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Weight Status Among Somali Immigrants in Sweden in Relation to Socio-demographic Characteristics, Dietary Habits and Physical Activity

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Abstract: *Background*: Immigrants are considered globally to be a vulnerable subpopulation. Vulnerable population groups have a higher prevalence of obesity than the general population. Despite increased immigration of people from Somalia to Sweden in recent years, little research has been undertaken about obesity and obesity-related health risks among Somali immigrants. The present study aimed to investigate the prevalence of overweight and obesity, as well as possible relationships between weight status and socio-demographic characteristics, dietary habits and physical activity (PA) among Somali immigrants in Sweden. *Methods*: This quantitative cross-sectional study included 114 respondents. Data were collected by means of a questionnaire covering socio-demographic factors, PA and dietary habits. Weight and height were also measured. *Results*: Of the 114 respondents, 50.9% had a body mass index (BMI) of 25 or above. In bi-variate analysis, there were no statistically significant differences between those with a BMI below 25 and those with a BMI of 25 or more regarding PA or dietary habits. Multiple logistic regression analysis showed that female gender and being married were associated with having a BMI of 25 or above. *Conclusion*: Socio-demographic factors may be more strongly associated with high BMI than PA or dietary habits among the targeted group and should be taken into account as an issue affecting Somali immigrants in Sweden that warrants further research.

Keywords: BMI, culture, dietary habits, overweight, physical activity, Somali immigrants, Sweden.

INTRODUCTION

Socio-demographic characteristics such as country of birth, education, occupational status, civil status, gender and age, as well as behaviours connected to diet and physical activity, have all been linked to inequalities in health [1, 2]. Inequalities in health have been seen within different populations worldwide, within which some vulnerable population groups have a higher prevalence of obesity and obesity-related disease than others [3, 4]. One such group is immigrants. Immigration entails a readjustment to a new life and has previously been shown to influence health in both psychological and physiological ways [5, 6]. The health of immigrants could be affected by factors on both the individual level and the group level because of societal factors both in their home country and in the new country [7, 8].

Overweight and obesity are considered as major preventable causes of death worldwide [5] and are regarded as serious threats to public health [5, 6]. The development of overweight and obesity is affected by people's lifestyle [5]; moreover, individuals' lifestyle choices and health behaviours are affected by a number of underlying factors, such as social, cultural and economic ones [9, 10].

Sweden has a total population of 9.6 million [11], of whom about 14% are immigrants. Those originating from Somalia make up the largest group of immigrants in Sweden, and most of them migrated due to the country's civil war, which started in 1990 [11]. In 2012–2013, 46.5% of Sweden's population with a Swedish background were overweight and 11.3% were obese, whilst among the general immigrant population, 48.5% were overweight and 13.2% were obese [12]. According to the latest WHO statistics (2008), obesity is rare in Somalia; approximately 3.1% of women and 6.4% of men were obese in 2008 [13]. However, previous research on Somali immigrants in New Zealand and Norway [14, 15] found that, after migration, the frequency of obesity rose, and according to a Swedish study, a main reason for this is decreased physical activity (PA) after immigration [16].

Despite a large influx of people from Somalia to Sweden in recent years, few studies have investigated weight status among the adult Somali immigrant population in Sweden. Therefore, this study aims to investigate the prevalence of overweight and obesity as well as possible relationships between body mass index (BMI) and socio-demographic characteristics, dietary habits and physical activity among Somali immigrants.

MATERIALS AND METHODOLOGY

Participants

This study was conducted in the southern part of Sweden, Scania, where about 2,000 Somali immigrants live [17]. The inclusion criteria for the selection were as follows: male or female, 18 years or older, with experience of immigration to Sweden from Somalia – that is, Somali immigrants, either

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born in Somalia or having at least one Somali-born parent living in Sweden. A total of 150 individuals were invited to participate in the study, and of them, 114 agreed. The response rate was thus 76%. The youngest participant was 18, the oldest 63, and the mean age 34.8.

