ASM Sc. J., 20(1), 2025

https://doi.org/10.32802/asmscj.2025.1462

Anthropometric Status and Perception of Body Image Among Sub-Saharan Migrants Residing in El Jadida, Morocco

D. Halima, B. Imane, C. Hamid, E. Houda, E. Sanae, E. Mohammed and B. Rekia*

Laboratory of Biotechnology, Biochemistry and Nutrition, Training and Research Unit on Nutrition and Food Sciences, Department of Biology, Faculty of Sciences, Chouaib Doukkali University, El Jadida 24 000, Morocco

Immigration exposes immigrants to changes that may affect their weight status and perceived body size. The objective of this study was to examine the link between the perception of body image among sub-Saharan migrants residing in Morocco and their anthropometric, socio-demographic and socio-economic status. Using a questionnaire, 282 sub-Saharans aged 18 to 55 residing in El Jadida were interviewed anthropometric parameters were measured, Body image perception was assessed by Figure Rating Scale, and body size dissatisfaction was calculated as Feel minus Ideal Discrepancy (FID). The results of this study show that the prevalence of overweight and obesity increases with age (P = 0.01) and in people with low monthly income. No person perceived themselves as obese. The total prevalence of body image dissatisfaction assessed by FID was 70.7%. The Sub-Saharan migrants show a high rate of body image dissatisfaction and a tendency to underestimate their body weight. These results draw attention to the consequences of weight gain appreciated in this population on health, and the need to put in place appropriate intervention and awareness strategies to prevent the comorbidities associated with overweight and obesity.

Keywords: Body status; body image perception; sub-Saharan immigrants; Morocco

I. INTRODUCTION

Several studies have described the relationships between health status and body weight in different populations and in several environmental contexts. The categorisation of weight status by BMI is a way of estimating underweight or overweight for a given height in order to have a general assessment of the health status of a population. The increasing incidence of overweight and obesity worldwide has now reached alarming proportions. Under the effect of the ongoing nutritional transition, nutritional diseases affect people in both developed and developing countries. The latter face a double burden of malnutrition, with a prevalence of existing underweight and an increase in overweight/obesity (Ng *et al.*, 2014; Gualdi-Russo *et al.*, 2014). Excess weight and obesity involve several factors, including the perception of ideal body size and weight by individuals and society. Body image concerns "perceptions, feelings and thoughts about one's body, and is generally conceptualised as the embodiment of body shape and size" (Grogan, 2006). As such, body image and perceptions of body size are closely linked (Riley *et al.,* 1998). Culture affects body image and perceptions of body size from an early age (Musaiger, 2011), and different body shape and weight ideals are observed in different cultures (Rodin, 1993; Rucker & Cash, 1992). In many African and Arab countries, being overweight has been associated with wealth, health, strength and fertility (Renzaho, 2004; Musaiger *et al.*, 2004), whereas a slim body size is largely idealised in the Western world (Swami *et al.*, 2007).

However, a shift in attitudes towards Western body ideals has been observed in non-Western countries (Musaiger, 2011). This change could be attributed to globalisation, urbanisation, food consumption, and energy expenditure due to nutritional transition advertising (Renzaho, 2004;

*Corresponding author's: rekiabelahsen@yahoo.fr

Musaiger, 2012). Body image perception is one of the psychosocial factors that can affect weight status. Misperception has consequences in thin people who might overestimate their weight than in overweight/obese people who are unaware that their body weight is excessive. In such a situation as well as in case of dissatisfaction with one's body image, there is often an association between weight and people's behaviours (Swami *et al.*, 2010; Frederick *et al.*, 2008). The relationship between weight status and self-perception of body image is also influenced by other factors, such as socio-cultural factors (Paeratakul *et al.*, 2002; Brown *et al.*, 2014). Previous studies in Western countries have reported that among people with low socioeconomic status (SES), less accurate perceptions of overweight contribute to the persistence of an unhealthy lifestyle (Pampel *et al.*, 2010; Joh *et al.*, 2013). This aspect is particularly pronounced among immigrants who wrongly perceive their overweight/obesity, leading to an increase in nutritional disorders. On the other hand, people from low- to middle-income countries who migrated to high-income countries are more susceptible to overweight and obesity than their local counterparts (Delavari *et al.*, 2013). Moreover, overweight and obesity among immigrants appears to increase significantly with time after migration, with rates approaching or exceeding those of the host population (Himmelgreen *et al.*, 2004). The “acculturation” process leads to major changes in the “housed” group, influencing diet and promoting the adoption of obesogenic behaviours (Gadd *et al.*, 1996; Hosper *et al.*, 2008). However, this process is not uniform for all migrant groups and depends on ethnicity, gender, age, time of migration and length of residence in the new country (Kaushal, 2009; Calzada & Anderson-Worts, 2009). Desirable body weight standards are influenced within cultures by socio-cultural factors. Also, image perception and body shape preferences are culturally determined (Paeratakul *et al.*, 2002). Modernisation, the influence of the media and the recent transition of the economy and urbanisation have facilitated a diffusion and subsequent adoption of Western ideals of thinness and can affect the evolution of body ideals of migrant populations and therefore their lifestyles, diet and physical activity (Tlili *et al.*, 2008; Swami *et al.*, 2006). Nevertheless, it is unclear whether the recent preference for a slimmer body size is solely due to the Westernisation process. It is also probably linked to the idea that "roundness" is only revered when it is a rare condition in the context of food scarcity, while it loses its desirability when overweight and obesity are becoming more prevalent (Tlili *et al.*, 2008). Body size and perception of body image have mainly been studied among immigrant groups in the United States (Delavari *et al.*, 2013), while few data exist regarding migrants from Africa to Europe.

In order to assimilate the effect of the immigration process, nutritional transition and acculturation and to improve the understanding of the complex relationships between different variables, the present study therefore, aimed to examine the associations between anthropometric status and the perception of current and ideal body image among sub-Saharan immigrants residing in the city of El Jadida in Morocco.

II. MATERIALS AND METHOD

A. The Participants

A cross-sectional survey was conducted among 282 sub-Saharan migrants residing in the Moroccan city of El Jadida for at least one year (150 women and 132 men). The age of the respondents was 18 to 55 years old with an average age of 31.21+/-10.10 at the time of the survey. The study took place over a period from May 2018 to December 2019 and the information was collected using a pre-tested questionnaire. Through a face-to-face interview with the participants, the following data, age, sex, anthropometric measurements as well as assessment of the perception of current and ideal body image as well as socio-economic status were collected.

