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BURDEN OF OBESITY IN HEALTHCARE WORKERS: THE ROLE OF WORK ENVIRONMENT AND SOCIODEMOGRAPHIC CHARACTERISTIC OBESITY IN HEALTHCARE WORKERS

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ABSTRACT **Background:** Overweight and obesity are major public-health challenges linked to cardiometabolic and other non-communicable diseases. Although clinicians, dentists, and pharmacists are expected to serve as health role models, many healthcare workers experience elevated BMI, particularly in under-studied regions such as Karbala, Iraq. **Objective:** To estimate the prevalence of overweight and obesity among physicians, dentists, and pharmacists in Karbala and to evaluate sociodemographic, clinical, occupational, lifestyle, and familial predictors of excess BMI. **Methods:** A cross-sectional study was conducted between January and May 2024 among 500 medical staff selected through stratified random sampling. Weight and height were measured using calibrated instruments, and BMI was classified according to WHO cut-offs. A structured questionnaire captured demographic, occupational, lifestyle, and clinical data. Associations were examined using chi-square tests, and logistic regression estimated odds ratios (ORs) with 95% confidence intervals (CIs). Statistical significance was set at $p < 0.05$. **Results:** Overall, 65.2% of participants had BMI above the normal range (42.9% overweight; 22.2% obese). Obesity was more common among males and increased with age and work experience (OR ≈1.06 per year; $p < 0.001$). Married staff had greater odds than unmarried peers (OR ≈3.5; $p < 0.001$). Physicians and dentists showed nearly twofold higher risk compared with pharmacists (OR ≈2.3; $p < 0.05$). Chronic disease and medication use strongly predicted obesity (OR >1.9; $p < 0.01$). Smoking cessation was linked to increased prevalence. Workplace differences were not significant after grouping administrative environments. Participants demonstrated high awareness of obesity causes, most citing poor diet and inactivity, yet lifestyle modification remained under-implemented. **Conclusion:** Overweight and obesity are highly prevalent among healthcare professionals in Karbala, particularly older, male, married staff with longer career tenure, chronic conditions, or family history. Despite strong awareness, translating knowledge into effective behavior change remains a critical challenge.

KEYWORDS : Obesity Prevalence; Healthcare Workers; Sociodemographic Factors

BACKGROUND

Obesity and overweight have become global public health crises, contributing significantly to diseases such as type 2 diabetes, cardiovascular disease, osteoarthritis, and certain cancers (1). According to the World Health Organization (2021), over 1.9 billion adults were overweight in 2016, of whom 650 million were obese, and at least 2.8 million adults die each year from obesity-related causes (2). Healthcare workers (HCWs) are expected to be role models for healthy living, yet they are not immune to the obesity trend. Their personal health behaviors and physical status can influence their credibility and effectiveness in counseling patients on lifestyle changes (3)

Recent studies have revealed surprisingly high rates of overweight and obesity among healthcare professionals (4). In high-income countries, studies report sizeable burdens for example, among nurses in the United Kingdom, Australia, and New Zealand, the prevalence of overweight approximates one-third of the workforce (about 32–34%) (5), with obesity also common (e.g., ~10% in Japan, 8% in Singapore, 4% in China when using WHO thresholds(4,6) . Data from lower- and middle-income regions often show equal or higher combined burdens. In India, studies estimate reach 42% overweight and 25% obesity (7), while in Al Ahsa, Saudi Arabia the overweight rate was (33.8%) and obesity (18.6%)(8), and in the Gaza Strip, the combined prevalence of overweight/obesity is roughly 65% (9).

Beyond prevalence, the implications of obesity in healthcare providers are important. Overweight and obese doctors or nurses may face difficulties in advising patients on weight management, potentially undermining patient trust and compliance (10). Prior research suggests that an obese clinician's advice on diet or exercise might carry less influence, and excess weight can even limit a provider's stamina and job performance (11). Cultural factors, work-related stress, long shifts, sedentary work duties, and easy access to food during work hours are all hypothesized contributors to higher obesity risk in this professional group (12).

