cost-effectiveness of a sustainable obesity prevention programme for preschool children delivered at scale 'HENRY' (Health, Exercise, Nutrition for the Really Young): Protocol for the HENRY III cluster randomised controlled trial. *BMJ Open*. 2024. https://doi.org/10.1136/bmjopen-2023-081861

[37] Akhlaghi M, Kohanmoo A. Sleep deprivation in development of obesity, effects on appetite regulation, energy metabolism, and dietary choices. *Nutr Res Rev.* 2025;38(1):4 – 24. https://doi.org/10.1017/S0954422423000264

[38] Lowden A, Moreno C, Holmbäck U, Lennernäs M, Tucker P. Eating and shift work? Effects on habits, metabolism, and performance. *Scand J Work Environ Health*. 2010;36(2):150 – 162. https://www.jstor.org/stable/40967841

[39] Beldon R, Garside J. Burnout in frontline ambulance staff. *J Paramed Pract.* 2022;14(1):6–14. https://doi.org/10.12968/jpar.2022.14.1.6

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/

APPENDIX

Appendix 1. Survey items and themes.

Themes	Questions
Demographic	Sex
Demographic	Age
Demographic	Nationality
Demographic	Marital
Demographic	HMCAS Staff
Demographic	Patient-facing role
Demographic	Division
Demographic	Employment Length
Demographic	Average working hours
Demographic	Education
Clinical	Weight
Clinical	Height
Clinical	Do you suffer from any of the following medical diseases?
Clinical	How would you rate your current health?
Nutrition Knowledge	How important do you think healthy eating is?
Nutrition Knowledge	How would you rate your knowledge about nutrition and healthy eating?
Nutrition Knowledge	My current eating habits during clinical shifts are healthy
Nutrition Knowledge	I eat the food that I have brought from home
Nutrition Knowledge	I often eat other food that I have brought from home
Nutrition Knowledge	I often eat other food even though I have brought my own food from home
Physiological factors	I often find myself hungry during my clinical shifts
Physiological factors	When I'm hungry during clinical shifts, I tend to overeat when I get the chance to eat
Physiological factors	When I'm hungry during clinical shifts, I tend to choose unhealthy foods when I get a chance to eat
Physiological factors	When I'm working a clinical shift, I eat whatever I can get my hands on, even if I'm on a diet or plan to eat healthy foods
Physiological factors	I often satisfy my cravings for unhealthy food during clinical shifts
Physiological factors	I eat less when I am tired
Physiological factors	I eat more when I am tired
Physical environment	I often eat inside the ambulance as there is no time to eat anywhere else
Physical environment	I often eat inside the facilities provided by HMC
Physical environment	All types of food are available to me while on a clinical shift
Physical environment	Healthy food is easily obtainable while I am on clinical shift
Physical environment	I often find myself next/near to unhealthy food choices as the ambulance drives around between calls
Organisational Factors	I often have no time to eat while working a clinical shift
Organisational Factors	I often have my meal interrupted during shift
Organisational Factors	I often rush through my meal or eat my meal quickly while on a clinical shift
Organisational Factors	I often buy/prepare my meal and then not eat as I get called out to a case
Organisational Factors	In general, eating during night shift is much easier than day shift

(Continued)

Appendix 1. (Continued)

Themes	Questions
Psychosocial factors	My partner that I am working with influences my eating positively
Psychosocial factors	My partner that I am working with influences my eating negatively
Psychosocial factors	I often sit and share my meals with colleagues
Psychosocial factors	Stress during my clinical shifts is often too much for me to handle
Psychosocial factors	Stress affects my eating behaviour
Psychosocial factors	Stress makes me eat less
Psychosocial factors	Stress makes me eat more
Psychosocial factors	Stress makes me eat unhealthy food
Psychosocial factors	Stress makes me eat healthy food
Psychosocial factors	Stress during clinical shifts carries over to my personal life and affects my eating habits at home
Psychosocial factors	I have, or I am eating according to a specific eating plan/diet, and I fail to follow this plan/diet due to work conditions

Appendix 2. Multicollinearity diagnostics of the multinomial logistic regression model (generalised variance inflation factors, GVIF).

Predictor	df	GVIF	GVIF^(1/(2·df))
Sex	1	1.347	1.160
Age group	2	2.010	1.191
Nationality group	4	1.995	1.090
Marital status	1	1.478	1.216
Employment length	2	2.098	1.204
Pre-existing medical condition	1	1.098	1.048
I eat more when I am tired	2	1.264	1.060
I often have my meal interrupted during shift	2	1.190	1.044
Stress makes me eat more	2	1.359	1.080

Downloaded from https://www.qscience.com at 2026-11-11 via Open Access. This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and repr... https://creativecommons.org/licenses/by/4.0/