B. The Anthropometric Measurements

Weight and height measurements were reported for each participant according to the protocol already described (Daif *et al.*, 2021). Briefly, body weight was measured in light clothing and without shoes to the nearest 0,1 kg, using a standard beam scale (Scale 500, Decathlon Morocco), Height was measured to the nearest millimetre using a tape measure with heels joined together against the wall, legs straight, shoulders relaxed, arms dangling and head leaning against the wall. Body mass index (BMI) was calculated as weight in kilograms divided by height in square meters and categorised

according to the WHO-defined categories of underweight (<18.5 kg/m²), normal (18.5 –24.9 kg/m²), overweight (25–29.9 kg/m²) and obesity (30 kg/m²) (WHO, 2000).

C. Assessment of Body Image Perception

Perception of body image was assessed by Stunkard's Figure Rating Scale (Stunkard, 1983), consisting of nine schematic silhouettes, presenting images of body shapes ranging from 1 to 9, where 1 was the thinnest body shape and 9 that of the largest type. This scale has frequently been used to measure body dissatisfaction. Subjects were asked to mark the number of the figure they thought their size looked like (perceived body size), then the figure they wanted to look like (ideal body size). Dissatisfaction with body size, considered as Feel Ideal Discordance (FID), was calculated through the difference between the perceived body size and the ideal body size expressed by the surveyed subject (Mciza *et al.*, 2005). The "zero" score indicates satisfaction with body image, and negative or positive scores indicate dissatisfaction with body image, with a desire to gain or lose weight, respectively (Zaccagni *et al.*, 2014). The index (FAI), or "The index Feel weight status minus Actual weight status Inconsistency", was also used to check if there was a realistic perception of weight status among survey subjects. FAI was calculated as the difference between perceived body image and actual body size assessed through BMI. Perceived body image was assessed on a scale classified according to the standard procedure (Bhuiyan, 2003; Lynch *et al.*, 2009; Boutahar *et al.*, 2019) into four groups, including underweight, normal weight, overweight and obesity (Figures 1 and 2 correspond to status 1, Figures 3, 4 and 5 correspond to status 2, Figures 6 and 7 correspond to status3, Figures 8 and 9 correspond to status4). The calculated BMI was classified into four categories where code 1 was used for underweight, code 2 for normal weight status, code 3 for overweight status and code 4 for obese status. An FAI score of zero indicates a realistic perception of body image, while negative and positive scores indicate an underestimation and overestimation of weight status, respectively (Zaccagni *et al.*, 2014).

D. Data Analysis

Statistical analysis was performed using SPSS software for Windows version 21 (Statistical Package for the Social Sciences). Data are described using the mean and standard deviation (SD) for continuous variables and proportions for categorical variables. The comparisons of the means of the variables were analysed using Student's t-test. The Chi-square test was used to assess associations between anthropometric status and body image perception. The test was considered significant when the P value (degree of significance) was less than or equal to 0.05.

E. Ethical Considerations

Participants in this survey were informed about the study objectives and the possibility for them to interrupt their participation to the survey at any time if they so wish. They signed a free and informed consent before being included in the study sample. All data collected has been treated as strictly confidential.

III. RESULT

The Table 1 shows that 53.1% of the sub-Saharans participating in the present study, were men and 46.9% were women with the majority of them being single and more than 80% with a monthly income of less than 300$. In addition, 37,9 % of the respondents have less than seven years of schooling and 42.9% had university education level.

Table 1. Socioeconomic and sociodemographic characteristics of the migrants studied

Socioeconomic and sociodemographic characteristics		**n (%)**
Sex	Females	150 (53,1)
	Males	132 (46,9)
Age groups (yrs)	[18-25]	114 (40,4)
	[26-35]	74 (26,2)
	≥ 36	94 (33,4)
Marital status	Single	194 (68,8)
	Married	88 (31,2)
Monthly income (US $)	Low (< 300 $)	229 (5,7)
	Medium (300 - 500)	44 (15,6)

	High (> 500)	9 (3,2)
Education attainment (yrs)	< 7	107 (37,9)
	[7-14]	54 (19,1)
	≥ 14	121 (42,9)

The details of the data collected concerning the anthropometry, age and weight status of the sample are presented in Table 2 by sex. The mean age of the participants was 31.6 years (SD = 10.5) for women and 31.7 years (SD = 9.5) for men. The results show that there is no significant difference between the two sexes with regard to age, weight, height and BMI.

Table 2. Anthropometric Characteristics of Sub-Saharan Africa

Anthropometric Characteristics	**BMI (kg/m²)**					**Body Image Perception**					**Ideal Body Image**
	≤18,5 n (%)	**18,5-24,9 n (%)**	**25-29,9 n (%)**	**≥30 n (%)**	***P***	**Under weight n (%)**	**Normal weight n (%)**	**Over weight n (%)**	**Obese n (%)**	***P***	**Under weight n (%)**
Females	8(5,3)	88(58,7)	35(23,3)	19(12,7)	ns	65(43,3)	59(39,3)	26(17,3)	0	ns	17(11,3)
Males	8(6,1)	68(51,5)	38(28,8)	18(13,6)		64(48,5)	40(30,3)	28(21,2)	0		17(12,9)
[18-25]	9(7,9)	72(63,2)	26(22,8)	7(6,1)	0,0	62(54,4)	32(28,1)	20(17,5)	0	ns	16(14)
[26-35]	6(8,1)	34(45,9)	21(28,4)	13(17,6)	1	27(36,5)	34(45,9)	13(17,6)	0		4(5,4)
≥36 yrs	1(1,1)	50(53,2)	26(27)	17(18,1)		40(42,6)	33(35,1)	21(22,3)	0		14(14,9)
Celibataire	12(6,2)	111(57,2)	49(25,3)	22(11,3)	ns	94(48,5)	66(34)	34(17,5)	0	ns	29(14,9)
En couple	4(4,5)	45(51,1)	24(27,3)	16(17)		35(39,8)	33(37,5)	20(22,7)	0		5(5,7)
Low (<300$)	13(5,7)	125(54,6)	61(26,6)	30(13,1)	ns	102(44,5)	82(35,8)	45(19,7)	0	ns	27(11,8)
Medium (300-500 $)	3(7,5)	26(65)	8(20)	3(7,5)		24(60)	10(25)	6(15)	0		5(12,5)
High (>500 $)	0	5(38,5)	4(30,8)	4(30,8)		3(23,1)	7(53,8)	3(23,1)	0		2(15,4)

