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**IMMIGRANTS FROM AFRICA TO EUROPE: AN  
EVALUATION OF NUTRITIONAL STATUS, BODY  
IMAGE PERCEPTION AND PSYCHOSOCIAL  
HEALTH**

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# CHAPTER 1

## INTRODUCTION

In the last decades migration has become a central topic in public and scientific discussion, due to the enormous migration wave that is affecting the Western world. The number of migrants is increasing dramatically Worldwide, and the major causes are political and economic. Migration has become a major concern of all governments, in particular European. The term migration refers to the act or process of individuals or groups of people moving from one location to another in order to settle for a longer period of time or permanently. The definition given by US of an international long-term migrant is “a person who moves to a country other than that his or her usual residence for a period of at least one year” (United Nations Department of Economic and Social Affairs 1998). The impulse of migration is intrinsic in the human nature, looking for new opportunities and a better life.

Migration has always been a problematic reality in Europe and, despite a slowdown caused by the global economic crisis, the number of migrants in Europe is growing. The majority of migrants in Europe comes from poor countries, such as Africa, East Europe and Near East countries, and escapes to war or to poor life conditions in search of a better place and life. In 2010 two thirds of migrants in EU came from another European country (Vasileva 2011). During 2014 a total of 3.8 million people immigrated to one of the EU-28 member states and among these 1.6 million were citizens of a non-member country. Germany reported the largest total number of immigrants (884.9 thousand) in 2014, followed by the United Kingdom (632.0 thousand), France (339.9 thousand), Spain (305.5 thousand) and Italy (277.6 thousand) (Table 1.1) (Eurostat 2016). In these years Europe is experiencing the largest movement of people since the Second World War. Last year more than 1.2 million people ask for asylum and most of them came from Syria, Afghanistan and Iraq, escaping from war.

Immigrant people, both from low income and medium income countries, has to face the complete change of their life. In fact, the act of migration implicates a series of events that are highly traumatizing and stressful and that can place migrants at risk. In particular, migrations involve three major sets of transitions: changes in personal ties and reconstruction of social networks, the change of the socio-economic system and shift from a culture to another (Rogler 1994, Bhugra 2004). Immigrants would be separated from their families, have to deal with new cultural and social situations and often without job and legal security. Social integration, adaptation and acculturation, the processes that immigrants have to face after their move to the new country, are often not easy and can lead to physiological and psychological problems (Abebe et al. 2014, Gilliver et al. 2014, Hollander et al. 2016). Non-EU migrants has to face more challenges than their European peers (International Organization for Migration 2010) and the situation of irregular migrants is even worse because they are often excluded from social and health services. The institute of International

Economics reported that in 2008 0.4-0.8 % of the total EU population were irregular immigrants (Vogel et al. 2011).

The aim of this thesis was to evaluate the weight status, body image perception and psychological well-being of African immigrants to Europe, in order to assess the relationship between the immigration process and the risk of developing nutritional disorders and mental health problems. This thesis is part of a project developed inside the EU 7<sup>th</sup> Framework Programme 2007-2013 with the aim to analyze the general health status of North African migrants to Europe and North African residents.

**Table 1.1** Immigration by citizenship, 2014 (Eurostat 2016).

	Total immigrants		Nationals		Total		Non-nationals					
	(thousands)	(thousands)	(% )	(thousands)	(% )	Citizens of other EU Member States		Citizens of non-member countries		Stateless		
						(thousands)	(%)	(thousands)	(%)	(thousands)	(%)	
Belgium	124.8	17.6	14.1	105.9	84.9	64.6	51.8	41.3	33.1	0.0	0.0	
Bulgaria	26.6	9.5	35.7	17.0	64.0	1.4	5.4	15.3	57.4	0.3	1.2	
Czech Republic	29.9	5.8	19.3	24.1	80.7	14.8	49.3	9.4	31.4	0.0	0.0	
Denmark	68.4	19.3	28.3	49.0	71.7	23.8	34.9	24.5	35.8	0.7	1.0	
Germany	884.9	88.4	10.0	790.2	89.3	415.9	47.0	372.4	42.1	1.9	0.2	
Estonia	3.9	2.6	65.5	1.3	34.4	0.2	4.0	1.2	29.6	0.0	0.8	
Ireland	67.4	12.4	18.4	55.0	81.6	26.2	38.8	28.7	42.6	0.1	0.1	
Greece	59.0	29.5	50.0	29.5	50.0	16.0	27.1	13.5	22.9	0.0	0.0	
Spain	305.5	41.0	13.4	264.5	86.6	100.0	32.7	164.4	53.8	0.1	0.0	
France	339.9	126.2	37.1	213.7	62.9	83.5	24.6	130.2	38.3	0.0	0.0	
Croatia	10.6	4.8	45.3	5.8	54.6	2.3	21.9	3.5	32.6	0.0	0.1	
Italy	277.6	29.3	10.5	248.4	89.5	68.1	24.5	180.3	64.9	0.0	0.0	
Cyprus	9.2	1.4	15.3	7.8	84.7	3.7	40.8	4.0	43.9	0.0	0.0	
Latvia	10.4	5.9	56.6	4.4	42.9	0.9	8.9	3.5	33.9	0.0	0.1	
Lithuania	24.3	19.5	80.4	4.8	19.6	0.7	2.7	4.1	16.8	0.0	0.1	
Luxembourg	22.3	1.3	5.9	21.0	94.0	16.5	74.1	4.4	19.9	0.0	0.0	
Hungary	54.6	28.6	52.4	26.0	47.6	10.5	19.3	15.5	28.3	0.0	0.0	
Malta	8.9	1.8	20.5	7.1	79.5	4.4	49.6	2.7	29.9	0.0	0.0	
Netherlands	145.3	37.4	25.8	107.8	74.2	58.4	40.2	47.8	32.9	1.6	1.1	
Austria	116.3	9.2	7.9	106.9	92.0	67.0	57.6	39.4	33.9	0.5	0.4	
Poland	222.3	127.8	57.5	94.3	42.4	27.2	12.3	67.0	30.1	0.1	0.0	
Portugal	19.5	10.2	52.4	9.3	47.6	3.4	17.3	5.9	30.3	0.0	0.0	
Romania	136.0	123.9	91.1	12.1	8.9	1.2	0.9	10.9	8.0	0.0	0.0	
Slovenia	13.8	2.5	18.3	11.3	81.7	3.3	23.6	8.0	58.1	0.0	0.0	
Slovakia	5.4	2.9	54.9	2.4	45.1	2.0	36.8	0.4	8.3	0.0	0.0	
Finland	31.5	7.9	24.9	23.1	73.4	9.5	30.1	13.6	43.1	0.1	0.2	
Sweden	127.0	20.9	16.4	105.6	83.2	28.1	22.1	70.7	55.7	6.8	5.3	
United Kingdom	632.0	81.3	12.9	550.7	87.1	263.6	41.7	287.1	45.4	0.0	0.0	
Iceland	5.4	1.9	35.8	3.4	64.2	2.9	53.2	0.6	10.3	0.0	0.8	
Liechtenstein	0.6	0.2	26.7	0.5	73.3	0.2	39.8	0.2	33.5	0.0	0.0	
Norway	66.9	6.9	10.3	60.0	89.6	35.1	52.5	24.3	36.3	0.6	0.8	
Switzerland	156.3	26.2	16.7	130.1	83.2	94.4	60.4	35.7	22.9	0.0	0.0	

In Italy, at 1 January 2015, the majority of immigrants comes from Romania (2,6%), followed by Albania (9,8%) and Morocco (9,0%) (Table 1.2) (Eurostat 2016). In particular, among African immigrants, the majority comes from Morocco, Egypt, Tunisia and Senegal (Istat 2016) (Table 1.3).

**Table 1.2** Main countries of citizenship and birth of the foreign-born population at 1<sup>th</sup> January 2015 in Italy (Eurostat 2016).

Citizens of	n (thous.)	%	Born in	n (thous.)	%
Romania	1131.8	22.6	Romania	1016.0	17.5
Albania	490.5	9.8	Albania	446.6	7.7
Morocco	449.1	9.0	Morocco	424.1	7.3
China	265.8	5.3	Ukraine	222.9	3.8
Ukraine	226.1	4.5	Germany	214.3	3.7
Other	2451.2	48.9	Other	3481.4	60.0



**Table 1.3** African citizens in Italy per geographical area and country of residence at 1<sup>st</sup> January 2016  
(Istat 2016).

<b>Geographical area and country of residence</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>AFRICA</b>	<b>744.279</b>	<b>483.502</b>	<b>1.227.781</b>
<b>North Africa</b>	<b>475.085</b>	<b>329.933</b>	<b>805.018</b>
Algeria	17.631	10.373	28.004
Egypt	99.214	44.018	143.232
Libya	1.210	666	1.876
Morocco	280.487	229.963	510.450
Sudan	262.078	200.511	462.589
Tunisia	74.439	44.382	118.821
<b>West Africa</b>	<b>232.797</b>	<b>117.940</b>	<b>350.737</b>
Benin	1.835	1.186	3.021
Burkina Faso	10.663	5.742	16.405
Cape Verde	1.529	3.335	4.864
Ivory Coast	17130	11.567	28.697
Gambia	11.869	418	12.287
Ghana	35.258	21.914	57.172
Guinea	4.654	1.670	6.324
Guinea Bissau	1.187	200	1.387
Liberia	1.067	227	1.294
Mali	13.157	678	13.835
Mauritania	771	282	1.053
Niger	911	343	1.254
Nigeria	49.662	39.291	88.953
Senegal	78.742	28.518	107.260
Sierra Leone	899	543	1.442
Togo	3.463	2.026	5.489
<b>East Africa</b>	<b>23.249</b>	<b>23.270</b>	<b>46.519</b>
Burundi	245	328	573
Comoros	5	-	5
Eritrea	6.055	5.193	11.248
Ethiopia	3.497	5.535	9.032
Djibouti	16	12	28
Kenya	989	1.613	2.602
Madagascar	448	1.051	1.499
Malawi	35	36	71
Mauritius	3.308	4.262	7.570
Mozambique	150	227	377
Rwanda	263	298	561
Seychelles	147	368	515
Somalia	7.025	3.214	10.239
Tanzania	564	603	1.167
Uganda	322	305	627
Zambia	103	124	227
Zimbabwe	77	101	178
<b>Central/Southern Africa</b>	<b>13.148</b>	<b>12.359</b>	<b>25.507</b>
Angola	806	726	1.532
Botswana	8	7	15
Cameroon	7.245	6.782	14.027
Central African Republic	127	64	191
Chad	341	102	443
Congo	1.602	1.560	3.162
Democratic Republic of the Congo	2451	2.431	4.882
Gabon	139	146	285
Guinea Equatorial	63	53	116
Lesotho	12	8	20
Namibia	11	19	30
Sao Tome'e Principe	11	19	30
South Africa	321	429	750
Swaziland	11	13	24

## 1.1 MIGRATION AND HEALTH

Migration involves necessarily a series of events that can be highly traumatizing and that can place migrants at high risks for their health, both physical and psychological (Carballo and Nerukar 2001). At the arrival in the new country immigrants are usually healthier than the native-born. This phenomenon is known as “the healthy immigrant effect” (HIE) (Rechel et al. 2013). There are a number of potential explanations suggested by the literature, as follows:

- health screening or selection by host country immigration authorities;
- relatively healthy behaviors of new immigrants prior to migration;
- immigrant self-selection because the act of migration requires good health;
- healthiest individuals are the most likely to migrate, and finally the salmon effect whereby the less healthy or successful immigrants return home (Kennedy et al. 2014).

