ORIGINAL ARTICLE

Epidemiology and sociodemographic determinants of Obesity in Moroccan Adult Population

Épidémiologie et déterminants sociodémographiques de l'obésité chez la population adulte marocaine

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Abstract

Introduction: Obesity and overweight result from excess fat, leading to health complications and a reduced life expectancy. This issue impact Morocco like all countries worldwide, due to several determinants such as dietary changes, lifestyle choices, sedentary behavior and socioeconomic parameters.
Aim: To evaluate the prevalence of overweight and obesity in Moroccan population, and their related socio-demographic factors.
Methods: Our study is a cross-sectional study carried out among adult subjects aged 18 years and above, who were selected using cluster sampling. Data collection was conducted using a questionnaire that included sociodemographic parameters such as age, sex, and marital status, educational level...as well as anthropometric measurements. The statistical analysis was performed using SPSS.
Results: The total number of participants was 731 (51.8% women and 48.2% males). The age group 20-29 years constitutes 25.6% of the studied population followed by 30-39 years with 19.4%. According to the BMI the overall prevalence of obesity was 20.7%, with a female predominance (80.10 %). The results indicated that BMI increases with age up to 59 years ($p<0.0001$). We revealed a strong association between numerous factors and obesity such as age, sex, age, marital status, occupational activity, education level and housing.
Conclusion: Through our study, we found that the obesity was associated with a several sociodemographic factors such as: gender, age, marital status, occupational activity, education level and housing type and size with a female predominance. We suggest structural and supportive policies such as improving access to healthcare services that promotes healthy living and reduces obesity rates.

Key words: obesity, overweight, prevalence, adult population, Morocco, sociodemographic factors.

Résumé

Introduction: L'obésité et le surpoids résultent d'un excès de graisse corporelle, entraînant des complications de santé et une réduction de l'espérance de vie. Ce problème touche le Maroc, comme tous les pays du monde, en raison de plusieurs facteurs tels que les changements alimentaires, les choix de mode de vie, le comportement sédentaire et les paramètres socio-économiques.
Objectif: Evaluer la prévalence du surpoids et de l'obésité dans la population marocaine, ainsi que les facteurs sociodémographiques associés.
Méthodes: Notre étude est une étude transversale menée auprès de sujets adultes âgés de 18 ans et plus, sélectionnés par échantillonnage en grappes. La collecte des données a été réalisée à l'aide d'un questionnaire comprenant des paramètres sociodémographiques tels que l'âge, le sexe, le statut matrimonial, le niveau d'instruction... ainsi que des mesures anthropométriques. L'analyse statistique a été réalisée à l'aide du logiciel SPSS.
Résultats: Le nombre total de participants était de 731 (51,8 % de femmes et 48,2 % d'hommes). La tranche d'âge des 20-29 ans représente 25,6 % de la population étudiée, suivie des 30-39 ans avec 19,4 %. Selon l'IMC, la prévalence globale de l'obésité était de 20,7 %, avec une prédominance féminine (80,10 %). Les résultats ont indiqué que l'IMC augmente avec l'âge jusqu'à 59 ans ($p<0,0001$). Nous avons révélé une forte association entre de nombreux facteurs et l'obésité, tels que l'âge, le sexe, le statut matrimonial, l'activité professionnelle, le niveau d'instruction et le type de logement.
Conclusion: À travers notre étude, nous avons constaté que l'obésité était associée à plusieurs facteurs sociodémographiques tels que le sexe, l'âge, le statut matrimonial, l'activité professionnelle, le niveau d'instruction et le type et la taille du logement, avec une prédominance féminine. Nous suggérons des politiques structurelles et de soutien, telles que l'amélioration de l'accès aux services de santé, qui favorisent un mode de vie sain et réduisent les taux d'obésité.

Mots clés: obésité, surpoids, prévalence, population adulte, Maroc, facteurs sociodémographiques.

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Introduction

Obesity and overweight, defined as abnormal or excessive fat accumulation, are a major risk factor of chronic diseases, including diabetes, cardiovascular disease and cancer. Considered before as a problem only in high-income countries, overweight and obesity are now considerably on the rise in low-and middle-income countries, especially in urban setting. Global obesity has almost tripled since 1975. In 2016, over 1.9 billion adults, aged 18 and over, were overweight. Of these, over 650 million were obese, and 39% of adults aged 18 years and over were overweight, and 13% were obese (1).