Procedure

In order to achieve a representative sample of the studied group, the research team consisted, in addition to the authors, of five Somali- and Swedish-speaking members of the local Somali association [18]. Acting as interpreters, these individuals facilitated the communication between the first author (JAT) and the Somali immigrant respondents. The participants were deliberately recruited through a snowball sampling technique, the chain referral method [18, 19]. This is a non-probability sampling method often used to identify potential respondents in hard-to-reach populations or subgroups. Initially, the first author (JAT) started the recruitment with the help of a Somali- and Swedish-speaking woman from the local Somali citizen association. From the first sample, four Somali and Swedish participants were asked to refer other individuals who could potentially participate in the study. These participants were further requested to refer other individuals [18, 19].Those who agreed to participate in the study were scheduled for an appointment to fill in the questionnaire. JAT and the Somali interpreters distributed the questionnaires and were also present when the respondents answered the questionnaires, to explain and clarify questions if needed.

The data collection was carried out between June 2011 and February 2013. All informants were informed about confidentiality, voluntary participation and the study design. Information about the study was provided by the research team. Verbal and written informed consent was obtained from each participant before the questionnaire was filled in. Participants were informed that they could terminate their participation at any time during the study and that they would not suffer any disadvantages as a result. The study was conducted in accordance with the Declaration of Helsinki [20], and the regional ethical review board in Lund, Sweden, approved the study (Ref. No. 2011/739).

Data Collection

Data were collected by means of a questionnaire that was divided into three sub-sections, namely, socio-demographic factors, self-rated health and lifestyle habits including PA as well as dietary habits. The main part of the study-specific protocol consisted of questions from a protocol that was originally developed for the Swedish national public health survey 'Health on Equal Terms' [21]. This national public health survey involved about 80 questions concerning demographic background, physical and mental health, consumption of pharmaceuticals, contact with healthcare services, dental health, lifestyle habits, financial situation, employment including work environment and social relationships. The original protocol has been used in a survey that has been conducted in Sweden every year since 2004. All of the questions in the 'Health on Equal Terms' survey had been previously tested and validated [21]. From the 'Health on Equal Terms' survey, 22 questions about demographic background, employment status and PA were selected for this study.

Physical Activity

The Somali immigrants' PA was measured using the Swedish short version of the International Physical Activity Questionnaire (IPAQ) [22]. IPAQ assumes that PA can be undertaken in four different areas: leisure-related activity, household-related activity, work-related activity and transport-related activity. In the IPAQ form, these four areas are graded as one of three intensity levels, along with an estimate of how much the individual sits in one day. The participants estimated how many times they engaged in different levels of PA in the past seven days, and how many hours this lasted each time. The result of this estimate was converted into a metabolic equivalent of task (MET). MET is used to standardise energy consumption in relation to the intensity level of PA [22]. Vigorous activity is given a MET value of 8, moderate activity is given a value of 4 and low-intensity PA is given a value of 3.3. The number of minutes spent on each category is then multiplied by the MET value to obtain the number of MET minutes (METmin) for each participant. Thus, the definitive value reflects not only the total number of minutes devoted to activity per week, but also energy consumption for the same. The IPAQ has been shown to have good reliability and validity [22].

The study questionnaire also contained a question asking the participants to estimate their average PA during their leisure time over the past 12 months. The response provides an indication of the relative degree of PA. Validations of the questions showed that those indicating a higher level of PA were also more active as measured by an accelerometer. The response options were grouped into four categories (sedentary, moderate, moderate regular and regular) allowing the categorisation of individuals with regard to their average PA [23].