Table 3 shows that overall, 5.7% of participants were underweight, 55.3% were normal weight, 38% were overweight or obese. The prevalence of overweight and obesity increases according to age categories (P = 0.01). The results also show that among the sub-Saharans studied, 57.2% of single people and 51.1% among those in couples had a normal weight, while overweight and obesity were more marked in people with a low monthly income (<$300) (p > 0.05). Data on the perception of body image reveal that regardless of sex or age group, no one perceived themselves to be obese. According to economic status, 60% of sub-Saharans, who have an average income ($300-$500) perceive themselves to be underweight, while 53.8% of those with a high monthly income (≥$500) perceive themselves to be of normal weight. The level of education also did not influence body perception with very similar values between the three categories described in Table 3.

Table 3. Association of real BMI, Body Image Perception, Ideal body Image, socio-demographic and economic characteristics

	Females N=150	**Males N=132**	**T-test**
Age (yrs)	31,6 ± 10,5	31,7 ± 9,5	ns
Weight (kg)	75,2 ±14,9	77,3 ±16	ns
Height (m)	1,7 ± 0,09	1,7 ± 0,09	ns
Body Mass Index (Kg/m²)	24,5 ± 4,8	24,6 ± 5,2	ns

Regarding the ideal body image, both women (53.3%)and men (52.3%) preferred to be overweight. The same is true for the age categories, where the same body image is preferred in 43.9% of young people (18 to 25 years old), in 63.5% of the age category from 26 to 35 years old and in 55.3% of people aged 36 and over.

The analysis of the results also shows that being in a couple is significantly (p=0.01) associated with weight gain with a

percentage of 64.8%, while monthly income and level of education do not seem to influence wish to be overweight.

Table 4. Perception of participants' body image in relation to calculated (actual) BMI

BMI (Kg/m²)	Sex	Body Image Perception			
		Underweight, n (%)	Normal weight, n (%)	Overweight, n (%)	Obese, n (%)
≤ 18,5	Females (n=8)	5 (62,5)	2 (25)	1 (12,5)	0
	Males (n=8)	5 (62,5)	0,0	3 (37,5)	0
	Total (n=16)	10 (62,5)	2 (12,5)	4 (25)	0
18,5 – 24,9	Females (n=88)	40 (45,4)	31 (35,22)	17 (19,3)	0
	Males (n=68)	33 (48,5)	24 (35,3)	11 (16,2)	0
	Total (n=156)	73 (46,8)	55 (35,3)	28 (17,9)	0
25 – 29,9	Females (n=35)	13 (37,1)	16 (45,7)	6 (17,1)	0
	Males (n=38)	18 (47,4)	8 (21,1)	12 (31,6)	0
	Total (n=73)	31 (42,5)	24 (32,9)	18 (24,7)	0
≥ 30	Females (n=19)	7 (36,8)	10 (52,6)	2 (10,5)	0
	Males (n=18)	8 (44,4)	8 (44,4)	2 (11,1)	0
	Total (n=37)	15 (40,5)	18 (48,6)	4 (10,8)	0

Regarding the perception of body image related to BMI, the results presented in Table 4 show that overall 45.7% of the participants considered themselves to be underweight; only 19.1% considered themselves overweight and no participants considered themselves obese. No significant difference in body image was noted between the two sexes (P>0.05). According to BMI classes, 70.5% of respondents did not have a correct perception of body image. Indeed, among people with a normal BMI, 46.7% thought they were underweight, only 24.7% among those who were overweight (BMI of 25 kg/m² and more, perceived their weight correctly, 21.1% of Overweight men considered their body weight normal while among overweight women, 51.4% considered themselves normal weight and 37.1% considered themselves underweight. Among participants of both sexes (BMI >30 kg/m2), 48.6% considered themselves normal weight and 40.5% even considered themselves underweight.

Most participants were underweight (31.3%), normal weight (52.6%), overweight (54.8%) and obese (59.5%) selected the normal figure [5,6,7] as their ideal body image, while no underweight participants and no overweight or obese women selected obese figures as ideal No significant difference was reported between the two sexes (Table 5).

The total prevalence of body image dissatisfaction calculated by the FID was 70,7%. Positive scores were obtained in 12% of respondents (expressing their desire to lose weight), while 58.7% had negative scores (desire to gain weight). Dissatisfaction with body image was not significantly different between the two sexes (P > 0,05). Moreover, with regard to dissatisfaction with body weight (FID) according to BMI, 83.3% of people surveyed with a normal BMI expressed dissatisfaction (P > 0,05). No underweight man was satisfied with his body image and no obese man wanted to lose weight. On the other hand, the majority of men of normal weight (70.6%), overweight (60.5%) or obese (88,9%) were not satisfied with their weight and expressed the wish to gain more weight (P<0,05). As for women, no skinny woman wants to lose weight, 15,9% of those with normal weight were satisfied with their body image against 20% overweight and 15,8% of obese. In total, 75% of underweight and 76.1% of

normal weight women, 65,7% overweight and 68.4% of obese
wanted to gain more weight.