Obesity and overweight are indeed primarily caused by an energy imbalance between calories intake and expenditure, as highlighted in multiple research studies (2,3), but also by other different risk factors including genetic susceptibility, physiological factors, environmental influences, psychological aspects, social, and economic determinants (4). Changes in dietary and physical habits are often the result of environmental and societal changes associated with urbanization and the absence of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food distribution, marketing and education (1,5).

Obesity is intricately linked to numerous sociodemographic determinants. including income levels, educational status, gender, age, marital status, race and cultural norms (6,7). Many papers emphasize the importance of understanding how socioeconomic determinant (SED) help to develop overweight and obesity (8), The relationship between SED factors and obesity is multifaceted, influenced by various interdependent pathways, ranging from acceptance of body fat, eating habits, leisure time and household income (9,10).

In Morocco, obesity is mainly linked to the ongoing demographic and nutritional transition as evidenced by various research studies. The nutrition transition is marked by a shift from a traditional Mediterranean diet, primarily based on cereals and pulses, to one dominated by animal products. This transition often leads to excessive caloric intake relative to the energy demands of a sedentary lifestyle (11,12). Obesity trends in Morocco show concerning increases over the years. Studies reveal a rise in obesity rates, from 2000 to 2018, from 13.6% to 20% in adult, with a female predominance (13,14). The objective of our study was to estimate the prevalence of overweight and obesity in a representative adult population in Morocco, and to describe its relationship to certain socio-demographic and socio-economic factors.

Methods

Participants & Study design

Our study was a descriptive and cross-sectional study conducted among subjects aged 18 years and above (N = 731), who belonged to different prefectures of Casablanca and selected using cluster sampling. Subjects who participated in the pilot study, and pregnant women were excluded from this study.

The purpose and the protocol of the study were presented and explained to the participants. All subjects gave their verbal consent before answering the survey. This study was conducted in accordance with the Declaration of Helsinki and had the approval of the regional ethical committee.

A pre-survey was conducted with the aim of testing the comprehension, duration and feasibility of the questions. Subsequently, our questionnaire was modified for a final version; investigators were recruited and trained to standardize the collected data and anthropometric measurements. They were grouped by binomial (one man and one woman) and were supervised.

Anthropometric measurements

The anthropometric parameters have been determined according to the procedures standardized by WHO (1). Body weight was measured using a scale with minimal clothing and no shoes, and was expressed in kilograms. The height was measured using a height gauge with the subject standing barefoot. Size was expressed in centimeters.

Body mass index (BMI) was determined by dividing the person's weight in kilograms by the square of height in meters (kg/m2) according to the (WHO) recommendations. Three groups were classified using BMI, subjects in a normal range with a BMI between 18.5 kg/m2 and 24,5 kg/m2; Over weight with a BMI between 25 kg/m2 and 29.99 kg/m2; and obese with a BMI higher or equal to 30 kg/m2 (15).

The waist circumference was measured at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac rest; Hip circumference was measured at the widest point over the buttocks. For abdominal obesity, WHR (Waist to Hip Ratio) was obtained by dividing the mean waist circumference by the mean hip circumference, people with a WHR above 0.90 for males and above 0.85 for females were classified as obese (15).

Statistical Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS, version 20.0). A descriptive analysis was conducted to compute means with standard deviation (SD) for quantitative variables and frequencies (%) for qualitative variables. Categorical variables were tested using the X2 test. Differences between groups were compared using Student's t-test. The Spearman rank-order correlation was the test used for correlations to describe the linear relationship between two continuous variables. p values < 0.05 were considered significant.

Results

The general socio-demographic characteristics of the population were presented in table 1. Our study

population is about 731 participants with 48.2% men and 51.8% women. The age group 20-29 years constitutes 25.6% of the studied population followed by 30-39 years with 19.4%. 74.3% of the participants were born in an urban area. Illiteracy is represented by a rate of 19.2%. According to the employment status 55.3 % of the subjects were active. A married status represented with 52.7%.

Table 1. The general socio-demographic characteristics of the population.