After a certain period of time immigrants tend to lose their health (Ro 2014), but the literature data regarding migrants’ health are often contradictory because of differences in migrants’ age, gender, country of origin, socio-economic status (SES) and type of migration (McKay et al. 2003). At the present poor attention has been paid to the impact of migration on migrants’ health and to conditions probably linked to poor health (Marmot et al. 2012). People are susceptible to the social and physical environment in which they live so discriminant attitude of the native-born people and poor work and health conditions affect their health and cause health risk factors (Carballo and Nerukar 2001).

The health issues that seem to be associated with migration are broad and include communicable and non-communicable diseases (especially diabetes), injuries in the work environment, maternal and child health problems and poor mental health (Carballo and Nerukar 2001, Rechel et al. 2012, Rechel et al. 2013, World Health Organization 2016). The high percentage of infectious diseases can be linked to the fact that a large percentage of migrants move because of the poor living condition and the poverty of their country of origin where a lot of diseases are endemic. Therefore, immigrants from poor country are at particular risk of contracting TB, hepatitis A and B and HIV/AIDS (Carballo and Nerukar 2001, Wörmann and Krämer 2011, Rechel et al. 2013). Among people living with TB in Europe in 2014, the percentage of migrants varies among the European states, from below 10% in eastern and central Europe, 20-50% in Western Europe, to more than 50% in northern Europe (ECDC/WHO 2016, World Health Organization 2016). In 2015 migrants constitute the 37% of the newly HIV diagnosed cases in Europe (ECDC and WHO 2016). However, a certain proportion of migrants acquires HIV after arrival in Europe (Fakoya et al. 2015).

The occupational health of migrants tends to be worse than that of non-migrants because they usually are employed in high risk and low qualified jobs with high rates of occupational injuries (Schenker 2008, Schenker 2010).

Deprivation, marginalizations and problems connected with cultural and social adaptation make migrants susceptible also to psychological stress and disorders (World Health Organization 2016). Even if there is a paucity of data regarding the incidence and prevalence of mental health problems among immigrants, especially in Europe, literature suggests that cultural background and country of origin play an important role in predisposing immigrants to mental health disease, such as depression, chronic anxiety and neuroses (Rechel et al. 2013).

The poor health condition and the nutritional disorders make migrants vulnerable to non-communicable diseases, that are common causes of preventable morbidity and mortality. The major non-communicable diseases are diabetes, cardiovascular disease, cancer and chronic lung disease (World Health Organization 2016). With regards to cancer, migrants to Europe seem to have lower incidence of cancer than native-born populations (Stirbu et al. 2006, Visser and Van Leeuwen 2007, Kunst et al. 2011) with high prevalence of cancers associated with infectious disease (Arnold et al. 2010). This can be due to genetic factors, that are probably connected with the high rate of diabetes, together with change of environment and insufficient medical control (Misra and Ganda 2007). In the incidence of cardiovascular disease there is a large heterogeneity among migrant groups with different country of origin (Kunst et al. 2011). Migrants with African origin have higher rates of hypertension and diabetes that lead to a higher incidence of strokes (Agyemang et al. 2009).

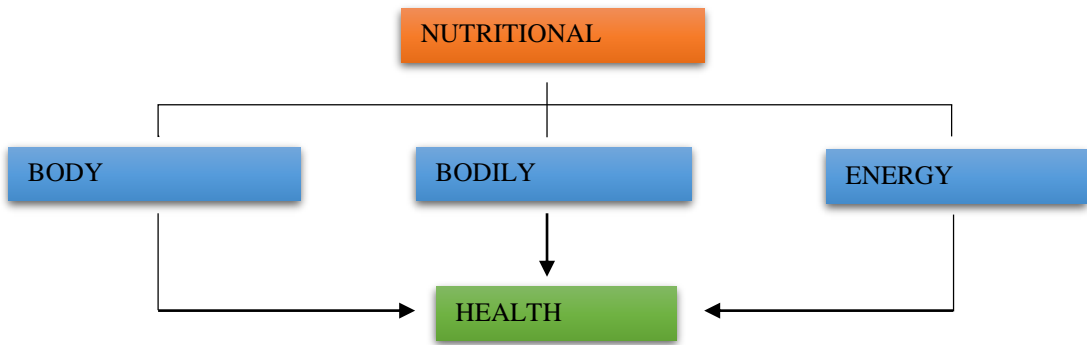
A large attention must be paid to diseases connected with negative lifestyle factors that can lead to nutritional disorders, such as overweight, obesity and malnutrition. Migrants, especially those from low income countries, tend to abandon their dietary habits after migration, adopting Western foods habits and this, together with low physical activity (PA) and body image dissatisfaction, can cause weight disorders (Gualdi-Russo et al. 2016).

## **1.2 WEIGHT STATUS, BODY COMPOSITION AND ANTHROPOMETRY**

### ***1.2.1 Definition of weight status body composition and anthropometry***

The evaluation of body weight and body composition is an important tool in nutritional status assessment because weight status mirrors the adequacy of energy intake, giving important data in order to prevent and study nutritional disorders. Defining the nutritional status of the population can reduce the rate of morbidity and mortality associated with nutritional disorder, such as malnutrition and overweight/obesity (Elmadfa and Meyer 2014). Nutritional status is composed by three variables, body composition, energy balance and body function and is therefore strictly connected with the health status of the individuals (Fig. 1.1) (Bedogni et al. 2001). The weight status is the classification of the body weight of the individuals in four categories, underweight, normal weight,

overweight and obese (James et al. 2001). The classification of the weight status is important both in an individual and at population level.



**Fig. 1.1** Definition nutritional status (Bedogni et al. 2001).

Anthropometry is the measurement of the size and proportions of the human body and permits the evaluation of the weight status, human body composition, and therefore of the nutritional status. Anthropometry is a useful tool for the assessment of health and nutritional risk, especially of populations or huge groups of people (for example migrants), because is cheap and fast (World Health Organization 1995). In some cases, this is the only tool that can be used for the assessment of body weight and composition, nutritional status, but it is often used in addition to other methods, such as dual energy X-ray absorptiometry, magnetic resonance imaging, or computed tomography for the assessment of body composition (Camhi et al. 2011), and other methods for the assessment of food intake and food components such as biochemical and immunological tests (Elmadfa and Meyer 2014). Surely anthropometry has some limitations that are the inter-observer error and the limited possibility of nutritional status assessment (Gorstein et al. 1994).

Body composition can be studied at five different levels: atomic, molecular, cellular, tissue-system and whole body. The most important level for the clinic assessment is the II level or molecular level, in which the body weight (BW) is expressed as

$$BW = TBW + PM + MM + Gn + FM$$

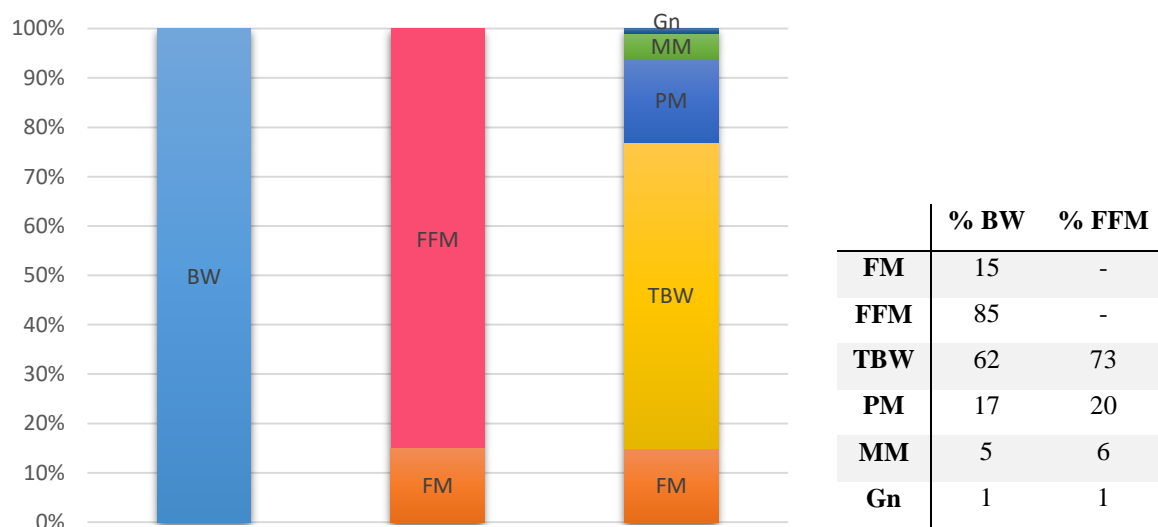
where TBW is the total amount of water in the body (total body water), PM the protein mass, MM the mineral mass, Gn the glycogen and FM the fat mass (Wang et al. 1992). Total body water, protein mass, mineral mass and glycogen constitute the FFM (fat free mass) (Fig. 1.2) (Bedogni et al. 2001):

$$FFM = TBW + PM + MM + Gn$$

This formula can be simplified as:

$$\mathbf{BW = FM + FFM}$$

It is important to define a person's body composition, especially the amount of FM and FFM, as excess or poor body fat are associated with a lot of diseases. In particular, excess body fat has been demonstrated to be associated with health related problems as coronary artery disease, hypertension, diabetes, osteoarthritis and pulmonary disease (Baumgartner et al. 1995).