Table 5. The ideal body image of the participants in relation to the calculated BMI

BMI (Kg/m²)	**Sex**	**Ideal Body Image**			
		Underweight, n (%)	**Normal weight, n (%)**	**Overweight, n (%)**	**Obese, n (%)**
≤ 18,5	Females (n=8)	1(12,5%)	5 (62,5)	2 (25)	0
	Males (n=8)	0	5(62,5)	3 (37,5)	0
	Total (n=16)	1 (6,3)	10 (62,5)	5 (31,3)	0
18,5 – 24,9	Females (n=88)	8 (9,1)	30 (34,1)	49 (55,7)	1 (1,1)
	Males (n=68)	11 (16,2)	21 (30,9)	33 (48,5)	3 (4,4)
	Total (n=156)	19 (12,2)	51 (32,7)	82 (52,6)	4 (2,6)
25 – 29,9	Females (n=35)	5 (14,3)	11 (31,4)	19 (54,3)	0
	Males (n=38)	4 (10,5)	12 (31,6)	21 (55,3)	1 (2,6)
	Total (n=73)	9 (12,3	23 (31,5)	40 (54,8)	1 (1,4)
≥ 30	Females (n=19)	3 (15,8	6 (31,6)	10 (52,6)	0
	Males (n=18)	2 (11,1)	3 (16,7)	12 (66,7)	1 (5,6)
	Total (n=37)	5 (13,5)	9 (24,3)	22 (59,5)	1 (2,7)

Table 6. FID and FAI according to calculated BMI and sex

Calculated BMI (Kg/m²)	**Sex**	**FID n (%)**				**FAI n (%)**			
		Desire to gain weight	**Satis-faction**	**Desire to loose weight**	***P***	**Underestimation**	**Real Perception**	**Overestimation**	***p***
≤ 18,5	Females	6 (75)	2(25)	0	ns	0	5(62,5)	3(37,5)	*p*<0,0001
	Males	7(87,5)	0	1(12,5)		0	5(62,5)	3(37,5)	
	Total	13(81,3)	2(12,5)	1(6,3)		0	10(62,5)	6(37,5)	
18,5 – 24,9	Females	67(76,1)	14(15,9)	7(8)	ns	40(45,5)	31(35,2)	17(19,3)	*p*<0,0001
	Males	48(70,6)	12(17,6)	8(11,8)		33(48,5)	24(35,3)	11(16,2)	
	Total	115(73,7)	26(16,7)	15(9,6)		73(46,8)	55(35,3)	28(17,9)	
25 – 29,9	Females	23(65,7)	7(20%)	5(14,3)	ns	29(82,9)	6(17,1)	0	*p*<0,0001
	Males	23(60,5)	9(23,7)	6(15,8)		26(68,4)	12(34,2)	0	
	Total	46(63)	16(21,9)	11(15,1)		55(75,3)	18(24,7)	0	
≥ 30	Females	13(68,4)	3(15,8)	3(15,8)	ns	19(100)	0	0	*p*<0,0001
	Males	16(88,9)	2(11,1)	0		18(100)	0	0	
	Total	29(78,4)	5(13,5)	3(8,1)		37(100)	0	0	

FID: Feel Ideal Discordance, FAI: The index Feel weight status minus Actual weight status Inconsistency, ns : Not Significant, BMI : Body Mass Index

FAI scores ranged from -3 to +2 and the mean value was negative in both sexes (mean = -0.73; SD = 1.08) indicating a tendency to underestimate weight status. A significant gender difference ($p<0.0001$) was found in the realistic assessment of perceived body image (FAI = 0) (62.5% in lean and normal-weight women and men (35.2%, 35.3%) respectively. In fact, no survey participant, male or female, overweight or obese overestimated their body image compared to 100% of obese men and women who underestimated their weight status.

IV. DISCUSSION

This study evaluated the association between anthropometry and self-perceived body image in a sample of sub-Saharan immigrants residing in El Jadida, a city in Morocco. According to the WHO classification (WHO, 2000) used for BMI, 5.7% of participants in this survey were underweight, 55.3% normal weight, including 56.4% women and 43.6% men, 25.9% was overweight and 13.1% was obese. The results of the present study are in agreement with the study carried out on sub-Saharans residing in the same city of the study (Daif *et al.*, 2021). A literature review carried out in 2016 on a larger sample of young people from developing countries also confirmed a constant increase in overweight and obesity in Sub-Saharan Africa (SSA) with a prevalence of obesity ranging from 2.3 to 12% in young adults (Poobalan & Aucott, 2016). The same result is observed in single women in southern Morocco, whose high prevalence of excess weight was linked to the perception of a large body, considered attractive (Rguibi & Belahsen, 2004). The same behaviour has also been reported among women in Indian society where fat is a means for obtaining alliances or finding a marriage partner. The same is true among Cameroonians where excess weight is considered prestigious (Treloar *et al.*, 1999).

Concerning the perception of body image, the present study reveals that all (100%) of the obese participants did not have a correct perception of their own body status and underestimated their real weight with 48.6% among them who consider themselves normal, including 52.6% women and 44.4% men. These results are in agreement with those of a study which reported a significant difference between weight and weight perception among university students (Akindele *et al.*, 2017; Devanathan *et al.*, 2013; Ettarh *et al.*, 2013; Muhihi *et al.*, 2012; Tateyama *et al.*, 2018; Yepes *et al.*, 2015). Another study of South African women in Cape Town of childbearing age showed that the majority (89%) were satisfied with their weight although most of them were overweight or obese (Mciza *et al.*, 2005), while approximately two-thirds of them did not see themselves as such (Puoane *et al.*, 2005). In addition, 37.5% of women in urban Cameroon who are overweight or obese consider themselves to be of normal weight (Cohen *et al.*, 2013). The same is true for many non-Western low-income countries, where fat is considered an indicator of health and prosperity. A 2016 study of South Africans (Okop *et al.*, 2016) found an underestimation of body size and inappropriate perception in overweight women. However, it has been suggested that the degree of preference for being overweight in non-Western societies is exaggerated by Western studies and that fear of obesity is more likely to be expressed in those who have had a greater exposure to Western culture (Soh *et al.*, 2008). In industrialised countries, on the other hand, obesity which is due to the abundance of food is associated with poverty and an altered state of health (Tlili *et al.*, 2008) while thinness is a sign of high socioeconomic status in these countries (Bush *et al.*, 2001).

During the complex process of migration, the environment of immigrants undergoes changes including diet, social and family relations, climate and culture (Toselli *et al.*, 2014). Factors such as acculturation, enculturation, and socioeconomic status (SES) have an important effect on weight status and perceived body size. In the present study, only 14.8% of the overall sample of women had a realistic perception of their own weight and this percentage is close to that reported by other studies, in Nigeria, Kenya, Seychelles, South Africa, Tanzania and Zambia. Some of these studies included both men and women (Akindele *et al.*, 2017; Devanathan *et al.*, 2013; Ettarh *et al.*, 2013; Muhihi *et al.*, 2012; Tateyama *et al.*, 2018; Yepes *et al.*, 2015). In the present study, the percentage of men and women who correctly estimated their current body size differed significantly according to weight status measured by BMI. Thus, 100% of obese men and women and 75.3% of overweight people underestimated their weight. These results are consistent with other studies that found that overweight women were more likely to underestimate their weight status

than those of normal weight (Muhihi *et al*., 2012; Tateyama *et al*., 2018). The absence of a significant association reported in the present study between the perception of body image and age groups, marital status, monthly income or level of education, is in agreement with the results found previously in the sub-Saharans of Seychelles by Alwan in 2010 (Alwan *et al*., 2010).