	Total n (%)	Women n (%)	Men n (%)	P-value
Age group (years)				
18-20	61 (8.3)	20 (5.7)	41 (10.8)	<0.0001
20-29	187 (25.6)	81(23.0)	106 (28.0)	
30-39	142 (19.4)	60 (17.0)	82 (21.6)	
40-49	138 (18.9)	87 (24.7)	51 (13.5)	
50-59	119 (16.3)	61 (17.3)	58 (15.3)	
>60	84 (11.5)	43 (12.2)	41 (10.8)	
Birth area				
Rural	185 (25.7)	102 (29.5)	83 (22.3)	0.027
Urban	534 (74.3)	244 (70.5)	290 (77.7)	
Marital status				
Single	282 (39.4)	91 (26.4)	191 (51.5)	<0.0001
Married	377 (52.7)	204 (59.1)	173 (46.6)	
Divorced	22 (3.1)	17 (4.9)	5 (1.3)	
Widowed	35 (4.9)	33 (9.6)	2 (0.5)	
Education level				
Illiterate	134 (19.2)	93 (27.4)	41 (11.5)	<0.0001
Informal education	18 (2.6)	8(2.4)	10 (2.8)	
Primary school	131 (18.8)	67 (19.7)	64 (17.9)	
Secondary	290 (41.5)	105 (30.9)	185 (51.7)	
University	125(17.9)	67 (19.7)	58 (16.2)	
Occupational activity				
Active	388 (55.3)	131 (39.1)	257 (70.6)	<0.0001
Housewife	141(20.2)	141 (42.1)	-	
Student	85 (12.2)	41 (12.2)	44 (12.1)	
Retired	27 (3.9)	8 (2.4)	19 (5.2)	
Unemployed	58 (8.3)	14 (4.2)	44 (12.1)	
Housing				
Traditional housing	19 (2.7)	10 (2.9)	9 (2.5)	
Luxurious	27 (3.8)	17 (4.9)	10 (2.8)	0.006
Modern	179 (25.2)	83 (24.0)	96 (26.4)	
Shantytown	48 (6.8)	35 (10.1)	13 (3.6)	
Flat	391(55.1)	177 (51.2)	214 (59.0)	
Room	45(6.3)	24 (6.9)	21 (5.8)	
Household size				
<4 people	273(37.3)	124 (35.2)	149 (39.3)	0.507
4 to 7 people	396 (54.2)	198 (56.3)	198 (52.2)	
>7 people	62 (8.5)	30 (8.5)	32 (8.4)	
Number of children				
No children	377 (51.6)	162 (46.0)	215 (56.7)	0.005
1 to 2 children	236 (32.3)	133 (37.8)	103 (27.2)	
3 and more	118 (16.1)	57 (16.2)	61 (16.1)	

Figure 1 represents obesity and overweight among studied population, according to the BMI of the population 20.7% are obese with a female predominance (80.10 %); the prevalence of overweight was 48.80%: 51.20% for women and men respectively. While, WHR obesity is represented by 22.20% and 46.90% in men and women respectively.

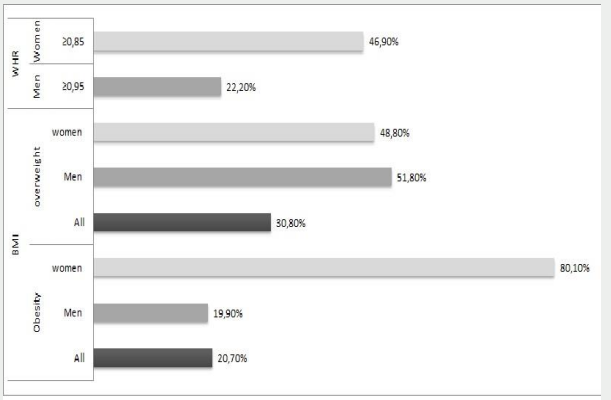

Figure 1. Obesity and overweight among studied population

Table 2 represents the distribution of BMI according to the sociodemographic parameters. The prevalence of obesity increased with age up to 49 years (p<0.0001). The prevalence of overweight is much more prevalent in age groups between 30-39 in both sex.

Anthropometric parameters of participants by age group are reported in table 3. The results indicate that BMI increases with age up to 59 years (p<0.0001). While WHR increases up to 60 years old. For WC and HC they increase with age up to >60 years, 50-59 respectively (p<0.0001).