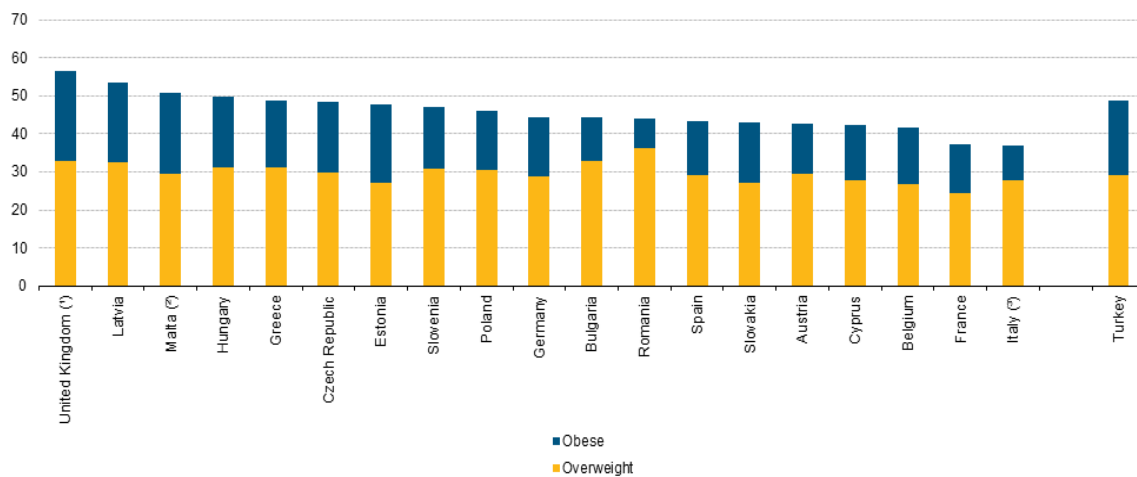


**Fig. 1.2** Molecular model of the human body (Bedogni et al. 2001)

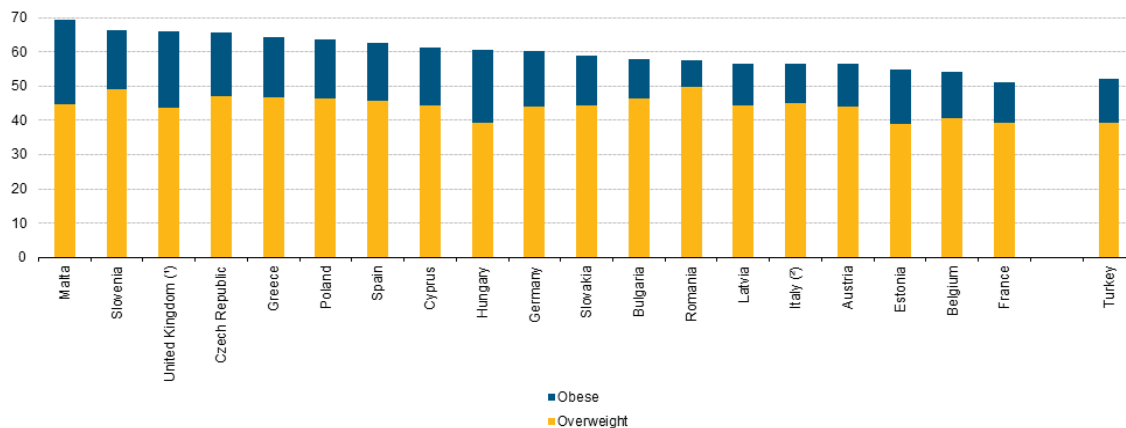
### ***1.2.2 Overweight and Obesity: causes and consequences***

Overweight and obesity are increasing worldwide becoming a major public health issue. Slimness and obesity are defined respectively as a deficiency or an excess of FM and both are associated with modification in the FFM.

Obesity is a chronic disease affecting people from both developed and developing countries (in addition to underweight). It is, with overweight, an excellent indicator of energy imbalance because is due to excessive energy intake versus insufficient energy expenditure (World Health Organization 2000). In contrast to other nutritional disorders, as underweight or malnutrition, only during the past twenty years overweight and obesity has become a global concern for the populations' health (Haslam and James 2005). WHO classifies people as overweight when they have a Body Mass Index (BMI) of 25 kg/m<sup>2</sup> or more and obesity with a BMI equal or higher than 30 kg/m<sup>2</sup> (World Health Organization 2000; James et al. 2001). According to WHO Europe has the highest rate of overweight and obesity in the world, after the Americas. Between 2006 and 2010 the number of adults aged 25-64 years that were overweight and obese in Europe varied from 37.0% and 56.7% in females and between 51.0% and 69.3% in males (Eurostat 2008).



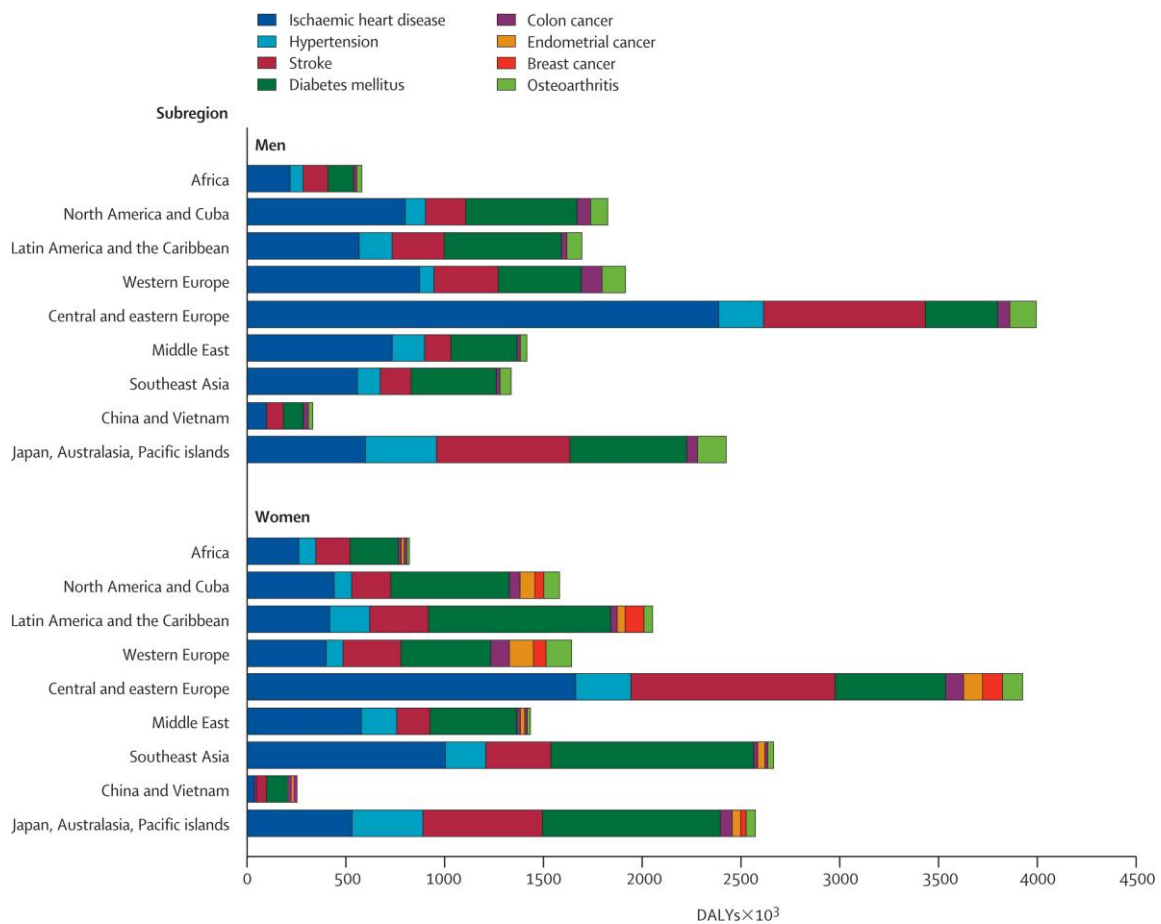
**Fig. 1.3** Proportion of women who were overweight or obese, 2008 (Eurostat 2008).



**Fig. 1.4** Proportion of men who were overweight or obese, 2008 (Eurostat 2008).

For both women and men aged 18 years and over, the lowest proportions of the population considered to be obese in 2008 were observed in Romania (8.0 % for women and 7.6 % for men), Italy (9.3 % and 11.3 %), Bulgaria (11.3 % and 11.6 %) and France (12.7 % and 11.7 %). The highest proportions of women who were obese were recorded in the United Kingdom (23.9 %), Malta (21.1 %), Latvia (20.9 %) and Estonia (20.5 %), and of men in Malta (24.7 %), the United Kingdom (22.1 %) and Hungary (21.4 %) (Eurostat 2008).

The correlation between overweight and obesity with cardiovascular diseases (Wilson et al. 2002, Sharma 2003), hypertension, type 2 diabetes (Meisinger et al. 2006) and increase of mortality is well known (Adams et al. 2006). Fig. 1.5 represents an estimate of the years of ill health and life lost between 30-75 years because of excess of weight (Haslam and James 2005).



**Fig. 1.5** Disability-adjusted life-years (DALYs) lost as a result of obesity in men and women worldwide (James et al. 2004, Haslam and James 2005).

The factors associated with obesity are various (Jebb 2004, Haslam and James 2005) and comprise:

- **Genetic factors.** Monogenic causes of obesity include mutations in the leptine gene and its receptor and the melacortin system, but there are a large number of genes nowadays associated with obesity.
- **Metabolism.** Even if a lot of obese people believe to have a low metabolic rate, researchers suggest that they have a higher metabolic rate. This can be explained by the fact that obese people tend to under-estimate their energy intake.
- **Food intake and lack of physical activity.** Another essential cause of nutritional disorders is the consumption of fat-rich meals and sugar-rich food, together with lack of exercise and PA. The relationship between sedentary lifestyle and weight gain is well-known. PA is fundamental for maintaining a 5-10% of the weight loss and for limiting the decline in lean tissues with age.