The body dissatisfaction data expressed in the sample of this study as measured by the FID, confirms the results concerning the perception of body image. Indeed, only 17.3% of participants were satisfied with their current body image. This result is in agreement with those of the study by Boutahar *et al*. (2019) carried out on university students in Morocco reporting satisfaction with their body image in 30.2% of them. A level of 30.7% satisfaction was also reported by university students in Cairo (Boutahar *et al*., 2019). Assessment of body dissatisfaction and weight difference among African immigrants in Europe compared to their counterpart still living in Africa has been reported in the literature. The analysis of the general geographical model of Stefania Toselli *et al*. (2016) showed that body image dissatisfaction (FID) increases with increasing BMI from south to north, reaching the highest values among African immigrants in the EU (Toselli *et al*., 2016). These results indicate different beauty ideals of African populations and, therefore, different degrees of satisfaction in the perception of their body image from Southern Africa to North Africa and, to a greater degree, with migration to Europe. Besides the differences in ideals, there was a South-North gradient of changes in weight status, which increased from southern Africa to North Africa and from there to Europe (Toselli *et al*., 2016). In the present study, 82.6% of sub-Saharans surveyed expressed their body dissatisfaction, of which 71.9% expressed the desire to gain weight and only 10.6% the desire to lose it. The same result was reported in another survey conducted on overweight or obese women in southern Morocco where most of them did not want to lose weight and the majority of whom wanted to gain weight, especially before marriage (Rguibi & Belahsen, 2004). The same is true for African residents who generally showed a preference for heavier body size than their immigrant peers with obvious differences in preferences according to area of residence, ethnicity and social-cultural factors in the same population (Ettarh *et al*., 2013). Indeed, a high level of corpulence in addition to dissatisfaction can lead to eating disorders and poor eating habits.

These observations show that there is a different awareness of weight among the groups examined, with different consequences for health and well-being (Toselli *et al*., 2016). The discrepancies between perceived weight and actual weight status measured by BMI in the sample of this study, clearly indicates that both men and women underestimated their body weight (mean FAI value was negative in both genders (0.39, SD=0.56 in females and 0.3, SD=0.58 in males) By gender, 35.2% of males and 35.3% of normal-weight females in overall sample considered their bodies to be normal weight. In contrast, 48.5% and 45.5% of men and women of normal weight, respectively, reported being underweight, thereby underestimating their actual weight. The majority of Nairobi slum-dwelling women who were normal weight tended to underestimate their body size in contrast to men who overestimated it. These women had low levels of dissatisfaction with a preference for normal body size (Ettarh *et al*., 2013). One possible explanation is the large rejection for "thinness" in some low-income African countries due to stigma associated with diseases such as HIV and tuberculosis (Ezekiel *et al*., 2009; Matoti-Mvalo & Puoane, 2011). The actual body image perception rate in the present study was 29.4%. Moreover, no obese respondents expressed satisfaction with their body image, but rather all obese underestimated their body size. On the contrary, the study by Nicolau *et al*. (2008) on North African migrants focusing on the preference and perception of body size among Moroccan immigrants settled in the Netherlands (Amsterdam) (Nicolaou *et al*., 2008) revealed that most Moroccan women wanted to be thinner and that the majority of Moroccan men were unaware of being overweight. A study conducted in Amsterdam (Nicolaou *et al*., 2012) showed that both Moroccan immigrants in the Netherlands and residents in Morocco expressed a preference for a slim waist and that many of them wished to lose weight. On the other hand, numerous studies have shown that a positive perception of body image is associated with happiness and life satisfaction (Tylka, 2011). Large body size was also seen to be a sign of strength and success in life (Ezekiel *et al*., 2009; Matoti-Mvalo & Puoane, 2011; Puoane *et al*., 2010) and was a symbol

of wealth and prosperity as well (Puoane *et al.*, 2010; Tateyama *et al.*, 2019). Data from studies of African societies, such as the one carried out among urban women in Cameroon reveal that being overweight for a woman suggests that her husband takes good care of her, that he is comfortable and that he has money (Cohen *et al.*, 2017). This is also the same result found in women in South Africa, showing that a fat person is generally assumed to be happy and wealthy. On the other hand, studies carried out among Moroccans have reported that thinness was associated with wealth (Batnitzky, 2008), while activities associated with weight loss, such as walking, were associated with poverty (Draper *et al.*, 2016).

Limitations of the study

The data reported in this work relate to people who participated in the entire study. Incomplete data from a number of 56 people who left the study at some point were discarded and not included in the final sample. The size of the final study sample could constitute a limit for the representativeness of the results obtained and their generalisation to the entire population of sub-Saharans residing in Morocco. Additionally, self-reported data can also be a potential source of recall bias.

V. CONCLUSION

Obesity is a major international health problem with a high prevalence among African women. Larger body sizes are generally assumed to be preferred for African women. Overall, the evidence synthesised in this paper shows a preference for being overweight or obese in African women than in African men, attesting to the barrier that traditional cultural norms still present to the prevention of overweight/obesity. The study conclusions underline the need for interventions that must considere all the modifiable factors of these preferences. These interventions must be adapted to the different stages of the life course of individuals with an emphasis on raising awareness about the consequences of obesity on health status. It should in addition, include information, education and the promotion in terms of healthy eating for all age groups to preventing all forms of malnutrition and for good health.

VI. ACKNOWLEDGMENTS

Our thanks go to all the sub-Saharans participating in this study for their dedication and their cooperation, which helped to facilitate the achievement of the work objectives. We thank the decision makers of the province of El Jadida for their contribution to facilitate access and collection of data. The authors also thank the delegate of the Ministry of Health of El Jadida province. The study was supported by the Ministry of Higher Education and Research, Morocco.

Conflict of interest

The authors declare no conflict of interest.