Association between anthropometric measures and socioeconomic status in studied population is represented in table 4. There is a significant correlation between age and BMI (r = 0.327, p <0.0001), and WHR (r = 0.393, p <0.0001). The birth area demonstrated a significant correlation with BMI (r=0.102, p=0.011.) and WHR (r=0.100, p=0.007). Likewise, the level of study also has a significant correlation with BMI and WHR (r= -0.236, r = -0.205, p<0.05) respectively. Marital status has shown a significant correlation with BMI (r=0.423, p <0.0001) and WHR (r=0.243, p <0.0001). For Housing and Household size they have a significant correlation just with the BMI (r= 0.098, r = 0.025, p <0.05) respectively. Number of children has a significant correlation with BMI (r = -0.087, p=0.029), and WHR (r =0.086, p=0.019).

Discussion

Casablanca is the largest and most populated city of Morocco, with a permanent dynamic. It has undergone a nutritional transition as the whole region of the Eastern Mediterranean, due to economic improvement over the last 50 years, in addition to a sedentary lifestyle and an increased level of stress, which has caused an increase in the prevalence of obesity, overweight and other non-communicable diseases (16). Urbanization is often associated with high obesity rates due to multiple factors, including the widespread availability of supermarkets stocked with multinational products, the proliferation of fast-food chains offering processed foods, high-calorie snacks, sweets, and sugary beverages, and the decline of open markets and local farms.

Table 2. BMI distribution by sociodemographic characteristics and gender

	Total				Women				Men			
	<18.49	18.5<BMI<24.99	25<BMI<30	≥30	<18.49	18.5<BMI<24.99	25<BMI<30	≥30	<18.49	18.5<BMI<24.99	25<BMI<30	≥30
Age group (years) %												
18-20	28.6	13.4	2.2	1.3	18.8	13.2	2.8	0.0	34.6	13.5	1.7	6.7
20-29	40.5	36.1	19.3	9.3	37.5	39.6	19.3	9.9	42.3	34.3	19.0	6.7
30-39	11.9	17.6	25.3	16.6	12.5	14.2	24.8	13.2	11.5	19.3	25.9	30.0
40-49	7.1	14.1	20.0	30.5	12.5	16.0	23.9	34.7	3.8	13.0	16.4	13.3
50-59	-	10.9	20.4	25.8	0.0	9.4	17.4	26.4	0.0	11.6	23.3	23.3
>60	11.9	8.0	12.9	16.6	18.8	7.5	11.9	15.7	7.7	8.2	13.8	20.0
P value	0.0001				0.0001				0.0001			
Birth area %												
Rural	7.1	23.3	71.2	68.5	6.3	26.7	29.5	35.0	7.7	21.6	28.1	17.2
Urban	92.9	76.6	28.8	31.5	93.8	73.3	70.5	65.0	92.3	78.4	71.9	82.8
P value	0.007				0.097				0.117			
Marital statut %												
Single	78.0	58.3	24.4	11.4	60.0	52.4	17.0	7.6	88.3	61.3	31.5	51.5
Married	14.6	38.5	65.4	73.8	20.0	41.9	63.2	75.6	11.5	36.8	67.6	46.6
Divorced	2.4	1.0	4.6	5.4	6.7	1.0	8.5	5.0	0.0	1.0	0.9	1.3
Widowed	4.9	2.3	5.5	9.4	13.3	4.8	11.3	11.8	0.0	1.0	0.0	0.0
P value	0.0001				0.0001				0.0001			
Housing %												
Traditional housing	7.5	3.5	1.4	1.4	18.8	4.7	0.0	1.7	0.0	2.9	2.8	-
Luxurious	5.0	3.2	4.2	4.1	12.5	4.7	4.7	4.2	0.0	2.4	3.8	3.6
Flat	47.5	59.8	55.7	46.6	43.8	56.6	50.9	47.5	50.0	3.8	60.4	42.9
Modern	32.5	24.8	25.0	24.7	18.8	24.5	24.5	23.7	41.7	60.4	25.5	28.6
Shantytown	2.5	3.5	7.5	13.7	0.0	6.6	6.6	13.6	4.2	25.5	3.8	14.3
Room	5.0	5.1	6.1	9.6	6.3	2.8	2.8	9.3	4.2	3.8	3.8	10.7
P value	0.008				0.010				0.190			
Occupational activity %												
Active	50	58.4	61.6	41.3	53.3	39.6	43.7	32.4	48.0	68.1	78.7	77.8
Student	25.0	19.4	5.7	2.2	13.3	28.3	7.8	0.9	32.0	14.7	3.7	7.4
Housewife	7.5	8.4	20.9	49.3	20.0	24.5	42.7	61.3	-	-	-	-
Retired	2.5	4.2	4.7	2.2	6.7	1.9	1.9	2.7	0.0	5.4	7.4	0.0
Unemployed	15.0	9.7	7.1	5.1	6.7	5.7	3.9	2.7	20.0	11.8	10.2	14.8
P value	0.0001				0.0001				0.003			
Education level %												
Illiterate	4.9	14.4	19.5	32.9	6.3	21.2	25.0	37.9	4.0	10.8	14.4	11.1
Informel education	2.4	2.0	2.8	3.5	6.3	1.0	2.9	2.9	0.0	2.6	2.7	7.4
Primary-school	17.1	14.7	20.5	25.2	12.5	11.5	23.1	25.0	20.0	16.4	18.0	25.9
Secondary	46.3	46.8	42.3	28.0	43.8	30.8	34.6	25.9	48.0	55.4	49.5	37.0
University	29.3	23.2	14.9	10.5	31.3	35.6	14.4	8.6	28.0	14.9	15.3	18.9
P value	0.0001				0.0001				0.570			
Householdd%												
<4	38.1	40.9	32.9	36.4	43.8	36.8	29.4	38.0	34.6	43.0	36.2	30.0
4-7	52.4	50.0	57.3	57.6	50.0	53.8	60.6	55.4	53.8	48.8	54.3	66.7
>7	9.5	8.6	9.8	6.0	6.3	9.4	10.1	6.6	11.5	8.2	9.5	3.3
P value	0.483				0.761				0.548			
Children number %												
0	42.9	57.2	50.2	44.4	37.5	56.6	41.3	42.1	46.2	57.5	58.6	53.3
1-2	42.9	30.7	27.6	39.7	50.0	34.9	34.9	41.3	38.5	28.5	20.7	33.3
3 or more	14.3	12.1	39.7	15.9	12.5	8.5	23.9	16.5	15.4	14.0	20.7	13.3
P value	0.005				0.039				0.373			