Dietary Habits

Dietary habits were assessed using the model of Food-Based Classification of Eating Episodes (FBCE) [24]. The FBCE is a Swedish assessment tool, regarded as a defined and reliable concept for food categorisation and studying eating episodes [24]. The FBCE describes food quality using a simplified classification of different meals and snacks. It was designed in accordance with the Nordic Nutrition Recommendations (NNR), developed to promote health at the population level [25]. The recommendations serve as guidelines to help people meet their needs in terms of individual nutrients.

According to the FBCE model, the definition of a 'complete meal' (CM) should meet the NNR dietary recommendations. A CM includes all food groups. 'Incomplete meals' (IM) are considered incomplete because they lack fruit, berries, root vegetables and other vegetables, which are potential sources of ascorbic acid. Furthermore, 'less balanced meals' (LM) are those that lack starch (regarded as a source of energy) because of the absence of rice and potatoes. The concept of FBCE was developed from the results of different dietary surveys [24]. The eating events were categorised as any of three types of 'meal' or three types of 'snack', due to their combinations of food categories. The categorisation is based on seven food categories with food products of similar nutritional profiles in each category. This implies that the

categorisation is based not only on types of food, but also on the nutrients in the food (Table **1**). A CM is considered to contain food from the categories a, b and c. An IM is supposed to contain food from categories a and b. An LM contains food from categories a and c. Finally, 'vegetarian meals' (VM) contain food from categories b and c (corresponding to a vegetarian CM). 'Snacks' are considered to contain food from categories d, e, f and/or g, that is, high-nutrient-density food, low-nutrient-density food or food containing no energy.

Weight Status

In order to calculate BMI, body weight and height were measured as the questionnaires were collected. Height was measured to the nearest 0.5 cm with informants standing without shoes, using a portable stadiometer (Seca 217). Bodyweight was measured to the nearest 0.1 kg using a portable digital scale (Med Weigh MS-3200) with subjects wearing light clothes. BMI was calculated as weight (kg)/height $(m)^2$. The participants were grouped into the following categories based on their BMI: underweight (BMI < 18.5), normal weight (BMI 18.5–24.9), overweight (BMI ≥ 25.0) and obese (BMI ≥ 30.0) [26]. These four categories were later transformed into two groups prior to the statistical analysis: BMI < 25.0 and BMI ≥ 25.0. Height and weight were in all cases measured by the first author (JAT) using portable equipment.

Statistical Analysis

Statistical comparisons were made using parametric and non-parametric methods according to the level of data, that is, nominal, ordinal or continuous (Chi-square test with Fisher's exact test when applicable, Mann-Whitney *U* test or ANOVA) [27].

Logistic regression analyses were performed with BMI (0 = BMI < 25; 1 = BMI ≥ 25) as the dependent variable. Variables with p-values < 0.20 in binary analyses were selected for the logistic regression analysis, namely, age, gender, marital status, country of birth, number of children in household, PA, METmin/wk, PA in the last 12 months, meeting the WHO's recommendations of moderate PA (150 min/week) [28] and years since arrival in Sweden. However, variables with high bivariate correlations (r > 0.5) were not included, namely, years since arrival (correlated with age), number of individuals in the household (correlated with number of children), PA and METmin/wk (correlated with the WHO's recommendations for moderate PA). In addition, the variable 'country of birth' was deleted because of a low number of respondents. The remaining variables were entered as independent variables in the logistic regression analysis, using the forward conditional method. All data were analysed using IBM SPSS statistics, version 20.

RESULTS

In the total sample, 3 individuals (2.6%) were underweight, 53 (46.5%) normal weight, 42 (36.8%) overweight and 16 (14.0%) obese. Fifty-eight (50.9%) of the participants had a BMI of 25 or more. The socio-demographic data revealed that those with a high BMI (≥ 25) were significantly older (mean age 37.8), more were women (71.9%) and more were married (63.2%) than those with a lower BMI (< 25) (mean age 31.6, women 36.8%, married 33.3%) (Table **2**).

There were no significant differences in PA in relation to BMI. On the other hand, there were more individuals meeting the WHO's recommendations for a moderate level of PA in those with lower BMI (34.5%) than those with higher BMI (17.5%) (Table **3**).