VII. REFERENCES

Akindele, MO, Phillips, J, Igumbor, E & Useh, U 2017, 'Body Weight Misperception and Dissatisfaction Among Overweight and Obese Adult Nigerians', JMIR Public Health and Surveillance, vol. 3, no. 3, p. e7047. doi: 10.2196/publichealth.7047.

Alwan, H, Viswanathan, B, Williams, J, Paccaud, F & Bovet, P 2010, 'Association between weight perception and socioeconomic status among adults in the Seychelles', BMC Public Health, vol. 10, no. 1, p. 467. doi: 10.1186/1471-2458-10-467.

Batnitzky, A 2008, 'Obesity and household roles: Gender and social class in Morocco', Sociology of Health & Illness, vol. 30, no. 3, pp. 445–462. doi: 10.1111/j.1467-9566.2007.01067.x

Bhuiyan, AR 2003, 'Differences in Body Shape Representations among Young Adults from a Biracial (Black-White), Semirural Community: The Bogalusa Heart Study', American Journal of Epidemiology, vol. 158, no. 8, pp. 792–797. doi: 10.1093/aje/kwg218

Boutahar, K, Chetoui, A, Kaoutar, K, Najimi, M & Chigr, F 2019, 'Anthropometric status and body image perception among Moroccan university students', Revue d'Épidémiologie et de Santé Publique, vol. 67, no. 5, pp. 311–317. doi: 10.1016/j.respe.2019.04.057

Brown, SR, Hossain, MB & Bronner, Y 2014, 'African American Male and Female Student Perceptions of Pulvers Body Images: Implications for Obesity, Health Care, and Prevention', Journal of Health Care for the Poor and Underserved, vol. 25, no. 3, pp. 1328–1340. doi: 10.1353/hpu.2014.0140

Bush, HM, Williams, RGA, Lean, MEJ & Anderson, AS 2001, 'Body image and weight consciousness among South Asian, Italian and general population women in Britain', Appetite, vol. 37, no. 3, pp. 207–215. doi: 10.1006/appe.2001.0424

Calzada, PJ & Anderson-Worts, P 2009, 'The Obesity Epidemic: Are Minority Individuals Equally Affected? Primary Care: Clinics in Office Practice, vol. 36, no. 2, pp. 307–317. doi: 10.1016/j.pop.2009.01.007

Cohen, E, Amougou, N, Ponty, A, Loinger-Beck, J, Nkuintchua, T, Monteillet, N, Bernard, JY, Saïd-Mohamed, R, Holdsworth, M & Pasquet, P 2017, 'Nutrition Transition and Biocultural Determinants of Obesity among Cameroonian Migrants in Urban Cameroon and France', International Journal of Environmental Research and Public Health, vol. 14, no. 7, p. 696. doi: 10.3390/ijerph14070696

Cohen, E, Boetsch, G, Palstra, FP & Pasquet, P 2013, 'Social valorisation of stoutness as a determinant of obesity in the context of nutritional transition in Cameroon: The Bamiléké case', Social Science & Medicine, vol. 96, pp. 24–32. doi: 10.1016/j.socscimed.2013.07.004

Daif, H, Chamlal, H & Barakat, I 2021, 'Nutritional status of sub-Saharans residing in the city of El Jadida - Morocco: Weight in relation to socio-economic status', Roczniki Państwowego Zakładu Higieny, pp. 409–418. doi: 10.32394/rpzh.2021.0184

Delavari, M, Sønderlund, AL, Swinburn, B, Mellor, D & Renzaho, A 2013, 'Acculturation and obesity among migrant populations in high income countries – a systematic review', BMC Public Health, vol. 13, no. 1, p. 458. doi: 10.1186/1471-2458-13-458

Devanathan, R, Esterhuizen, TM & Govender, RD 2013, 'Overweight and obesity amongst Black women in Durban, KwaZulu-Natal: A 'disease' of perception in an area of high HIV prevalence', African Journal of Primary Health Care and Family Medicine, vol. 5, no. 1, pp. 1–7. doi: 10.10520/EJC131372

Draper, CE, Davidowitz, KJ & Goedecke, JH 2016, 'Perceptions relating to body size, weight loss and weight-loss interventions in black South African women: A qualitative study', Public Health Nutrition, vol. 19, no. 3, pp. 548–556. doi: 10.1017/S1368980015001688

Ettarh, R, Van de Vijver, S, Oti, S & Kyobutungi, C 2013, 'Overweight, Obesity, and Perception of Body Image Among Slum Residents in Nairobi, Kenya, 2008–2009', Preventing Chronic Disease, vol. 10, p. E212. doi: 10.5888/pcd10.130198

Ezekiel, MJ, Talle, A, Juma, JM & Klepp, K-I 2009, '"When in the body, it makes you look fat and HIV negative": The constitution of antiretroviral therapy in local discourse among youth in Kahe, Tanzania', Social Science & Medicine, vol. 68, no. 5, pp. 957–964. doi: 10.1016/j.socscimed.2008.12.016

Frederick, DA, Forbes, GB & Berezovskaya, A 2008, 'Female Body Dissatisfaction and Perceptions of the Attractive Female Body in Ghana, the Ukraine, and the United States', vol. 18.

Gadd, M, Sundquist, J & Johansson, S-E 1996, 'Do

immigrants have an increased prevalence of unhealthy behaviours and risk factors for coronary heart disease?' vol. 7.

Grogan, S 2006, 'Body Image and Health: Contemporary Perspectives', Journal of Health Psychology, vol. 11, no. 4, pp. 523–530. doi: 10.1177/1359105306065013

Gualdi-Russo, E, Zaccagni, L, Manzon, VS, Masotti, S, Rinaldo, N & Khyatti, M 2014, 'Obesity and physical activity in children of immigrants', The European Journal of Public Health, vol. 24(suppl 1), pp. 40–46. doi: 10.1093/eurpub/cku111

Himmelgreen, DA, Pérez-Escamilla, R, Martinez, D, Bretnall, A, Eells, B, Peng, Y & Bermúdez, A 2004, 'The longer you stay, the bigger you get: Length of time and language use in the U.S. are associated with obesity in Puerto Rican women: Obesity in Inner-City Puerto Ricans', American Journal of Physical Anthropology, vol. 125, no. 1, pp. 90–96. doi: 10.1002/ajpa.10367

Hosper, K, Nierkens, V, van Valkengoed, I & Stronks, K 2008, 'Motivational factors mediating the association between acculturation and participation in sport among young Turkish and Moroccan women in the Netherlands', Preventive Medicine, vol. 47, no. 1, pp. 95–100. doi: 10.1016/j.ypmed.2008.02.024

Joh, H-K, Oh, J, Lee, H-J & Kawachi, I 2013, 'Gender and Socioeconomic Status in Relation to Weight Perception and Weight Control Behavior in Korean Adults', Obesity Facts, vol. 6, no. 1, pp. 17–27. doi: 10.1159/000346805

Kahveci, R, Öksüz, E, Malhan, S, Eminsoy, G, Özcan, C & Şencan, İ 2012, 'Weight Management, Calorie Intake and Body Image Perception among Young Adults', vol. 6, no. 4, p. 8.