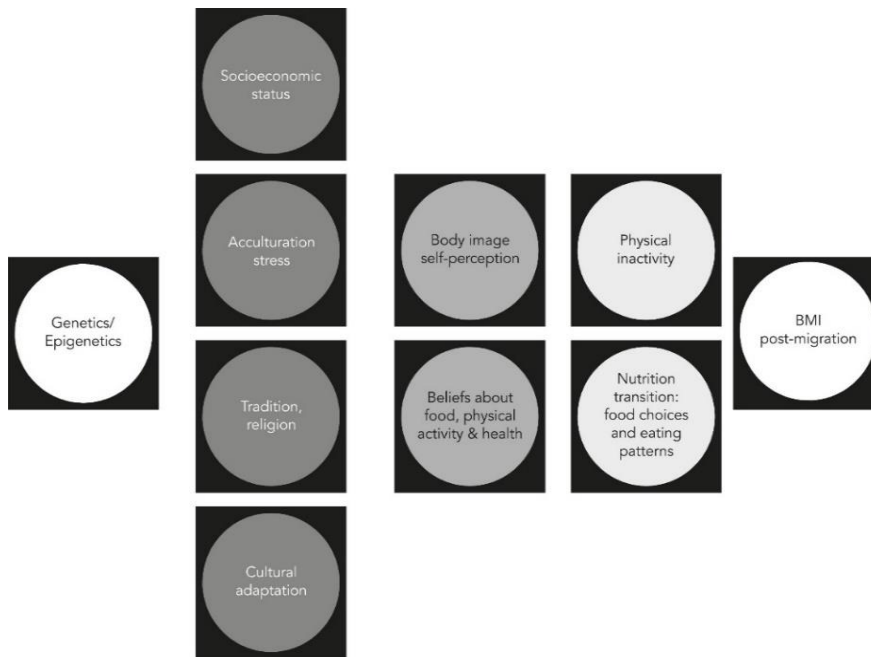
- **Environment.** The change of the lifestyle linked to the economic development causes an increase in overweight and obesity because people tend to consume convenience food higher in sugar and fat, eat outside home and increase the time spent in front of TV or computer.

### *1.2.3 Weight status, body composition and immigration*

Immigration involves a number of changes in lifestyle, culture and socio-economic status. As mentioned above, immigrants in the first period after migration are on average healthier than the host population or the long-term migrants, as an effect of the self-selection and health screening practice. This is known as the “healthy immigrant effect” (Ng 2011, Okrainec et al. 2015). With time after migration these differences decline due to the adoption of sedentary lifestyle and unhealthy dietary habits that place migrants at an increased risk of nutritional disorders and obesity-related diseases (Mathers and Loncar 2006, Misra and Ganda 2007, Fuller-Thomson et al. 2011, Misra and Khurana 2011). A significant positive association between BMI and time since migration was found among immigrants, with an increase susceptibility to obesity (Goulão et al. 2015). This is supported by studies carried out especially in USA (Argeseanu Cunningham et al. 2008, Oza-Frank and Cunningham 2010). This association however varies according to ethnic background and gender, as women are more vulnerable to the acculturation process and, consequently, more at risk of nutritional disorders. A consistent association between BMI and time after migration is seen in Hispanic, African and European migrants (Goulão et al. 2015). This is influenced also by the level of education, as immigrants with higher education level have lower risk of overweight and obesity (Van Hook and Balistreri 2007, Kaushal 2009).

The variables that might influence the nutritional health of immigrants are shown in Fig. 1.6





**Fig. 1.6** Variables influencing nutritional status of immigrants (Goulão et al. 2015).

As shown in the figure (Fig. 1.6) the variables associated with nutritional and weight status of immigrants are various but interdependent, as follows:

- **Genetic and environmental.** Genetic susceptibility and environmental factors (such as diet, smoking and exercise) are related to non-communicable and chronic diseases, such as obesity and diabetes (Vincent et al. 2002, Greenfield et al. 2003).
- **Socio-economic and psychological factors, religion and cultural adaptation.** Literature reports that migration and acculturation process often increase the level of stress and stress-related disorders (Miller et al. 2011, Tovar et al. 2013) that can be connected with an increase of nutritional disorders, especially obesity (Tseng and Fang 2011). Obviously also cultural and religious norms play an important role in eating habits. Moreover, the level of cultural adaptation may influence migrants' BMI as migrants that are more integrated in the host population tend to converge towards the eating habits and the BMI of the host population (Antecol and Bedard 2006).
- **Body image preference and body dissatisfaction.** The body size preferences and the level of dissatisfaction play an important role in the development of nutritional disorders. For more details, see paragraph 1.3 and chapters 2, 3 and 4.
- **Physical inactivity and nutrition transition.** According to literature, migrants have more probability to become less active than the host population after migration, and this surely increase the risk of develop overweight and obesity (Jebb 2004). Furthermore, after migration, immigrants tend to change their food habits, combining their traditional food with

the Western tradition. The food choice depends on age and gender, but also on price and food availability and the acculturation process (Ayala et al. 2008, Mejean et al. 2009). The process of westernization after the migration lead to a deterioration of the diet with abundance of calorie-dense/low fiber food and sedentary lifestyle (Satia-Abouta et al. 2002, Misra and Ganda 2007, Satia 2010, Maqoud et al. 2016). Some studies show also an increase in fat and sugar intake and in the consumption of caffeine and a decrease in fruit and vegetables consumption (Rosenmoller et al. 2011, Holmboe-Ottesen and Wandel 2012, Garduno-Diaz and Khokhar 2013, Maqoud et al. 2016). However, the nutrition transition varies in accordance to the ethnic background and the place of migration.

Migration is therefore generally considered a risk factor for the development of nutritional disorders and related non-communicable diseases due to the stress of the new environment and the difficulties that migrants undergo in the new country.

#### ***1.2.4 Assessment of weight status and body composition***

Anthropometry is widely accepted as a useful tool for assessing nutritional status in adults and children (World Health Organization 1986) The basic anthropometric measurements considered are height and weight. It is universally known that weight alone is not a good indicator of the weight status, therefore it is integrated with the use of indices, that are a combination of measurements and are used with a classification system useful for the interpretation of the data (World Health Organization 1986, World Health Organization 2000). The main index used for the evaluation of the weight status is BMI. However, BMI is not accurate because it cannot distinguish fat and lean masses (Zaccagni et al. 2014). It is therefore important to use in combination with other indicators to complement the measurement of BMI, for the evaluation of the central and abdominal obesity (such as waist and hip circumference, Waist to Hip Ratio and Waist to Stature Ratio) (World Health Organization 2000, World Health Organization 2008) and for the prediction of body composition (Skinfold thicknesses, Total Upper Arm Area, Upper Arm Muscle Area, Upper Arm Fat Area and Arm Fat Index) (Frisancho 1981, Frisancho 2008, Jaswant and Nitish 2014). In the following part of the paragraph there is a description of the main measurements and indices utilized for the assessment of the weight status and for the prediction of body composition.

Height and weight. Body weight measurement is a rough indicator of individual's nutritional status. Used in combination with height, it permits the calculation of BMI, widely used for the assessment of the weight status.

Body Mass Index. BMI is the most rapid, albeit not accurate, method-for the estimation of the weight status on a population level. It is an index defined as the weight in kilograms divided by the square

of the height in meters (World Health Organization 2000). It is commonly used for the classification in underweight, normal-weight, overweight and obese in children and adults.

**BMI: kg/m<sup>2</sup>**

The cut-off points for the classification of adults according to BMI and the correlated risk of comorbidities are shown in Table 1.4.

**Table 1.4** Classification of adult weight status according to BMI (James et al. 2001, World Health Organization 2000).

<b>Classification</b>	<b>BMI</b>	<b>Risk of comorbidities</b>
Underweight	<18.50	Low (but risk of other clinical problems increased)
Normal weight	18.50-24.99	Average
Overweight:	≥25.00	
Preobese	25.00-29.99	Increased
Obese class I	30.00-34.99	Moderate
Obese class II	35.00-39.99	Severe
Obese class III	≥40.00	Very severe

These cut offs can be used only for adults because the classification for children and adolescent is complicated by the fact that their height and body composition are continually changing. Moreover, these changes occur at different rates and time in different population so it is difficult to establish cut-off points universally efficient (Cole et al. 2005, Cole et al. 2007).

In adults BMI can be predictive for clinical outcomes, such as type 2 diabetes, and it is globally utilized for the assessment of nutritional status and nutritional disorders (Wells and Fewtrell 2006). However, it cannot be used to predict an individual's body composition because it provides information on the relative amount of lean and fat masses (Zaccagni et al. 2014). This can lead to misinterpretation in individuals with high or low muscle mass (Okorodudu et al. 2010). BMI also depends on the age and sex of individuals and on their ethnic background (Camhi et al. 2011). Despite these limitations, BMI remains a useful tool for the assessment of populations' health risk but it is important to use together with waist circumference (WC) and Waist to Hip Ratio (WHR) for the assessment of central and abdominal obesity and for a better evaluation of the health risks (Table 1.6) (World Health Organization 2008).

Waist and hip circumferences. Both Waist and Hip Circumferences (HC) are important measurements because they are necessary for the calculation of the WHR. The measurement of WC is also useful by itself, as it is a commonly used approach for the estimation of abdominal body fat

and can be more predictive of adverse outcomes such as lipid profile or insulin resistance than total fat (Wells and Fewtrell 2006). Studies have found a positive association between WC and cardiovascular mortality and cardio-metabolic diseases, and it is a diagnostic variable also for the metabolic syndrome (Lee et al. 2008). However, although WC allows an estimate of body fat content, it suffers from a high individual and ethnic variability (World Health Organization 2008). Table 1.5 shows the cut-off points correlated with the risk of metabolic complications (World Health Organization 2008) and Table 1.6 presents the risks for type 2 diabetes, hypertension and CVD combined with BMI and WC (NHLBI 2000). Unfortunately the presented cut-off are applicable only to Caucasians, because are based on European reference populations. It is in fact important to use cut-off points specific to ethnic groups, due to the differences in WC distribution in population with different body size. The need of specific cut-off is underline especially for Asians populations (World Health Organization, 2008).

**Table 1.5** World Health Organization sex-specific cut-off points for the evaluation of the risk of metabolic complications (World Health Organization 2008).

WC cut-off points		Risk of metabolic complications
Men	Women	
>94 cm	>80 cm	Increased
>102 cm	>88 cm	Substantially increased

**Table 1.6** Risks associated with combined BMI and WC sex specific cut-off points (NHLBI 2000)

Classification	BMI	Disease risk	
		Men WC < 102 cm Women WC < 88 cm	Men WC > 102 cm Women WC > 88 cm
Underweight	<18.50		
Normal weight	18.50-24.99		
Overweight:	≥25.00		
Preobese	25.00-29.99	Increased	High
Obese class I	30.00-34.99	High	Very high
Obese class II	35.00-39.99	Very high	Very high
Obese class III	≥40.00	Extremely high	Extremely high

Waist to Hip Ratio. WHR provides an index of both subcutaneous and intra-abdominal adipose tissue (World Health Organization 2008). It is calculated as waist circumference divided for hip circumference.

$$\text{WHR} = \text{WC} / \text{HC}$$

WHR appear to be a stronger independent risk factor than BMI as abdominal obesity is associated with myocardial infarction, stroke and cardiovascular diseases (Lee et al. 2008). It is of particular importance in those population with a predisposition to central obesity. In table 1.7 are presented the WHO cut-off points for the risk of metabolic complication. It is important to underline that these cut-offs differ in regard, not only to sex, but also to ethnicity.