The results showed that CM was the least common meal type. Among the participants who completed the FBCE form (n = 106), 7 (6.6%) had CM and 22 (20.8%) had IM. The LM was the most common type of meal, (n = 33, 31.1%), which means that dietary fibre and carbohydrates from rice, pasta and bread were not frequently eaten. In addition, 'snacks', high-nutrient-density food, low-nutrient-density food and food containing no energy were common (n = 44, 41.5%). However, there were no statistically significant differences in dietary habits in relation to BMI (Table **4**).

Table 1. Food categories and their nutrient properties as the base for categorization of eating events.

Category a	Animal origin	Meat and meat products, fish and shellfish, poultry, egg, milk and cheese	*High nutrient density*	Animal protein and fat iron, zinc, calcium
Category b	Plant origin	Rice, pasta, bread, dried legumes, seeds	*High nutrient density*	Starch, plant protein, potatoes dietary fibre
Category c	Plant origin	Green vegetables, fruit, berries, roots	*High nutrient density, low energy density*	Starch, carotenoids,
Category d	Plant origin	Nuts, olives, avocado	*High fat density*	Plant fat, plant protein
Category e	Animal and plant origin	Cooking fat, spreads, cream, fatty sauces	*High fat density*	Fat
Category f	Plant origin	Products in which white sugar is often added	*Low, nutrient density*	Sugar, fat, alcohol Beverages containing alcohol, ice cream, sweets, chocolate, biscuits, sweet desserts
Category g		Water, coffee, tea, unsweetened light beverages	*No energy*	

Table 2. Socio-demographic characteristics of respondents.

	BMI ≤25 n=56	BMI ≥25.0,n=58	P-value	Total, n=114
Age, mean (SD)	31.6 (10.2)	37.8 (10.3)	0.002 [a)]	34.8 (10.7)
Gender, n (%)			0.000 [b)]	
Men	36 (64.3)	16 (35.7)		52 (45.6)
Women	20 (27.6)	42 (72.4)		62 (54.4)
Marital status, n (%)			0.003 [b)]	
Married	19 (34.5)	36 (65.5)		55 (48.2)
Unmarried, divorced, widow/er	37 (62.7)	22 (37.3)		59 (51.8)
Born in, n (%)			0.118 [b)]	
Sweden	4 (7.0)	0 (0)		4 (3.5)
Somalia	53 (93.0)	57 (100)		110 (96.5)
Years since arrival to Sweden, median (q1-q3)	6 (3-19)	9 (4-21)	0.196 [c)]	7.5 (4-19)
Main language spoken at home, n (%)			0.319 [b)]	
Somali	45 (51.7.)	42 (48.3)		87 (76.3)
Swedish/Other	11 (40.7)	16 (59.3)		27 (23.7)
Kind of residency, n (%)			0.538 [b)]	
Rental flat	54 (48.6)	57 (51.4)		111 (97.4)
Other	2 (66.7)	1 (33.3)		3 (2.6)
Persons in residence, n (%)			0.856 [b)]	
Single household	12 (50.0)	12 (50.0)		87 (76.3)
Two persons or more	43 (49.4)	44 (50.6)		24 (21.1)
No answer	1 (33.3)	2 (66.7)		3 (2.6)
Children in the household, n (%)			0.063 [c)]	
0	39 (58.2)	28 (41.8)		67 (58.8)
1-3	9 (39.1)	14 (60.9)		23(20.2)
4 or more	8 (33.3)	16 (66.7)		24 (21.1)
Education			0.411 [c)]	
Elementary school	30 (44.1)	38 (55.9)		68 (59.6)
High school	18 (58.1)	13 (41.9)		31 (27.2)
University	8 (53.3)	7 (46.7)		15 (13.2)
Daily Occupation, n (%)			0.890 [b)]	
Working/ Studying/ Labour market programs	36 (48.6)	38 (51.4)		74 (64.9)
Unemployed/Retired	20 (50.0)	20 (50.0)		40 (35.1)

Analysis: [a)] T-test, [b)] Chi-square test with Fishers test when applicable, [c)] Mann-Whitney U test

Table 3. PA in minutes/week (min/wk) and mets minutes/week (metmin/wk) in relation to BMI and meeting the WHO recommendation.