Kaushal, N 2009, 'Adversities of acculturation? Prevalence of obesity among immigrants', Health Economics, vol. 18, no. 3, pp. 291–303. doi: 10.1002/hec.1368

Lynch, E, Liu, K, Wei, GS, Spring, B, Kiefe, C & Greenland, P 2009, 'The Relation Between Body Size Perception and Change in Body Mass Index Over 13 Years: The Coronary Artery Risk Development in Young Adults (CARDIA) Study', American Journal of Epidemiology, vol. 169, no. 7, pp. 857–866. doi: 10.1093/aje/kwn412

Matoti-Mvalo, T & Puoane, T 2011, 'Perceptions of body size and its association with HIV/AIDS', South African Journal of Clinical Nutrition, vol. 24, no. 1, pp. 40–45. doi: 10.1080/16070658.2011.11734348

Mciza, Z, Goedecke, JH, Steyn, NP, Charlton, K, Puoane, T, Meltzer, S, Levitt, NS & Lambert, EV 2005, 'Development and validation of instruments measuring body image and body weight dissatisfaction in South African mothers and their daughters', Public Health Nutrition, vol. 8, no. 5, pp. 509–519. doi: 10.1079/PHN2005814

Muhihi, AJ, Njelekela, MA, Mpembeni, R, Mwiru, RS, Mligiliche, N & Mtabaji, J 2012, 'Obesity, Overweight, and Perceptions about Body Weight among Middle-Aged Adults in Dar es Salaam, Tanzania', ISRN Obesity, vol. 2012, pp. 1–6. doi: 10.5402/2012/368520

Musaiger, AA bin Z y RD 2012, 'Percepción Del Peso Corporal En Los Adolescentes De Dubia, Emiratos', Nutricion Hospitalaria, vol. 6, pp. 1966–1974. doi: 10.3305/nh.2012.27.6.5830

Musaiger, AO 2011, 'Overweight and Obesity in Eastern Mediterranean Region: Prevalence and Possible Causes', Journal of Obesity, vol. 2011, pp. 1–17. doi: 10.1155/2011/407237

Musaiger, AO, Shahbeek, NE & Al-Mannai, M 2004, 'The Role of Social Factors and Weight Status In Ideal Body-Shape Preferences As Perceived By Arab Women', Journal of Biosocial Science, vol. 36, no. 6, pp. 699–707. doi: 10.1017/S0021932003006412

Ng, M, Fleming, T, Robinson, M, Thomson, B, Graetz, N, Margono, C, Mullany, EC, Biryukov, S, Abbafati, C, Abera, SF, Abraham, JP, Abu-Rmeileh, NME, Achoki, T, AlBuhairan, FS, Alemu, ZA, Alfonso, R, Ali, MK, Ali, R, Guzman, NA, … Gakidou, E 2014, 'Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: A systematic analysis for the Global Burden of Disease Study 2013', The Lancet, vol. 384, no. 9945, pp. 766–781. doi: 10.1016/S0140-6736(14)60460-8

Nicolaou, M, Benjelloun, S, Stronks, K, van Dam, RM, Seidell, JC & Doak, CM 2012, 'Influences on body weight of female Moroccan migrants in the Netherlands: A qualitative study', Health & Place, vol. 18, no. 4, pp. 883–891. doi: 10.1016/j.healthplace.2012.03.001

Nicolaou, M, Doak, C, Dam, R, van Hosper, K, Seidell, J & Stronks, K 2008, 'Body size preference and body weight perception among two migrant groups of non-Western origin', Public Health Nutrition, vol. 11, no. 12, pp. 1332–1341. doi: 10.1017/S1368980008002966

Okop, KJ, Mukumbang, FC, Mathole, T, Levitt, N & Puoane, T 2016, 'Perceptions of body size, obesity threat and the willingness to lose weight among black South African

adults: A qualitative study', BMC Public Health, vol. 16, no. 1, p. 365. doi: 10.1186/s12889-016-3028-7

Paeratakul, S, White, MA, Williamson, DA, Ryan, DH & Bray, GA 2002, 'Sex, Race/Ethnicity, Socioeconomic Status, and BMI in Relation to Self-Perception of Overweight', Obesity Research, vol. 10, no. 5, pp. 345–350. doi: 10.1038/oby.2002.48

Pampel *et al.* (n.d.), 'Socioeconomic Disparities in Health Behaviors'.

Poobalan, A & Aucott, L 2016, 'Obesity Among Young Adults in Developing Countries: A Systematic Overview', Current Obesity Reports, vol. 5, no. 1, pp. 2–13. 10.1007/s13679-016-0187-x

Puoane, T, Fourie, JM, Shapiro, M, Rosling, L, Tshaka, NC & Oelefse, A 2005, 'Big is beautiful—An exploration with urban black community health workers in a South African township', South African Journal of Clinical Nutrition, vol. 18, no. 1, pp. 6–15. doi: 10.10520/EJC64875

Puoane, T, Tsolekile, L & Steyn, N 2010, 'Perceptions about body image and sizes among Black African girls living in Cape Town', viewed at <http://repository.uwc.ac.za/xmlui/handle/10566/293>.

Renzaho, AMN 2004, 'Fat, rich and beautiful: Changing socio-cultural paradigms associated with obesity risk, nutritional status and refugee children from sub-Saharan Africa', Health & Place, vol. 10, no. 1, pp. 105–113. doi: 10.1016/S1353-8292(03)00051-0

Rguibi, M & Belahsen, R 2004, 'Overweight and obesity among urban Sahraoui women of South Morocco', Ethnicity and Disease, vol. 14, pp. 542–547.