**Table 1.7** World Health Organization sex-specific WHR cut-off point for the evaluation of the risk of metabolic complications (World Health Organization 2008).

WHR cut-off points		Risk of metabolic complications
Men	Women	
>0.90 cm	>0.85 cm	Increased
≤0.90 cm	≤0.85 cm	Substantially increased

Triceps skinfold thickness. Triceps skinfold thickness (TST), and in general skinfold thickness measurements, have been used to assess the relative fatness of individuals, because they are quick and simple to take and the inter- and intra-observer error are quite low (Wells and Fewtrell 2006, Jaswant and Nitish 2014).

Upper Arm Indices. The upper arm composition is usually assessed using total upper arm area (TUA), upper-arm muscle area (UMA), upper-arm fat area (UFA) and arm fat index (AFI%) and are calculated from mid-upper-arm circumference (Mid-UAC) and TST (Jaswant and Nitish 2014). AFI (%) is a good index for the assessment of the body composition. It is calculated by triceps skinfold thickness and upper arm circumference (Frisancho 1981, Frisancho 2008). Table 1.8 reports the equations used for the calculation of Arm Fat Index and the other indices of the upper arm.

**Table 1.8** Formula used for the calculus of upper arm indices (Frisancho 1981, Frisancho 2008, Rinaldo and Gualdi-Russo 2014)

Index	Formula
Total Upper Arm Area (TUA)	$(C^2) / (4\pi)$
Upper Arm Muscle Area (UMA)	$[C - (Ts \cdot \pi)]^2 / (4\pi)$
Upper Arm Fat Area (UFA)	TUA – UMA
Arm Fat Index (AFI %)	$(UFA / TUA) \cdot 100$

## 1.3 BODY IMAGE

### *1.3.1 Definition of body image*

Body image is a multidimensional construct in which internal and self-representations of physical appearance are expressed (Pruzinsky and Cash 2002). It is defined by Grogan (2007) as “a person’s perceptions, thoughts, and feelings about his or her body or about other people body”. With the term body image literature usually refers to two main themes:

- **Body image perception:** it is the individual’s assessment of the physical aspect of their body and how this perception is accurate. In extreme cases of body perception inaccuracy, it can result into the Body Dysmorphic Disorder (BDD) (Veale et al. 1996). The American Psychiatric Association defines BDD as a preoccupation with a slight or imagined defect in appearance that leads to substantial distress or impairment in social, occupational, or other areas of functioning that is a psychological disorder consisting in a preoccupation with an imagined defect in appearance (American Psychiatric Association 2000).
- **Body image satisfaction:** this is the extent to which individuals are satisfied with their body shape and size. It comprises self-esteem, body confidence and body dissatisfaction.

Body image dissatisfaction, albeit the most common associated with eating problems, is only one of the possible manifestations of the body image disturbance. With the term body image disturbance is indicated “any form of affective, cognitive, behavioral, or perceptual disturbance that is directly concerned with an aspect of physical appearance” (Thompson 1995). Negative body image and body image dissatisfaction are associated with psychological distress (Lo Coco et al. 2014), impaired sexual functioning (Woertman and van den Brink 2012), depression (Jackson et al. 2014, Silveira et al. 2015) and eating and weight-related disorders, such as anorexia, bulimia nervosa and obesity (Peat et al. 2008, Menzel et al. 2010).

Body image is surely influenced by a range of factors such as race/ethnicity, gender, age, environment, psychological factors and mass media (Kay 2001). Traditionally body image dissatisfaction and eating disorders were considered culture-bound syndromes spreading in Western societies, but now these disorders show a global distribution (Soh et al. 2008, Swami et al. 2010, Swami et al. 2012). The causes can be modernization, urbanization and Westernization of the ideal of beauty (Swami and Tovee 2005, Swami et al. 2012).

### *1.3.2 Factors related to body image*

A lot of studies has been done to establish the causes correlated with negative body image and low body satisfaction (Algars et al. 2009, Austin et al. 2009). As mentioned above, body image perception

is influenced by a broad variety of factors that include: age, gender, ethnic background, socio-cultural and psychological factors, genetic factors and weight status (Algars et al. 2009, Grogan 2007).

Body weight was found to be the stronger predictor of negative body image regardless of gender and ethnicity (Xanthopoulos et al. 2011), and all the studies report a negative association with an increased weight associated with lower body satisfaction (Goldfield et al. 2010). In particular, higher values of BMI has been shown to be related with higher level of dissatisfaction (Eisenberg et al. 2006, Neighbors and Sobal 2007, van den Berg et al. 2007), poor self-esteem and eating disorders (Wilson et al. 2005). Even if the correlation between body image and body weight is proved, it is difficult to establish the cause effect relationship that exists between them. Indeed, it is not sure whether body dissatisfaction can result in weight gain due to unhealthy dieting behaviors (Goldfield et al. 2010) or if an increase in body weight can cause a decrease in body satisfaction (Cafri et al. 2005).

Body image is surely affected by gender and age. Literature reports that body image perception changes with age, especially in women (Smolak 2002). When age increases there is a decrease in the perceived importance of body shape, weight and appearance, albeit the level of dissatisfaction remain high (Tiggemann 2004).

Also the socio-cultural factors, especially the exposure to the media pressure, can influence body image (McCabe et al. 2006, Swami and Chamorro-Premuzic 2008, Mellor et al. 2009). Some research has highlight that the exposure to idealized body images can result in a reduction in body image perception and satisfaction (Grabe and Hyde 2006, Barlett et al. 2008), but these results are not confirmed by other studies in which analyzed people were unaffected by media images (Holmstrom 2004). The attitudes and behaviors of family and peers can influence body image (Rodgers and Chabrol 2009), especially in girls (Crespo et al. 2010), because of the constant exposure to parent's and peers pressure.

Body image is not uniform among different cultures and varies between race/ethnicity (Vaughan et al. 2008, Swami et al. 2015). It is well-known that in the Western industrialized society thinness is seen as an indicator of wealth and prosperity and this often results in greater dietary restriction and body dissatisfaction (Vaughan et al. 2008), meanwhile in some African societies fatness is valued as a sign of beauty, health and prosperity (Ettarh et al. 2013, Draper et al. 2016). Differences in perception of body weight exist also in population sub-groups, as shown by studies of Moroccan population (Rguibi and Belahsen 2006). African American women, for example, are reported to have lower level of body dissatisfaction in comparison to white women (Kronenfeld et al. 2010). However, nowadays the introduction of Western values contributed to a rise in body dissatisfaction among women even in developing and middle/low-income countries (Tlili et al. 2008).

Individual psychological well-being is strongly correlated with body image, that it is both an influencing and an influenced factor. People with poor mental health, with a tendency of social

comparison and that have previously suffered from social phobia, are at greater risk of developing a negative body image (Izgiç et al. 2004, Cafri et al. 2005, Myers and Crowther 2009). A lot of studies have been done regarding the link between body image dissatisfaction and depression, especially in adolescents. The relationship has been found in both girls (Pesa et al. 2000) and boys (Cohane and Pope 2001), although girls are at greater risk (Sujoldžić and De Lucia 2007). In general individuals with low body satisfaction are more likely to have low self-esteem and depression, especially in women.

Some studies tried to explore the relationship between body image and genetic factors comparing data obtained from monozygotic twins. These studies found a stronger genetic link between genes and body image in women than in males. The association between genetic factors and body image is specifically in ability of estimate their own body size (body image perception). Meanwhile body image ideals are more strongly associated with environmental and socio-cultural factors (Wade et al. 2001, Keski Rahkonen et al. 2005).

Negative body image can be influenced also by individual factors such as personality (Allen and Walter 2016).

### ***1.3.3 Body image and immigration***

Some scholars believe that transmigration, and in particular cultural distance and differences, contributes to the development of negative body image (DiNicola 1990), but just few studies has considered relationship between migration and body image analyzing non-Western migrants in both their origin and host country (Soh et al. 2006). Literature suggests that non-Western migrants to Western countries tend to adopt the body size ideals of the host countries. The exposure to the thin ideals, typical of the Western countries (Vaughan et al. 2008), is reported to increase the level of body dissatisfaction (Tovée et al. 2006, Nicolaou et al. 2008, Råberg et al. 2010, Taylor et al. 2013) that can rise even higher values than the host population'. This change in the beauty ideals, and the consequently strictly control of the diet, can put immigrants at high risk of nutritional disorders and eating disorders, such as anorexia and bulimia or, on the other hand, obesity.

### ***1.3.4 Assessment of body image***

Given its link with nutritional disorders, it is important to assess methods for the evaluation of body image disturbance, body image dissatisfaction and body perception. There are a number of research methods that can be used to assess body image (Thompson 1995, Cash and Smolak 2011). Below are described the main methods developed and their limits.

Figural stimuli. It is the most commonly used method for the assessment of overall dissatisfaction, because they can be quickly administered, they are cheap and ideals for collecting group data



(Gardner and Brown 2010). Usually these figural stimuli represent a series of schematic figures ranging from underweight to overweight. Generally, when the figure drawings are used, subjects are asked to rate the figures identifying their “actual” body shape, that are the silhouettes that best reflects their real body, and their “ideal” figure, the body shape that they want to have (Thompson 1995). The most used for adults are the 9 silhouettes developed by Stunkard et al. (1983) and the Figure Rating Drawing Scale developed by Thompson and Gray (Thompson and Gray 1995). For children the most used are the figures published by Collins (1991). A review of the methods using figural stimuli has been done by Thompson (1995) and Gardner and Brown (2010) that found out eight methods developed for children under 18 years of age and eleven methods developed for adults (Thompson 1995; Gardner and Brown 2010). However, there are nowadays some problems and limitations with the use of this figural stimuli. First of all, many of the drawings are unrealistic representations of the human form, disproportionately sized, and the majority of them are developed for Caucasians (Thompson and Gray 1995, Thompson 2004, Gardner et al. 2009). Another limitation of the many existing scales is that the majority of them consist of nine or fewer figures and a lot of information can be lost due to the poor amount of choice and the misleading due to the poor number of figures available (Gardner et al. 2009). Another potential limitation, if these contour drawings are used alone, is that they do not allow the measurement of body size distortion, but only body size dissatisfaction.

For an objective evaluation of body image distortion and body image dissatisfaction though the use of figural stimuli two indices have been proposed. Below a description of the two indices:

**The Feel-Ideal Difference index (FID)** was developed by McIza et al. (2005) for the assessment of body image attitudes and body image dissatisfaction. It is based on the silhouettes developed by Thompson et al. (1995) and it is based on the differences between the silhouette selected to represent the current appearance with the one that represents the ideal body size. A score of 0 represents no dissatisfaction at all, a positive score means that the person desired to be thinner meanwhile a negative score a desire to be fatter. Higher is the score higher is the dissatisfaction (McIza et al. 2005).