BMI: Body Mass Index. Statistically significant differences defined as P<0.05

Table 3. Anthropometric parameters of participants by age group

Age group	Weight (kg)	Height (m)	BMI(kg/m²)	WC (cm)	HC (cm)	WHR	*P* value
18-20	64.44±11.4	1.71±0.1	21.89±3.51	75.44±12.36	91.84±8.34	0.82±0.11	<0.0001
20-29	66.97±11.53	1.68±0.1	23.9±6.07	79.14±10.95	95.15±9.93	0.83±0.10	<0.0001
30-39	73.73±13.72	1.67±0.08	26.24±4.87	88.35±15.07	100.03±14.72	0.87±0.07	<0.0001
40-49	74.51±13.16	1.64±0.11	28.06±6.97	90.65±14.45	100.815±12.89	0.90±0.11	<0.0001
50-59	74.86±16.17	1.63±0.08	28.06±6.18	92.65±14.45	102.42±18.6	0.90±0.11	<0.0001
>60	72.46±14.99	1.63±0.08	27.33±6.09	93.72±14.32	98.28±13.42	0.95±0.13	<0.0001

BMI: Body Mass Index. **WC**: Waist Circumference. **HC**: Hip Circumference. **WHR**: Waist to Hip Ratio. Anova One way test (mean ± standard deviation). Statistically significant differences defined as P<0.05

Table 4. Association between anthropometric measures and socioeconomic status in studied population