	BMI ≤25.0 n=57	BMI ≥25.0, n=57	P-value	Total, n=114
PA, min/wk, mean (SD)				
Vigorous	208.2 (785.4)	88.5 (233.4)	0.199 [a)]	148.4 (579.9)
Moderate	146.2 (246.4)	169.1 (423.7)	0.221 [a)]	157.7 (345.3)
Walking	615.0 (1126.8)	433.0 (1007.3)	0.751 [a)]	524.0 (1067.9)
Total	969.4 (1449.4)	690.6 (1167.3)	0.114 [a)]	830.0 (1317.6)
PA, metmin/wk, mean (SD)				
Vigorous	1665.9 (6283.2)	708.0 (1867.3)	0.199 [a)]	1187.0 (4639.4)
Moderate	584.9 (985.7)	676.4 (1695.1)	0.221 [a)]	630.7 (1381.2)
Walking	2029.5 (3718.3)	1428.9 (3324.1)	0.751 [a)]	1729.2 (3524.0)
Total	4280.4 (7727.8)	2813.5 (4473.0)	0.096 [a)]	3546.9 (6328.7)
PA at moderate level WHO (≥150 min/wk), n (%)	19 (34.5)	10 (17.5)	0.040 [b)]	29 (25.9)
PA at vigorous level WHO (≥75 min/wk), n (%)	18 (32.7)	15 (26.3)	0.457 [b)]	33 (29.5)
PA last 12 months, n (%)			0.104 [c)]	
Sedentary	9 (17.3)	15 (29.4)		24 (23.3)
Moderate	18 (34.6)	19 (37.5)		37 (35.9)
Moderate regular	7 (13.5)	4 (7.8)		11 (10.7)
Regular	18 (34.6)	13 (25.5)		31 (30.1)

Analysis: [a)] ANOVA, [b)] Chi-square test with Fisher's exact test, [c)] Mann-Whitney U test

Table 4. Dietary habits in relation to BMI.

	BMI ≤25.0, n=53(%)	BMI ≥25.0, n=53(%)	P-value	Total, n=106[a)]
Dietary habits			0.637	
CM or VM/day	4 (7.5)	3 (5.7)		7 (6.6)
IM/day	10 (18.9)	12 (22.6)		22 (20.8)
LB/day	19 (35.8)	14 (26.4)		33 (31.1)
Snacks/day	20 (37.7)	24 (45.3)		44 (41.5)

Analysis: Mann-Whitney U test, [a)] Missing 8 respondents

According to the multiple logistic regression, being female (OR 6.67, p-value = 0.000) and being married (OR 0.18, p-value = 0.001) were significantly associated with high BMI (≥ 25) (Table **5**).

DISCUSSION

This study aimed to investigate the prevalence of overweight and obesity together with possible relationships between weight status and socio-demographic characteristics, dietary habits and PA among immigrants with a Somali background. Healthy eating habits and PA are recurrent explanatory factors in studies about weight issues; however, this study found socio-demographic factors to be more important, since being female and being married were significantly associated with high BMI.

The Somali immigrants seemed to eat more 'IM' and 'LM' than 'CM', which means that they ate fewer meals with vegetables, fruit, berries and roots. One possible reason for this, as indicated in a previous study [29], is that the fruit and vegetables available in Sweden are generally not similar to those in Somalia [29] and when similar types are present, they may have a different taste than in their home country [29]. It can also be due to economic factors in that fruit and vegetables are expensive.