Riley, NM, Bild, DE, Cooper, L, Schreiner, P, Smith, DE, Sorlie, P & Thompson, JK 1998, 'Relation of Self-Image to Body Size and Weight Loss Attempts in Black Women: The CARDIA Study', American Journal of Epidemiology, vol. 148, no. 11, pp. 1062–1068. doi: 10.1093/oxfordjournals.aje.a009583

Rodin, J 1993, 'Cultural and Psychosocial Determinants of Weight Concerns', Annals of Internal Medicine, vol. 119(7_Part_2), p. 643. doi: 10.7326/0003-4819-119-7_Part_2-199310011-00003

Rucker, CE & Cash, TF 1992, 'Body images, body-size perceptions, and eating behaviors among African-American and white college women', International Journal of Eating Disorders, vol. 12, no. 3, pp. 291–299. doi: 10.1002/1098-108X(199211)12:3<291::AID-EAT2260120309>3.0.CO;2-A

Soh, NL-W, Touyz, S, Dobbins, T, Surgenor, L, Clarke, S, Kohn, M, Lee, EL, Leow, V, Rieger, E, Ung, KEK & Walter, G 2008, 'Body image disturbance in young North European and East Asian women with and without eating disorders in Australia and in Singapore', European Eating Disorders Review, vol. 16, no. 4, pp. 287–296. doi: 10.1002/erv.836

STUNKARD, AJ 1983, 'Use of the Danish Adoption Register for the study of obesity and thinness', Res. Publ. Assoc. Res. Nerv. Ment. Dis., vol. 60, pp. 115–120. doi: naid/10025281459/

Swami, V, Caprario, C, Tovée, MJ & Furnham, A 2006, 'Female physical attractiveness in Britain and Japan: A cross-cultural study', European Journal of Personality, vol. 20, no. 1, pp. 69–81. doi: 10.1002/per.568

Swami, V, Frederick, DA, Aavik, T, Alcalay, L, Allik, J, Anderson, D, Andrianto, S, Arora, A, Brännström, Å, Cunningham, J, Danel, D, Doroszewicz, K, Forbes, GB, Furnham, A, Greven, CU, Halberstadt, J, Hao, S, Haubner, T, Hwang, CS, … Zivcic-Becirevic, I 2010, 'The Attractive Female Body Weight and Female Body Dissatisfaction in 26 Countries Across 10 World Regions: Results of the International Body Project I', Personality and Social Psychology Bulletin, vol. 36, no. 3, pp. 309–325. doi: 10.1177/0146167209359702

Swami, V, Knight, D, Tovée, MJ, Davies, P & Furnham, A 2007, 'Preferences for female body size in Britain and the South Pacific', Body Image, vol. 4, no. 2, pp. 219–223. doi: 10.1016/j.bodyim.2007.01.002

Tateyama, Y, Musumari, PM, Techasrivichien, T, Suguimoto, SP, Zulu, R, Dube, C, Feldman, MD, Ono-Kihara, M & Kihara, M 2019, 'Dietary habits, body image, and health service access related to cardiovascular diseases in rural Zambia: A qualitative study', PLOS ONE, vol. 14, no. 2, p. e0212739. doi: 10.1371/journal.pone.0212739

Tateyama, Y, Techasrivichien, T, Musumari, PM, Suguimoto, SP, Zulu, R, Macwan'gi, M, Dube, C, Ono-Kihara, M & Kihara, M 2018, 'Obesity matters but is not perceived: A cross-sectional study on cardiovascular disease risk factors among a population-based probability sample in rural Zambia', PLOS ONE, vol. 13, no. 11, p. e0208176. doi: 10.1371/journal.pone.0208176

Tlili, F, Mahjoub, A, Lefèvre, P, Bellaj, T, Ben Romdhane, H, Eymard-Duvernay, S & Holdsworth, M 2008, 'Tunisian Women's Perceptions of Desirable Body Size and Chronic Disease Risk', Ecology of Food and Nutrition, vol. 47, no. 4, pp. 399–414. doi: 10.1080/03670240802003942

Toselli, S, Gualdi-Russo, E, Marzouk, D, Sundquist, J & Sundquist, K 2014, 'Psychosocial health among immigrants in central and southern Europe', European Journal of Public Health, vol. 24(suppl_1), pp. 26–30. doi: 10.1093/eurpub/cku100

Toselli, S, Rinaldo, N & Gualdi-Russo, E 2016, 'Body image perception of African immigrants in Europe', Globalization and Health, vol. 12, no. 1, p. 48. doi: 10.1186/s12992-016-0184-6

Treloar, C, Porteous, J, Hassan, F, Kasniyah, N, Lakshmanudu, M, Sama, M, Sja'bani, M & Heller, RF 1999, 'The cross cultural context of obesity: An INCLEN multicentre collaborative study', Health & Place, vol. 5, no. 4, pp. 279–286. doi: 10.1016/S1353-8292(99)00018-0

Tylka, TL 2011, 'Positive psychology perspectives on body image', In Body image: A handbook of science, practice, and prevention, 2nd ed, pp. 56–64, The Guilford Press.

WHO 2000, Obesity: Preventing and managing the global epidemic.

Yeng, PP & Sedek, R 2012, 'The Body Weight Perception and Weight Control Behaviors among Undergraduate Students in National University of Malaysia (UKM)', Pakistan Journal of Nutrition, vol. 11, no. 12, pp. 1131–1138. doi: 10.3923/pjn.2012.1131.1138

Yepes, M, Viswanathan, B, Bovet, P & Maurer, J 2015, 'Validity of silhouette showcards as a measure of body size and obesity in a population in the African region: A practical research tool for general-purpose surveys', Population Health Metrics, vol. 13, no. 1, p. 35. doi 10.1186/s12963-015-0069-6

Zaccagni, L, Masotti, S, Donati, R, Mazzoni, G & Gualdi-Russo, E 2014, 'Body image and weight perceptions in relation to actual measurements by means of a new index and level of physical activity in Italian university students', Journal of Translational Medicine, vol. 12, no. 1, p. 42. doi: 10.1186/1479-5876-12-42