Despite the growing evidence of obesity among healthcare workers globally, certain populations and subgroups remain under-studied. In particular, few studies have focused specifically on physicians, dentists, and pharmacists in the Middle East, and none to our knowledge in Karbala, Iraq. Karbala's healthcare workforce may have unique cultural and occupational exposures influencing their weight status for instance, dietary traditions, social norms, and differences in work setting (hospital vs. clinic) could all play a role. Understanding these factors in an Iraqi context is crucial for designing effective interventions.

This study was conducted to fill that gap by focusing on medical professionals in Karbala. Specifically, we aimed to determine the prevalence of overweight and obesity among physicians, dentists, and pharmacists working in Karbala. Identify key sociodemographic and occupational factors (age, gender, marital status, education, years of experience, workplace setting) associated with overweight and obesity in this group. Assess the relationship between lifestyle and clinical factors (smoking status, physical activity, presence of chronic conditions, long-term medication use) as well as family history of obesity, with the likelihood of being overweight or obese.

Ultimately, by clarifying these patterns, the study seeks to inform targeted health promotion strategies to improve healthcare workers' health in Karbala and similar settings.

Methodology

Study Design

This was a cross-sectional, questionnaire-based study.

Setting

The studied carried out in Karbala City, Iraq, between January 1 and May 30, 2024. The target population was physicians, dentists, and pharmacists working in various health facilities in Karbala, including Al-Hussein Teaching Hospital, Pediatric Teaching Hospital, Obstetric and Gynecological Hospital, several primary health care centers, and the Karbala Health Directorate and Specialist Dental Center.

Participants and Sampling

Eligible participants were medical staff (physicians, dentists, pharmacists) aged 21–65 years who were actively working in the Karbala health system during the study period. The only exclusion criterion was pregnancy (pregnant staff were not included due to the temporary weight changes of pregnancy). According to the Planning Department, a total of 1,683 such professionals were employed in Karbala health institutions (approximately 871 physicians, 302 dentists, and 510 pharmacists).

The required sample size was calculated using an online sample size calculator. For an expected prevalence estimate with 95% confidence level and a margin of error of ±4%, the minimum sample needed was 443 participants. To improve reliability and compensate for potential non-response, we targeted a sample of 500 participants. A stratified random sampling approach was used to ensure proportional representation from each professional category. The sample of 500 was allocated roughly according to the profession distribution in the population, and participants were then randomly selected from staff

lists in each stratum (profession). This approach ensured that physicians, dentists, and pharmacists were appropriately represented in the final sample. All selected individuals were invited to participate, and participation was voluntary.

Data Collection

Data were collected using a structured, self-administered questionnaire designed for this study. The questionnaire was developed in English (with Arabic translation as needed for clarity) and consisted of three sections.

Section A: Demographic and Occupational Information. This section gathered personal and work-related details including age, sex, occupation (physician/dentist/pharmacist), highest educational qualification, primary workplace (hospital, primary health care center, health directorate, or other), marital status, and years of work experience.

Section B: Medical and Lifestyle Factors. This section asked about the participant's personal health history and habits. It covered the presence of any chronic diseases (e.g., hypertension, diabetes, respiratory diseases, others), current use of any long-term or chronic medications, smoking status (current smoker, non-smoker, or ex-smoker), and level of physical activity (qualitatively assessed as part of lifestyle, though detailed activity frequency was not quantified). Participants were also asked whether they have a family history of obesity (any close family members who are obese).

Section C: Obesity Awareness and Perceptions. This final section assessed participants' awareness of obesity causes and their attitudes toward weight management. They were presented with a list of potential causes of obesity (such as physical inactivity, unhealthy diet, genetic/hereditary factors, psychological stress/depression, certain medications, and underlying diseases) and asked to mark which they believed to be important causes. Similarly, they were asked about the best ways to lose weight, choosing from options like increased physical exercise, healthy dieting, weight-loss medications, bariatric surgery, or other measures. Lastly, participants rated their interest in controlling their body weight (e.g., very interested, interested, or not interested).

The questionnaire was reviewed by experts for content validity and then pilot-tested.