**The Feel Weight status minus Actual weight status index (FAI index)** was recently developed by Zaccagni et al. (2014) for the evaluation of the weight status perception inconsistency or body image distortion using the nine silhouettes of the Contour Drawing Rating Scale (Thompson et al. 1995) and the BW anthropometrically assessed. The FAI score range from -3 to +3. Negative scores indicate weight underestimation, positive scores overestimation and a 0 score a correct perception of their body size (Zaccagni et al. 2014).

Self-reported questionnaire. For the measurement of body image dissatisfaction an alternative to the figural stimuli’ method, is the use of the self-reported questionnaires. There are a large number of questionnaire measures that assess a generic aspect of body dissatisfaction. A review of the

questionnaires available for adults and adolescents has been made by Thompson (1995), meanwhile for children a review of the questionnaires developed has been published by Yanover and Thompson (2009). The most widely used is probably the Multidimensional Body-Self Relationship Questionnaire (MBSRQ) developed by Cash (Cash 2000). This questionnaire comprises a 69-items self-reported measures with 10 subscales and it can assess individual's attitudes and disposition concerning their physical appearance (Cash 2000). Among the other questionnaires used for the assessment of body image dissatisfaction there are the Body Shape Questionnaire by Cooper et al. (1987), the Body Esteem Scale (Franzoi and Shields 1984) and the Body Shape Satisfaction Scale (Slade et al. 1990). Unfortunately, even if these are validated questionnaires, a huge limitation is that it is impossible to compare data if different scales are used.

Computer software programs. These methods are computer-based techniques developed recently for measuring both body size distortion and body image dissatisfaction. They involve computer software that allows the participants to modify size and shape of a digitalized image of their body (Ferrer-Garcia and Gutierrez-Maldonado 2012). These methods overtake most of the limitation of the contour drawings and they allow an estimation of the body size distortion, but they are more expensive and more time consuming (Gardner and Brown 2010).

Other methods. Other procedures used, especially in earlier studies, comprise the use of a distorting mirror, in which the body is distorted in the vertical and in the horizontal plane (Traub and Orbach 1964), and the use of a distorting photograph techniques (Glucksman and Hirsch 1969).

## **1.4 MENTAL HEALTH AND ACCULTURATION**

### ***1.4.1 Definition of mental health, psychosocial well-being and acculturation***

The World Health Organization defines mental health as a “state of well-being in which the individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his own community” (World Health Organization 2007). It is a significant and necessary component to overall good health and quality of life. The literature divided “well-being” or “positive mental health” into two dimensions: hedonic and eudemonic. Hedonic are the positive feeling (subjects well-being, life satisfaction and happiness), meanwhile eudemonic is the positive functioning (engagement, sense of meaning, social well-being) (Huppert and Whittington 2003, Samman 2007).

Mental health disorders contribute to the burden of diseases worldwide and are an important cause of long-term disability. They are also correlated with a broad variety of communicable and non-communicable diseases (Prince et al. 2007). People with mental health problems are at higher risk of

physical illness, with higher prevalence of coronary heart diseases, stroke, diabetes, infections and respiratory diseases (Osborn et al. 2007).

With the use of term psychosocial well-being is highlighted the psychological/emotional/cognitive impact of social factors on individual's well-being, that are to be distinguished from material factors (World Health Organization 2007). It underscores the close connection between the psychological aspects of our experience and our social experience.

In the last years there are been a growing interest in the relationship between acculturative stress and mental health of immigrants (Cassidy et al. 2004, Chou 2009). Acculturation implies the adaptation to a majority or a new host culture. At the beginning it was considered a group-level phenomenon involving cultural change and adaptation (Boas 1988), and only subsequently psychologists changed its conceptualization emphasizing an individual level of analysis (Cuellar et al. 1980, Cuellar et al. 1995). It is a multi-dimensional process that involves several stressful factors, such as changes in language, socio-economic status and cultural orientation (Lopez-Class et al. 2011), and that can have negative or positive mental health outcomes that depend on the way they adapt to the new society. Negative adaptation leads to anomie, anxiety, and identity confusion, meanwhile acculturating individuals develop a clear identity, positive mental health and self-esteem (Smith Castro 2003, Tonsing et al. 2016).

The major contribution to the study of psychological acculturation and its correlation with stress is the research of Berry and colleague (Ward and Rana-Deuba 1999). Berry defines acculturation as the "psychological and behavioral changes that an individual experience as a results of sustained contact with members of other cultural groups" (Berry 1997). In his studies Berry identified two dimensions of acculturation: the maintenance of original cultural identity and maintenance of relation with other groups. Moreover, Berry distinguished four acculturation and adaptation strategies: integration, separation, assimilation and marginalization (Berry 1974).

#### ***1.4.2 Mental health of immigrants: causes and consequences***

Immigration is a major stressful life event that may increase mental health risk. The relationship between migration and mental health has been studied for several decades because it is considered a public health challenge, but the results are often contradictory (Bhugra 2004, Goodman et al. 2008, Abebe et al. 2014). In most of the studies immigrants have been found to be at greater risk for developing mental health diseases than the host population (Bhugra 2004, Goodman et al. 2008, Abebe et al. 2014 Gilliver et al. 2014), but there are also researches that report lower level mental health problems in comparison to non-migrants, as for example studies on the mental health of Hispanic in US (Vega et al. 1998) or South Asians in UK (Nazroo 1998). The HIE affects also the mental health of immigrants. In general immigrants tend to have a better mental health than the non-

immigrant peers and the host population when they arrive in the host country (Kandula et al. 2004). However, their mental health usually gets worse over time becoming similar or worse than that of the host population (Newbold 2005). On the other hand, the risk of mental health disorders, such as post-traumatic stress, chronic pain and depression, is ten times higher in refugees, especially if exposed to torture (Fazel et al. 2005, Norredam et al. 2009, Steel et al. 2009, Hollander et al. 2016).

Mental disorders vary among different migrant groups, in relation not only to the country of origin but to the migration itself. Some groups of immigrants have elevated incidence of psychotic disorders after migration, and the factors related to it can be coming from a developing country, racism and discrimination (Cantor-Graae 2007, Coid et al. 2008, Schmitt et al. 2014). Prevalence of specific types of mental health problems can be linked to the adversity experiences prior to migration, during the migration and after the settlement in the new environment (Kamperman et al. 2007). In Table 1.9 are reported the main migrating factors that can affect mental health in children and adults, divided in pre-migration, migration and post-migration factors (Kirmayer et al. 2011).

**Table 1.9** Factors related to migration that affect mental health (Kirmayer et al. 2011).

<b>Pre-migration</b>	<b>Migration</b>	<b>Post-migration</b>
<b>Adult</b>		
Economic, educational and occupational status in country of origin	Trajectory (route, duration)	Uncertainty about immigration or refugee status
Disruption of social support, roles and network	Exposure to harsh living conditions	Unemployment or underemployment
Trauma (type, severity, perceived level of threat, number of episodes)	Exposure to violence	Loss of social status
Political involvement	Disruption of family and community networks	Loss of family and community social support
	Uncertainty about outcome of migration	Concern about family members left behind
		Difficulties in language learning, acculturation and adaptation
<b>Child</b>		
Age and developmental stage at migration	Separation from caregiver	Stresses related to family's adaptation
Disruption of education	Exposure to violence	Difficulties with education in new language
Separation from extended family and peer networks	Exposure to harsh living conditions	Acculturation
	Poor nutrition	Discrimination and social exclusion
	Uncertainty about future	

Each phase of the migration process is associated with specific problems and risks. In the pre-migration period immigrants have to face the disruption to usual social roles and network, and risk

factors are related to the living conditions (Lindert et al. 2008). During the voyage migrants can experience violence, traumatic events and uncertainty about their citizenship, that can increase the risk of depression and other mental health problems (Porter and Haslam 2005, Steel et al. 2006, Robjant et al. 2009). Once arrived, migrants, after a first period characterized by optimism and hope, have to face obstacles, discrimination, racism, economic strains, alienation, status loss and changes in family life (Tang et al. 2007, Tran et al. 2007, Lindencrona et al. 2008, Cook et al. 2009). Also the language can play an important role in migrants' mental health, as difficulties in communication can affect social integration and lead to feeling of isolation and being "unwanted" (Carballo and Nerukar 2001).

There are other factors that are associated with mental health outcomes in immigrants, such as socio-cultural and economic context, gender, generation, acculturation and the living conditions (Gilliver et al. 2014, Tonsing et al. 2016). Low SES is associated with high risk of physical and mental health and for health related behaviors, as drinking and smoking habits (Lindert et al. 2008). Gender and age have been reported to be strongly correlated with the emotional well-being and common mental health disorders of immigrants and refugees. Studies on the gender difference in psychological risk factor reported that immigrant women are at higher risk of mental health disorders (Ritsner et al. 1999, Ritsner et al. 2001, Tonsing et al. 2016). As regards studies on adolescents, the results are controversial (Stevens and Vollebergh 2008). Although some studies reported greater level of psychopathological disorders in adolescent immigrants, other reported that the rate of psychiatric disorders are lower among immigrants than native-born adolescents. In general, in the post migration phase youth have to face acculturative stress and family poverty and these can increase the risk of development stress and conduct disorders, substance abuse and depression (Oppedal et al. 2005, Vollebergh et al. 2005, Sagatun et al. 2008)

The main mental health problems that can affect immigrant adults are depression and anxiety disorders, post-traumatic stress disorders, domestic violence and pathological gambling (Fox et al. 2001). Among immigrant children and youth anxiety disorders, depression, post-traumatic stress disorders (McKelvey et al. 2002, Fox et al. 2004) meanwhile second generation children have been found to be at higher risk of behavioral conditions, such as substance abuse, eating disorders and conduct disturbance (Miller and Pumariega 2001). Older adults are at greater risk of mental health problems, because of their traditionalism and cultural inflexibility, linguistic barriers, lack of social support and family and physical infirmities. They are especially at risk of developing depression, somatization, and a variety of culture bound syndromes (Mui et al. 2003, Chang and Moon 2016).

It is very important preventing, recognizing and treating mental health problems, even if this could be more complicated for immigrants due to the differences in language, culture a seeking for help (Borowsky et al. 2000). There are a huge number of questionnaire that can be used for the assessment of psychosocial well-being but most of them must be validated for immigrants and translated in the

appropriate language. Moreover, up to now, longitudinal studies on mental health in Europe are scarce (Lindert et al. 2008).