Table 5. Multiple logistic regression (forward conditional) analysis of variables significantly associated with BMI (0=BMI<25; 1=BMI ≥25, n=114).

Variables	Odds Ratio	95% CI of OR	P-value
Gender [1)]	6.666	2.435-18.252	0.000
Marital status [2)]	0.185	0.068-0.504	0.001

Omnibus test (should be significant): P-value = 0.000. Hosmer-Lemeshow goodness of fit (should not be significant): p-value = 0.549. Nagelkerke R-square: 29.5%. Variables not significantly associated with BMI: age, number of children in household, Meeting WHO recommendations of Physical Activity (PA) at moderate level (150 minutes/week), PA last 12 months.

[1)] Coded as 0=male, 1=female

[2)] Coded as 0=married; 1=not married/divorced/widow/widower

As shown in previous studies, differences in weight development between men and women could be attributable to hormonal differences, since women need to store energy to ensure their nutrient supply during pregnancy and breastfeeding [30]. In addition, earlier studies propose pregnancy as a reason for obesity [31, 32], referring to the difficulty of reversing weight gain after a pregnancy [32]. In a study by Linné *et al.* [32], however, no statistically significant difference could be seen between the women who were overweight and those who had a normal weight in relation to the number of pregnancies or total number of births.

The association of high BMI with being married in our sample of Somali women living in Sweden is in line with a previous finding by Averett *et al.* [33], who compared married white women, black women and Hispanic women in the US. They found an increased incidence of overweight and obesity among married women in all groups, compared with their single, never-married counterparts. Sobal *et al.* [34], who found a similar result, showed that changed marital status (from unmarried to married) among women also appeared to be correlated with weight gain. Sobal *et al.* [34] concluded that, after marriage, women ate more often and in larger amounts because of shared meals and the confirmation of their relationships through food.

Social constructions of gender could also be a risk factor in the development of overweight among women. A previous study by Batnitzky [35], conducted in Morocco, where women are more often responsible for the household than men, concluded that being in charge of the household and home was related to weight gain. Batnitzky [35] argued that the responsibility for the household and food implied that women had less time for physical activity. As a further result, in the same study, an association between preparing meals and nibbling food was identified [35]. In a study among Somali female immigrant in Sweden by Aronsen *et al.* [29], food-related activities, that is, shopping, meal preparation and meal sharing, were important factors for family and social cohesion. After their immigration, the women faced a more irregular lifestyle, which complicated the maintenance of social routines – a fact that could cause impaired health as it has been argued that retaining habits, such as family meal routines, could strengthen and enhance people's wellbeing [36].

One could argue that there are some weak points in the design of this study. The data on PA and eating habits were self-reported, which implies certain inherent limitations. In accordance with the Hawthorne effect [37], the informants could have misreported their level of PA and number of eating events, depending on what they believed the researchers would have expected [37]. Regardless of such limitations, the use of self-reported data represents an efficient way to achieve an overview of the situation in order to draw conclusions and establish a foundation for public-health interventions [38]. Although the Swedish short version of the IPAQ has been shown to have good reliability and validity [22], PA might be understood and interpreted differently depending on age, gender, individual experience and culture [39], which should be kept in mind when interpreting the results of this study. One strength of the study was that height and weight were in all cases measured by the first author (JAT) and not self-reported.

The authors are aware of the limitations of the FBCE among Somali immigrants, whose dietary procedures and schedules differ from those of the endogenous Swedish population. For instance, a result of a study performed in the UK was that a lunch meal without meat and rice was not seen as lunch by most Somali people [40], which might not be the case among most Swedish people, who consider a plain salad to be suitable as lunch.

CONCLUSION

According to this study, socio-demographic factors may be more important as determinants of BMI than PA or dietary habits among the targeted group. Further research is needed regarding family composition and socio-cultural constructions as probable indirect causes of high BMI among Somali immigrants in Sweden.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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