Each participant's height and weight were measured following standard protocols. Weight was measured in kilograms using a calibrated digital scale placed on a flat, hard surface. Participants were weighed in light indoor clothing and without shoes. Height was measured in centimeters using a wall-mounted stadiometer, with participants standing erect, without shoes, and with the back of the head, shoulders, and heels touching the vertical surface.

Using these measurements, the Body Mass Index (BMI) was calculated for each individual as weight in kilograms divided by height in meters squared (kg/m²). BMI was classified according to the World Health Organization criteria. Participants with a BMI <18.5 kg/m² were considered underweight, those between 18.5–24.9 kg/m² were classified as normal weight, individuals with a BMI between 25.0–29.9 kg/m² were defined as overweight, and those with a BMI ≥30.0 kg/m² were categorized as obese.

Data Analysis

Completed questionnaires were checked for accuracy and coded before analysis. Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics summarized the data (means ± SD for continuous variables; frequencies and percentages for categorical variables). The prevalence of overweight and obesity was calculated, and associations with sociodemographic and lifestyle factors were tested using chi-square (χ^2). Univariate logistic regression was performed to identify independent predictors of obesity (BMI ≥30 kg/m²), with odds ratios (ORs) and 95% confidence intervals (CIs). A p-value < 0.05 was considered statistically significant.

RESULTS

A total of 500 healthcare professionals were included in the final analysis (Table 1). Participants spanned an age range of 21 to 65 years, with a mean age of 35.7 ± 9.5 years. Females constituted 59.0% of the participants, while 41.0% were male. The largest share of participants were married (78.6%), followed by single professionals (20.2%), with <1.0% reporting divorced or widowed status. All professions of interest were represented, with physicians forming 53.6% of the cohort, pharmacists 31.6%, and dentists 14.8%.

Table 1. Demographic, Professional, Clinical and Life Style Characteristics of Participants (N = 500).

Variable	Category	N (%) or Mean ± SD
Age (years)	Mean ± SD	35.7 ± 9.5
Age group	20–45 years	416 (83.2%)
	46–65 years	84 (16.8%)
Gender	Male	205 (41.0%)
	Female	295 (59.0%)
Marital status	Married	393 (78.6%)
	Single	101 (20.2%)
	Divorced	4 (0.8%)
	Widowed	2 (0.4%)
Occupation	Physician	268 (53.6%)
	Pharmacist	158 (31.6%)
	Dentist	74 (14.8%)
Education level	Bachelor's degree	353 (70.6%)
	Diploma/Master's	67 (13.4%)
	Doctorate/Board specialty	80 (16.0%)
Primary workplace	Hospital	300 (55.0%)
	Primary Health Care Center (PHCC)	99 (19.8%)
	Health Directorate (Admin)	50 (10.0%)
	Other (e.g., private clinics)	41 (8.2%)
Years of experience	≤ 5 years	175 (35.0%)
	> 5 years	325 (65.0%)
Smoking status	Current smoker	45 (9.0%)
	Non-smoker	442 (88.4%)
	Ex-smoker	13 (2.6%)
Any chronic disease	Yes	104 (20.8%)
	No	396 (79.2%)
Chronic diseases	No chronic diseases	396 (79.2%)
	Hypertension	59 (11.8%)
	Diabetes mellitus	15 (3.0%)
	Chronic respiratory disease	19 (3.8%)
	Other chronic disease	21 (4.2%)
On chronic medication	Yes	81 (16.2%)
	No	419 (83.8%)
Family history of obesity	Yes	301 (60.2%)
	No	199 (39.8%)

Smoking history (current or former) was reported by 11.6% of participants (9.0% current smokers, 2.6% ex-smokers). A total of 20.8% reported at least one chronic illness, including hypertension (11.8%), diabetes mellitus (3.0%), respiratory diseases such as asthma or COPD (3.8%), and other chronic conditions (4.2%). Chronic medication use was reported by 16.2%, while 83.8% reported no long-term medication. Family history of obesity was reported by 60.2% of participants.

Body mass index analysis showed that 43.0% of participants were classified as overweight and 22.2% were classified as obese according to WHO BMI thresholds. Underweight cases were negligible (<0.5%). The combined prevalence of overweight/obesity in the cohort was 65.2%.