		Weight	Height	BMI	WC	HC	WHR
Age group	R	0.195*	-0.268*	0.327*	0.422*	0.238*	0.393*
	P value	0.000	0.000	0.000	0.000	0.000	0.000
Birth area	R	0.002	-0.169*	0.102*	0.130*	0.83*	0.100*
	P value	0.955	0.005	0.011	0.001	0.037	0.007
Marital status	R	0.106*	-0.327*	0.423*	0.439*	0.379*	0.243*
	P value	0.006	0.000	0.000	0.000	0.000	0.000
Education level	R	-0.077*	0.289*	-0.236*	-0.263*	-0.174*	-0.205*
	P value	0.043	0.000	0.000	0.000	0.000	0.000
Occupational activity	R	-0.022	-0.246*	0.100*	0.051	0.137*	-0.043
	P value	0.567	0.000	0.008	0.206	0.001	0.291
Housing	R	0.220	-0.120*	0.098*	0.062	0.083*	0.025
	P value	0.550	0.001	0.009	0.121	0.040	0.537
Household size	R	-0.053	-0.023	-0.097*	0.004	0.059	0.027
	P value	0.156	0.533	0.015	0.911	0.137	0.464
Number of children	R	-0.50	0.072	-0.087*	0.052	0.117*	0.086*
	P value	0.178	0.051	0.029	0.187	0.003	0.019

BMI: Body Mass Index. **WC**: Waist Circumference. **HC**: Hip Circumference. **WHR**: Waist to Hip Ratio. The correlation is significant at the level of 0.05 (bilateral).

Additionally, increased reliance on passive transportation reduces walking in daily activities, while densely populated neighborhoods and limited outdoor recreational spaces further contribute to a sedentary lifestyle. We have also more exposure to mass media marketing of food and beverages, that can change people's preferences away from traditional diets (1,5). Through our study, confirmed that obesity was associated with several sociodemographic factors such as: gender, age, marital status, occupational activity, education level and housing type and size.

The prevalence of obesity and of overweight in our population was 20.7% and 30.8% respectively. These values are close to national prevalence: 17.9% for obesity and 32.9 for overweight (17), the difference between the two sexes is marked : 80.1% of obesity in women and 51.6% 173 of overweight in men, This difference was also found in other studies (18,19). Recently, According to the National Survey on Common Risk Factors for Non-Communicable Diseases 2017-2018, the percentage of individuals with a BMI ≥ 25 was 53.0% (51.4-54.5), with a significantly higher prevalence among women compared to men (63.4% vs. 42.6%). The prevalence of obesity was 20%, and like other countries around the world, this figure has increased compared to previous years. It was three times more common among women at 29% (27.4-30.6) compared to men at 11.0% (9.5-12.6) (13). Several factors contribute to women being more obese than men. Hormonal differences play crucial role, affecting metabolic rates and fat distribution, with women generally having lower basal metabolic rates and higher subcutaneous fat accumulation compared to men who accumulate more abdominal fat (20). In fact, multiple pregnancies are an important factor because women earn 4.5 kg or more in one year after child birth, due to a combination of factors such as gestational weight gain, decreased physical activity and an increase in food consumption (21) Another study highlighted that genetic, epigenetic, environmental, physiological, cultural, political, and socioeconomic factors play significant roles in higher obesity rates among women globally, particularly in middle- and low-income countries (22). Wenpeng and Henneberg found that economic affluence correlates more strongly with obesity in men than women, suggesting that the causes of obesity in women are more complex and multifaceted (23).

We observed that abdominal obesity had the highest prevalence among all obesity types, particularly in women, where it reached 46.90%. Our results align with previous studies conducted in Morocco (13,24). Research consistently links abdominal adiposity to a higher risk of chronic diseases such as cardiovascular diseases (CVD) and diabetes mellitus (DM). Visceral fat, a hallmark of abdominal obesity, contributes to endothelial dysfunction, atherosclerosis, and an increased risk of coronary artery disease due to chronic inflammation and an imbalance between proinflammatory and anti-inflammatory processes (25). Several studies have

also highlighted its strong association with diabetes. For instance, research conducted in India found that individuals with abdominal obesity had significantly greater odds of developing diabetes compared to those without it (26)..

Our study showed a significant association between age and obesity. As age increases, a higher prevalence of overweight and obesity is noticed. A Several data from multiple studies support the association of fat gains with age. Itoh et al. studied middle-aged adults, showing that changes in body weight were strongly correlated with changes in fat weight, with 70% of body weight gain attributed to fat gain, regardless of age, gender, and baseline BMI (27).