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## **CHAPTER 2**

# **BODY IMAGE DISSATISFACTION AND PREFERENCES AMONG AFRICAN IMMIGRANTS IN EUROPE AND AFRICAN RESIDENTS**

In this research, the issue of body image perception in immigrants from Africa to Europe has been reviewed. In particular, this research intends to examine body image perception, body weight discrepancy and body dissatisfaction among African immigrants in Europe and African residents. In order to simplify the collection of the literature data and the analysis of the results, the African continent was divided in three big geographical areas: North Africa (NA), Central Africa (CA) and Southern Africa (SA).

Body image ideals and, in particular body image dissatisfaction, have been linked to a number of poor health outcomes, including nutritional and eating disorders, that are a major public health issue. Body image ideals are strictly connected to socio-cultural factors therefore they can be influenced by the migration process and the ethnic background.

The results suggest that body dissatisfaction and BMI are increasing from SA to Europe according to a geographical gradient. In conclusion this research highlights that both African residents and migrants are at high risk of nutritional disorders due to the westernization of beauty ideals.

### **2.1 INTRODUCTION**

Body image is a multidimensional construct (Thompson, 1999) that can be defined as a person's perception, feelings and thoughts about his or her body, usually conceptualized as incorporating body size estimation, the evaluation of body attractiveness, as well as various emotions associated with body shape and size (Grogan, 2007).

As a multidimensional construct, body image perception and body ideals are influenced by several factors, especially cultural and social (Paeratakul et al. 2002, Mama et al. 2011, Gillen and Lefkowitz 2012, Brown et al. 2014). Traditionally Arab-Muslim women see large body size and plumpness as desirable and associated with female beauty (Mokhtar et al. 2001). However, ideal body size is also influenced by educational level: those with a high education have a preference with slimmer bodies, as a consequence of westernization of the beauty ideals (Jackson et al. 2003). In general, ethnic groups living in great isolation or with low incomes still have an ancestral idea of beauty, preferring a shapely body. On the other hand, ethnic groups living in urban areas are moving toward a Western

ideal of beauty, preferring underweight or normal weight bodies (Yahia et al. 2011, Rguibi and Belahsen 2006; Holdsworth et al. 2004).

The adaptation to the Western beauty ideals can increase the risk of body dissatisfaction and concern. Body size dissatisfaction can provoke weight control behaviours that influence negatively physical and mental health and can result into nutritional disorders, such as obesity or anorexia and bulimia nervosa (Frederick et al. 2008, Swami et al. 2010). Weight related behaviours are also caused by a misperception of one's body image, with thin people who might overestimate their weight and, conversely, many overweight/obese people might be unaware that their body weight is too high. Nutritional disorders have become a major public health issue because, especially in the last decades, they are spreading worldwide both in developed and developing countries (Swami et al. 2010, Gualdi-Russo et al. 2014, Ng et al. 2014). Overweight and obesity in particular are associated with an amplified risk of non-communicable diseases and mental health problems (Jebb 2004, Misra and Khurana 2011).

The risk of body size misperception and body image dissatisfaction, and therefore of nutritional disorders, is particularly high in immigrants. The migration process can influence both the perception of itself and body size ideals because of the change in the life style and in the socio-cultural context (Cachelin et al. 2006; Nicolaou et al. 2012; Tlili et al. 2008). Studies reported that the acculturation process has an influence in food intake, PA and perception of body weight (Lawton et al. 2008, Slattery, 2006, Cachelin et al. 2006). The ideals of beauty may change as a result of immigration, leading immigrant people, especially women, to pursue ideals of beauty of the host country. However, this process is not uniform across all immigrant groups and depends on ethnicity, gender, age at the time of migration and period of residency in the new country (Calzada and Anderson-Worts 2009, Kaushal 2009).

Studies reported that in many European countries overweight and obesity are higher among migrants than among the host population (Gualdi-Russo et al. 2009) or their compatriots still living in their countries of origin (Agyemang et al. 2009). People from low-to-medium-income countries who have migrated to high-income countries seem to be more susceptible to overweight and obesity than their local counterparts (Delavari et al. 2013). In addition, overweight and obesity among immigrants appear to increase significantly with time after migration, with rates approaching or overtaking those of the host population (Himmelgreen et al. 2004). The process of "acculturation" leads to great changes in the "hosted" group, influencing diet and favouring the adoption of obesogenic behaviours (Gadd et al. 2005, Hosper et al. 2008).

To date, however, there are few studies that have considered the incidence of negative body image among non-Western immigrant in both their country of origin and in the host countries (Soh et al. 2006; Nicolaou et al. 2008b), and most of these have investigated immigrant groups in the USA (Delavari et al. 2013). The data regarding migrants from Africa to Europe are scarce and



contradictory. In this review we evaluate body size ideals, body image perception and body dissatisfaction among African immigrants in Europe compared to people still living in Africa, tracing a pattern of geographical variation where possible. Furthermore, the aims of this studies are: a) to compare body image perception in different population samples from the same country; b) to compare body image perception between women and men; c) to consider how weight status interacts with body image perception.

## **2.2 METHODS**

### ***2.2.1 Search strategy***

A systematic search for publications regarding body image perception, body dissatisfaction and body size preferences in different ethnic groups from Africa, both in their countries of origin and after their migration to Europe, was conducted. The databases used were PubMed and PsycINFO. Further searches were carried out in the search engine Google Scholar. Furthermore, the references of all included articles were screened manually for additional studies.

Combinations of population, geographical area and outcome terms were used to conduct the searches, including: “immigration”, “immigrants”, “migrants”, “refugees”, “ethnic minorities”, “body size preferences”, “body dissatisfaction”, “body image dissatisfaction”, “body image”, “weight”, “weight perception”, “Europe”, “Africans”, “North Africa”, “Central Africa”, “Southern Africa.

### ***2.2.2 Eligibility criteria***

In the systematic search only cross-sectional studies with samples composed of healthy subjects aged 15 years or more were taken in consideration. The exclusion criteria comprised longitudinal studies, case reports or studies of subjects in childhood or with concomitant diseases (i.e. diabetes). The experimental or review articles had to be published in English from January 2000 to November 2015. Identified abstracts were initially read and reviewed in relation to the eligibility criteria. Later the full-texts with potential relevance to the review were screened. In total, 730 records were found, all through database and references searching, and 582 records were screened after duplicates removal. A number of 36 full-text articles were assessed for eligibility. After the omission of four studies on samples of too young or unhealthy subjects, three studies without body image outcomes and other three studies not focused on African migrants in Europe or on African residents, we included in this review 26 full-text papers.

### ***2.2.3 Data extraction***

All relevant data from the final selected articles were extracted. The information obtained from each study included: age, gender and nationality of participants; sample size; host country; BMI;

prevalence of overweight and obesity (according to WHO cut-off points) (James et al. 2001); actual and ideal figures, level of dissatisfaction; qualitative or quantitative methodologies to assess body image perception. As there are few articles available in the literature on this topic, we considered all of them, irrespective of sample size, for a general listing.

#### ***2.2.4 Data synthesis***

The Africa continent was divided into three geographical areas in order to esteem the cultural differences of the African population. For calculation purposes, considering also immigrants, these geographical areas were identified by numbers 1 (SA), 2 (CA), 3 (NA) and 4 (African immigrants to Europe).

Studies were assessed for methodological heterogeneity. There were substantial methodological differences between studies. The main differences regarded the methods used for the evaluation of body image perception (silhouettes developed by different authors; self-reported questionnaires), the method for the assessment of the BMI (in some cases height and weight were self-reported) and the methods used for the evaluation of the body image dissatisfaction (some studies reported the FID, McIza et al. 2005) meanwhile others the percentage of satisfaction and the desire to lose/gain weight). Some examples of methods used in the collected studies for the assessment of body image are: among silhouettes drawings the Contour Drawing Rating Scale developed by Thompson and Gray (1995), the seven silhouettes developed by Collins et al. (1991) and Body Image Assessment for Obesity (Williamson et al. 2000); among the questionnaires Body Shape Questionnaire by Cooper et al. (1986) and The Multidimensional Body-Self Relations Questionnaire (Cash et al. 2000).

An evidence synthesis by weighted means and pooled standard deviation (SD) of FID and BMI was carried out. The studies considered for this analysis had to report both BMI and FID of samples composed with equal or more than 50 females. For this purpose, we utilized linear regression analysis and Spearman R Coefficient. Comparisons of mean BMI values between independent samples were conducted with Student's t-test.

The statistical analysis was carried out using STATISTICA for Windows, Version 11.0 (StatSoft Italia srl, Padua, Italy). The results were statistically significant when  $p < 0.05$ .

## **2.3 RESULTS**

### ***2.3.1 Description of included studies***

The search identified twenty-six articles that met the inclusion criteria and were consequently included in the final review. Details regarding the sample characteristics and body image perception are reported in Tables 2.1, 2.2 and 2.3. Table 2.1 reported the data concerning immigrants and

residents with NA origin, Table 2.2 data of immigrants and residents with CA origin and Table 2.3 data on immigrants and residents with SA origin. Six of them considered body image and body size ideals of Africans migrants to Europe and these were subsequently divided on the basis of the country of origin. Three examined NA immigrants in the Netherlands (Nicolaou et al. 2008a, Nicolaou et al. 2008b, Nicolaou et al. 2012), one NA immigrants in Italy (Gualdi-Russo et al. 2016) and two SA immigrants in the UK (Tovée et al. 2006, Swami et al. 2012). For the comparison with their peers still resident in Africa, we utilized studies on Moroccans, Tunisians, Egyptians (Jaeger et al. 2002, Rguibi and Belahsen 2004, Rguibi and Belahsen 2006, Lahmam et al. 2008, Nicolaou et al. 2008a, Tlili et al. 2008, El Ansari et al. 2013, Jafri et al. 2013, El Ansari et al. 2014, Gualdi-Russo et al. 2016) and on Zimbabwean and South African residents (Senekal et al. 2001, Jaeger et al. 2002, Faber and Kruger 2005, Puoane et al. 2005, Tovée et al. 2006, Swami et al. 2010, McHiza et al. 2011, Peltzer and Pengpid 2012, Swami et al. 2012). The databases search did not report data on CA immigrants in Europe. However, the data of Central African residents were reported for completeness (Jaeger et al. 2002, Holdsworth et al. 2004, Siervo et al. 2006, Frederick et al. 2008, Benkeser et al. 2012, Ettarh et al. 2013, Okoro et al. 2014) in order to have a full picture of body image perception and dissatisfaction throughout the whole Africa continent.