Factors associated with obesity (BMI ≥30 kg/m²) were evaluated using both chi-square tests (Table 2) and univariate logistic regression (Figure 1 and 2).

Table 2. Obesity Prevalence and their Association with Personal, Professional Characteristics, Lifestyle and Clinical Factors.

Characteristic	Category	Overall N	Obese (BMI ≥30) N (%)	Not Obese N (%)	p-value
Age group	20–45 years	361	72 (19.9%)	289 (80.1%)	0.015
	46–65 years	80	26 (32.5%)	54 (67.5%)	
Gender	Male	185	62 (33.5%)	123 (66.5%)	<0.001
	Female	256	36 (14.1%)	220 (85.9%)	
Marital status	Married	347	90 (25.9%)	257 (74.1%)	<0.001
	Single/Other	94	8 (8.5%)	86 (91.5%)	
Occupation	Physician	236	61 (25.8%)	175 (74.2%)	0.010
	Pharmacist	136	18 (13.2%)	118 (86.8%)	
	Dentist	69	19 (27.5%)	50 (72.5%)	
Education level	Bachelor's	314	61 (19.4%)	253 (80.6%)	0.050
	Diploma/ Master's	57	19 (33.3%)	38 (66.7%)	
	Doctorate/ Board	70	18 (25.7%)	52 (74.3%)	
Workplace	Hospital	268	46 (17.2%)	222 (82.8%)	0.017
	PHCC	92	27 (29.3%)	65 (70.7%)	
	Health Directorate	45	14 (31.1%)	31 (68.9%)	
	Other	36	11 (30.6%)	25 (69.4%)	
Experience	≤ 5 years	154	15 (9.7%)	139 (90.3%)	<0.001
	> 5 years	287	83 (28.9%)	204 (71.1%)	
Smoking status	Smoker	42	15 (35.7%)	27 (64.3%)	0.004
	Non-smoker	387	77 (19.9%)	310 (80.1%)	
	Ex-smoker	12	6 (50.0%)	6 (50.0%)	
Chronic disease	Yes	95	44 (46.3%)	51 (53.7%)	<0.001
	No	346	54 (15.6%)	292 (84.4%)	
Chronic medication use	Yes	73	35 (47.9%)	38 (52.1%)	<0.001
	No	368	63 (17.1%)	305 (82.9%)	
Family history of obesity	Yes	267	73 (27.3%)	194 (72.7%)	<0.001
	No	174	25 (14.4%)	149 (85.6%)	

Older age showed a consistent effect, with higher odds of obesity per additional year of age (OR ≈ 1.06, p < 0.001). Female gender had significantly lower obesity odds than males (OR < 0.4, p < 0.001). Marriage was one of the strongest predictors, with married participants having around threefold higher odds of obesity than unmarried peers (OR ≈ 3.5, p < 0.001). Profession also mattered: physicians and dentists had roughly double the odds of obesity compared with pharmacists (ORs ≈ 2.3, p < 0.05). Participants with Diploma/Master's degrees had higher odds of obesity than those with only a Bachelor's degree, whereas Doctorate/Board level was not significantly associated with obesity. Work duration showed a similar gradient to age: each additional year of experience was associated with a modest but significant increase in obesity odds (OR ≈ 1.06, p < 0.001), consistent with the higher obesity prevalence observed in those with >5 years of work experience. Workplace setting did not remain a significant predictor when non-hospital sites were grouped and compared with hospitals.

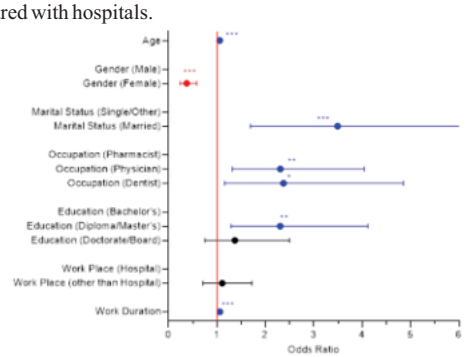

Figure 1. Forest Plot of Univariate Odds Ratios for Personal and Professional Factors Associated with Obesity (BMI ≥ 30 kg/m²).