The endocrinology of aging, as detailed by Oguz and yildiz, shows that aging alters hormone secretion patterns, reduces tissue sensitivity to hormones, and decreases hormone bioavailability. These changes are linked to increased visceral adiposity, insulin resistance, and cardiometabolic disorders, exacerbating frailty, and reducing physical strength and vitality (28). Kamenova and Ivanov noted that aging leads to decreased levels of estrogens and testosterone, and increased levels of luteinizing hormone, follicle-stimulating hormone, and sex hormone-binding globulin, resulting in clinical impacts such as increases in fat mass and a reduction in muscle mass (29). Dyleva et al. reviewed the molecular mechanisms linking obesity and aging, highlighting that obesity accelerates aging processes at both molecular and systemic levels, contributing to the early onset of age-related chronic diseases (30).

According to our finding, we noted a significant correlation between marital status and obesity. Married persons are generally more obese and overweight compared to the unmarried, widowed and divorced, but in divorced men there is a more obesity, in fact the relationship between the matrimonial Status and the obesity was revealed in several Moroccan studies (19,24,31). This revealing complex interactions influenced by various factors such as race, income (32), and marital quality (33). In a population-based study from southern Brazil, Fuchs et al. reported that marital status is independently associated with overweight and obesity, regardless of demographic and socioeconomic characteristics. Married men and women had higher prevalence rates of overweight and obesity compared to their single counterparts (34).

According to the employment status, we showed that active men were more overweight, while housewives were more overweight and obese, These results are concordant with the results of previous studies (19,35). The study conducted by borak in 2011, reported that employed individuals tend to have higher obesity rates due to sedentary work environments and lifestyle factors associated with employment (36). While, housewives tend to have higher rates of obesity compared to other due to more factors such as: lifestyle, psychological and social factors. This can be explained by the fact that women in homes do not go out much leading to fewer opportunities for regular physical activity (37). Housewives, often have easy access to food throughout the day, leading to more frequent snacking (38). And Housewives, particularly in low-income families, may have limited access to resources such as gyms, fitness programs, and healthy food options, contributing to weight gain (39).

The relationship between education level and obesity varies significantly across different populations and contexts. In our study, we found a significant association between education level and obesity. A study carried out in Croatia showed that lower education was linked to higher BMI, mid-upper arm circumference, and visceral fat percentage, suggesting stress and lower education exacerbate obesity (40). Also, Among Japanese adults, lower education was strongly associated with higher obesity rates, underscoring the importance of educational attainment in health outcomes (41). Boukrim et al highlighted that the relationship between education level and obesity reveals various trends influenced by socioeconomic and lifestyle factors as physical inactivity and poor dietary habits (42).

Numerous studies have shown that the type and size of housing are significantly linked to obesity and our results confirm this. A study in Los Angeles County found that severe housing-cost burden among low-income families was associated with higher obesity rates in preschool-aged children, with household size moderating this relationship (43). Alaoui et al revealed that middle-class housing is characterized by adequate conditions, suitable size (two to three rooms), and affordability, which tend to correlate with better health outcomes due to improved living standards and access to facilities (44). Conversely, women living in impoverished urban areas experience higher obesity rates, worsened by restricted access to healthy foods and recreational facilities (31).

Our study is the first to evaluate obesity and overweight across all regions of Casablanca, including both women and men, providing a comprehensive overview of obesity, and also to compare men and women.

Limitations

Here are some possible limitations for your study:

The study's cross-sectional nature only provides a snapshot of the population at a single point in time, making it difficult to infer causality or examine changes over time. Population Age group focusing only on adults aged 18 and above excludes younger populations, potentially missing important trends or factors affecting obesity and overweight in adolescents and children. The study might not account for all possible factors influencing obesity and overweight, such as genetic predispositions, detailed dietary patterns, physical activity levels.

Conclusion

There was a significant correlation between obesity and socio-economic factors such as gender, age, marital status and occupation, education level and housing type and size. Women had higher obesity rates compared to men. We suggest structural and supportive policies such as improving access to healthcare services. Develop urban spaces that facilitate physical activity while implementing

targeted public health initiatives and socio-economic support to foster a healthier environment and lower obesity rates.

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