The plotted dot shows the estimated odds ratio, while the horizontal bar extending from it displays the 95% confidence interval range. The vertical red reference line at OR = 1.0 represents no difference in obesity odds. Significance asterisks are placed next to dots to reflect the p-value associated with each univariate model.

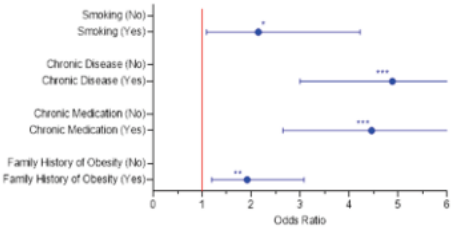

Figure 3. Forest Plot of Univariate Odds Ratios for Lifestyle and Clinical Factors Associated with Obesity (BMI ≥ 30 kg/m²).

The plotted dot shows the estimated odds ratio, while the horizontal bar extending from it displays the 95% confidence interval range. The vertical red reference line at OR = 1.0 represents no difference in obesity odds. Significance asterisks are placed next to dots to reflect the p-value associated with each univariate model.

Lifestyle and clinical factors significantly associated with obesity (BMI ≥30) were assessed. Obesity prevalence differed by smoking history (p = 0.004), where never-smokers had the lowest obese share (19.9%) compared with current smokers (35.7%), while the highest proportion was observed among former smokers after cessation (50.0%). Participants reporting at least one chronic disease had a substantially greater obesity proportion than those without chronic illness (46.3% vs 15.6%; p < 0.001). A similar pattern was observed for chronic medication use, where those receiving long-term therapies showed higher obese shares than those not on chronic medications (47.9% vs 17.1%; p < 0.001). Additionally, family history influenced obesity distribution, with greater obese proportions among individuals with a familial predisposition compared with those without (27.3% vs 14.4%; p < 0.001).

Finally, the study assessed participants' awareness and perceptions regarding obesity (Table 3). Participant awareness of obesity causes and preferred weight-management approaches was high. The most frequently perceived causes were physical inactivity (81.0%) and unhealthy diet (85.6%), while hereditary factors were recognized less often (42.8%). Only a small proportion considered stress/depression, medications, or medical conditions as primary causes (<1%). For weight reduction, most participants selected increased physical exercise (88.2%) and healthy diet modification (87.2%) as the best methods, whereas few viewed weight-loss medications (2.8%) or bariatric surgery (2.4%) as optimal solutions. Most participants reported being interested or very interested in weight control (28.4% and 58.2%, respectively), with 13.4% indicating no interest.

Table 3. Participant Awareness of Obesity Causes and Preferred Weight Management Methods (N = 500).

Question	Response	N (%)
Perceived causes of obesity	Physical inactivity (“Immobility”)	405 (81.0%)
	Unhealthy diet	428 (85.6%)
	Hereditary factors	214 (42.8%)
	Stress or depression	4 (0.8%)
	Certain medications	2 (0.4%)
	Disease or medical condition	4 (0.8%)
Best way to lose weight	Increased physical exercise	441 (88.2%)
	Healthy dieting	436 (87.2%)
	Weight-loss medications	14 (2.8%)
	Bariatric surgery	12 (2.4%)
	Other measures	5 (1.0%)
Interest in weight control	Very interested	142 (28.4%)
	Interested	291 (58.2%)
	Not interested	67 (13.4%)

DISCUSSION

Overweight and obesity are pervasive health problems globally, and our findings confirm that healthcare professionals in Karbala are not exempt from this trend (4,8,13). The prevalence of overweight (43%) and obesity (22.2%) among physicians, dentists, and pharmacists in

this study is alarmingly high roughly two out of three were above normal weight. This level is comparable to reports from other regions and underscores a concerning reality, the very individuals entrusted with advising patients on healthy lifestyles often struggle with weight issues themselves.

One possible explanation for these high rates among HCWs is that they may be particularly vulnerable to weight gain due to occupational stresses and prolonged working hours, night shifts, high job stress, easy access to calorie-dense foods during long shifts, and sedentary work patterns, can all contribute to energy imbalance (14–18).

Gender-based differences in obesity among healthcare professionals vary widely across countries, and our findings contribute to this complex discussion. In our study, male healthcare workers exhibited a significantly higher prevalence of obesity than females (33.5% vs. 14.1%). However, it aligns with findings from Saudi Arabia, where Al-Ghamdi et al. (2020) observed greater obesity prevalence among male healthcare providers, attributing this to sociocultural factors such as men's dietary habits, reduced engagement in physical activity, and work-related stress (19). This contrasts with results from Nigeria, where Chigbu et al. (2019) reported higher BMI and obesity rates among female medical staff (20). These contrasting patterns highlight how cultural, occupational, and lifestyle factors shape gender-obesity relationships differently across societies (21,22). In the context of Karbala, our results suggest that male healthcare workers may represent a particularly vulnerable group, warranting targeted workplace health-promotion and obesity-prevention interventions.

Profession-specific differences were also evident. Dentists recorded the highest obesity prevalence (27.5%), followed by physicians (25.8%) and pharmacists (13.2%). The outcomes of our study are similar to several studies (23–25), which revealed that most of the dentists suffered from obesity and practiced minimal physical activity. In Karbala, the lower prevalence among pharmacists may relate to younger age profiles and more regular work hours. Collectively, these results indicate that profession-specific wellness initiatives, such as ergonomic breaks for dentists and shift-nutrition guidance for physicians are warranted.

Marital status emerged as a significant predictor, married HCWs had roughly threefold higher obesity rates than unmarried peers. Comparable associations have been observed in Saudi Arabia, where married couples tend to have higher BMI compared to unmarried individuals (13,26). The likely explanation includes shared household eating patterns, reduced physical activity, and less perceived social pressure to maintain a particular physique after marriage.

Age is another important factor, with obesity rates increasing steadily among healthcare workers as age advanced (27). This trend is expected, as metabolic rate typically declines with age and long-term lifestyle habits tend to accumulate (28). Our observation that those aged over 45 had substantially higher obesity levels aligns with findings from other studies (29), for instance, a study in Saudi Arabia reported that healthcare workers over the age of 30 have twice the risk of being obese compared with their younger counterparts.

An interesting finding was the markedly higher obesity prevalence among ex-smokers (50%) compared with current smokers (36%) and non-smokers (20%). This pattern mirrors global evidence that smoking cessation often results in short-term weight gain due to appetite increase and lower resting energy expenditure (30,31). Although quitting smoking remains critical for overall health, integrating dietary and activity guidance into cessation programs can help minimize post-cessation weight gain among HCWs.

The strong link between obesity and chronic conditions in this study, particularly hypertension and diabetes, reinforcing the global understanding that obesity is a central risk factor for cardiometabolic diseases (32). Routine occupational screening for chronic diseases and targeted counseling for those with familial risk may thus help maintain a healthier healthcare workforce.

Despite high awareness of key obesity causes and prevention methods, translation into personal behavior remains inconsistent, indicating a disconnect between knowledge and implementation. Closing this gap may require structured occupational health policies, routine BMI monitoring, and behavior-paired counseling rather than information alone.

Several limitations should be acknowledged. First, the cross-sectional design identifies associations but cannot infer causality or temporal direction between behavior, job factors, and obesity. Second, physical-activity patterns were assessed qualitatively without objective frequency or intensity measures, limiting behavioral resolution. Third, dietary habits and shift-related food environments were not quantified, which may mediate part of the workplace effect. Finally, the study relied on self-report for clinical illness, smoking, and family history, creating potential for responder bias or social-desirability effects.

CONCLUSION

This study shows a high burden of overweight and obesity among healthcare professionals in Karbala, with 43% overweight and 22.2% obese. Obesity was significantly more common in males, older staff, married participants, physicians, and dentists, while pharmacists had the lowest obese proportion. Chronic disease, chronic medication use, smoking history (especially former smokers), and family history of obesity were also strongly associated with higher obese shares. Although awareness of obesity causes and lifestyle-based weight control was high, excess BMI remained common. These results emphasize the need for structured workplace wellness, routine BMI and cardiometabolic screening, and integrated lifestyle support for high-risk professional groups to improve provider health and strengthen their role as patient health advocates.

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