**Table 2.1 Studies on body image perception, body size ideal and weight dissatisfaction in North African immigrants and residents**

Reference (year)	Country of origin/ethnic sample	Eventual host country	Gender: number of subjects	Age (years)	BMI	Actual body image and self-perception	Ideal body image	Dissatisfaction and FID	Methods
<b>NORTH AFRICA</b>									
Nicolaou et al. (2008a)	Morocco	Amsterdam, The Netherlands	Male: 56	18-30 Mean: 21.6 ± 3.4	BMI: 23.4 ± 2.8 Ow: 19.6% Ob: 3.6%	4.1 ± 0.8	Self: 4.2 ± 0.5 Own sex: 4.4 ± 0.7, Opposite sex: 4.2 ± 1.1	Want to be thinner: 21.8%	7 silhouettes developed by Collins (1991)
			Female: 104	18-30 Mean: 23.4 ± 4.2	BMI: 23.1 ± 4.1 Ow: 24.8% Ob: 11.5%	4.6 ± 1.0	Self: 3.9 ± 0.7 Own sex: 4.1 ± 0.6, Opposite sex: 4.2 ± 0.6	Want to be thinner: 57.6%	7 silhouettes developed by Collins (1991)
(Nicolaou et al. (2008b), Nicolaou et al. (2012)	Morocco	Amsterdam, The Netherlands/ Second generation immigrants	Female: 22	20-59 Mean: 34.5			Preferred silhouettes from 2 to 4. The most attractive is number 4.	A lot of women desire to lose weight	7 silhouettes developed by Collins (1991)
Nicolaou et al. (2008a)	Morocco (Al Hoceima, Rif region)		Female: 31	16-48 Mean: 25.7			Preferences are between silhouettes 2 to 4. The most attractive is number 4	A lot of women desire to lose weight	7 silhouettes developed by Collins (1991)
Gualdi-Russo et al. (2016)	North Africa (Morocco, Tunisia and Egypt)	Italy	Female: 105	Mean: 36.3 ± 7.8	BMI: 28.4 ± 4.8	5.9 ± 2.1	3.9 ± 1.6	FID: +1.99 ± 2.31	9 silhouettes developed by Thompson and Gray (1995)
Gualdi-Russo et al. (2016)	Morocco (Casablanca)		Female: 124	Mean: 39.5 ± 13.1	BMI: 26.4 ± 5.2	5.9 ± 2.0	4.4 ± 1.4	FID: +1.50 ± 1.83	9 silhouettes developed by Thompson and Gray (1995)
Gualdi-Russo et al. (2016)	Tunisia (Tunis)		Female: 104	Mean: 28.7 ± 11.5	BMI: 25.5 ± 5.5	5.2 ± 2.4	3.8 ± 1.6	FID: +1.40 ± 2.41	9 silhouettes developed by Thompson and Gray (1995)

Lahmam et al. (2008)	Morocco (High Atlas)/ Amazigh people		Male: 165	≥ 20	BMI: 22.9 ± 3.2 Uw: 6.7% Nw: 69.01% Ow: 21.8% Ob: 2.4%	False perception: 48.5%, uw: 46.7%, ow: 1.8% Right perception: 51.5%		Gain weight: 40.0% Sat: 59.4% Lose weight: 0.6%	Self-administered questionnaire
			Female: 271	≥ 20	BMI: 25.0 ± 4.2 Uw: 3.7% Nw: 50.2% Ow: 32.8% Ob: 13.3%	False perception: 75.2%, uw: 74.5% ow: 0.8%. Right perception: 24.7%		Gain weight: 53.1% Sat: 45.8% Lose weight: 1.1%	Self-administered questionnaire
(Rguibi and Belahsen (2004), Rguibi and Belahsen (2006)	Morocco (Laayoun)/Sahraoui women		Female: 249	≥ 15	BMI: 26.1 ± 5.6 Uw: 2.7% Nw: 47.1% Ow: 28.3% Ob: 21.9% Ow-Ob: 50.2%		Ideal body size: 4.88 ± 0.86 Healthy body size: 4.33 ± 0.82	Gain weight: 16.9% Sat: 79.9% Lose weight: 3.2%	9 silhouettes developed by Liburd et al. (1999) and self-administered questionnaire
Jafri et al. (2013)	Morocco (Casablanca)		Female: 425	≥ 18	BMI: 29.9 Ow: 36.2% Ob: 47.4%	Right perception: 47%. Ow-ob underestimate: 36.1%		Gain weight: 16.7%	Self-administered questionnaire
Ansari et al. (2013); Ansari et al. (2014)	Egypt (Assiut)		Male: 1504	Mean: 19.3 ± 1.6	Uw: 7% Nw: 68% Ow: 19% Ob: 6%	Self-perception: Uw: 17% Nw: 60% Ow: 23%		Sat: 64% dis: 46%; no BIC: 74.4%, mild BIC: 17.3%, moderate/marked BIC: 8.3%	Body Shape Questionnaire by Cooper et al. (1987); BIC: Body Image Concern
			Female: 1663	Mean: 18.6 ± 1.2	Uw: 6% Nw: 62% Ow: 25% Ob: 7%	Self-perception: Uw: 11% Nw: 56% Ow: 14%		Sat: 45%, dis: 55%; no BIC: 60%, mild BIC: 24.2% moderate/marked BIC: 15.8%	Body Shape Questionnaire by Cooper et al. (1987); BIC: Body Image Concern

Tlili et al. (2008)	Tunisia (Tunis)		Female: 203	18-52	BMI: 26.1 ± 5.6; Uw: 2.7% Nw: 47.1% Ow: 28.3% Ob: 21.9% Ow-Ob: 50.2%			Dis: 62.1% Lose weight: 47.3% Gain weight: 14.8% Ow-ob want to lose weight: 77.9%	6 photographic silhouettes developed by Bush et al. (2001)
Jaeger et al. (2002)	Tunisia (Tunis)		Male and Female: 52	19-23 Mean: 21.4 ± 1.1	BMI: 22 ± 3	3.6	2.8	FID: +0.8	10 silhouettes (self-administered questionnaire)

**Table 2.2 Studies on body image perception, body size ideal and weight dissatisfaction in Central African immigrants and residents**

Reference (year)	Country of origin/ethnic sample	Eventual host country	Gender: number of subjects	Age (years)	BMI	Actual body image and self-perception	Ideal body image	Dissatisfaction and FID	Methods
<b>CENTRAL AFRICA</b>									
Benkeser et al. (2012)	Ghana (Accra Metropolitan Area)		Female: 2814	Mean: 46.28 ± 18.21	BMI: 28.34 ± 6.69	5.05 ± 1.45	4.84 ± 1.45		8 silhouettes developed by Stunkard et al. (1983)
Frederick (2008)	Ghana (HO, rural)		Male: 22	Mean: 24.5 ± 8.0			Female ideal body: 4.4 ± 1.4		Contour Drawing Rating Scale (Modified Version; 9 women's silhouettes developed by Thompson and Grey (1995)
			Female: 26	Mean: 30.6 ± 12.23		5.1 ± 2.2	4.6 ± 1.4	FID: +0.5 ± 1.7	Contour Drawing Rating Scale (Modified Version; 9 women's silhouettes developed by Thompson and Grey (1995)
Siervo et al. (2006)	Gambia (Bakau-Kanifing Municipal Area)		Female: 50	Mean: 18.6 ± 3.4	BMI: 20.6 ± 4.1	4.4 ± 2.3	4.7 ± 1.4	FID: -0.38 ± 2.5	Body Image Assessment for Obesity (18 silhouettes developed by Williamson et al. (2000); 8 silhouettes developed by Stunkard (1983)
			Female: 50	Mean: 42.5 ± 5.2	BMI: 30.3 ± 5.2	7.8 ± 3.0	5.0 ± 2.6	FID: +2.8 ± 3.0	Body Image Assessment for Obesity (18 silhouettes developed by Williamson et al. (2000); 8 silhouettes developed by Stunkard (1983)
			Male: 50	Mean: 19.3 ± 2.6	BMI: 19.0 ± 2.2	3.7 ± 1.5	4.9 ± 1.6	FID: -1.2 ± 1.9	Body Image Assessment for Obesity (18 silhouettes developed by Williamson et al. (2000); 8 silhouettes developed by Stunkard (1983)

			Male: 50	Mean: 42.0 ± 5.3	BMI: 22.3 ± 3.9	5.4 ± 2.6	5.5 ± 2.1	FID: -0.08 ± 1.8	Body Image Assessment for Obesity (18 silhouettes developed by Williamson et al. (2000); 8 silhouettes developed by Stunkard (1983))
Holdsworth et al. (2004)	Senegal (Dakar)		Female: 301	20-50	BMI: 25.4 ± 5.6	2.90	2.40		6 photographic silhouettes developed by Bush et al. (2001)
Okoro et al. (2014)	Nigeria (Yoruba)		Male: 220	Mean: 42.6 ± 17.2	BMI: 21.7 ± 3.7	4.30 ± 0.99	4.72 ± 1.06		9 silhouettes developed by Becker et al. (1999)
			Female: 304	Mean: 44.9 ± 16.7	BMI: 24.6 ± 5.5	4.33 ± 1.17	4.41 ± 1.22		9 silhouettes developed by Becker et al. (1999)
Jaeger et al. (2002)	Gabon (Libreville)		Male and Female: 100	19-23 Mean: 19.5 ± 1.3	BMI: 20.8 ± 2.8	4.4	4.2	FID: +0.2	10 silhouettes (self-administered questionnaire)
Jaeger et al. (2002)	Ghana (Techiman)		Male and Female: 58	19-23 Mean: 19.3 ± 1.3	BMI: 22.4 ± 4.6	3.9	4.2	FID: -0.3	10 silhouettes (self-administered questionnaire)
Ettarh et al. (2013)	Kenya (Korogocho and Viwandani slums of Nairobi)		Male: 2669	≥ 18 Mean: 42	Uw: 9.8% Nw: 72.9% Ow: 15.0% Ob: 2.3%	Self-perception: Uw: 13.2% Nw: 52.7% Ow: 20.8% Ob: 13.4%	Ideal body size: Uw: 6.1%, Nw: 41.3% Ow: 32.0% Ob: 20.6%		18 silhouettes developed by Williamson et al. (2000)
			Female: 2265	≥ 18 Mean: 42	Uw: 5.1% Nw: 51.5% Ow: 27.9% Ob: 15.5%	Self-perception: Uw: 14.2% Nw: 50.5% Ow: 22.2% Ob: 13.2%	Ideal body size: Uw: 7.1% Nw: 53.4% Ow: 24.8% Ob: 14.8%		18 silhouettes developed by Williamson et al. (2000)



**Table 2.3 Studies on body image perception, body size ideal and weight dissatisfaction in Southern African immigrants and residents**

Reference (year)	Country of origin/ethnic sample	Eventual host country	Gender: number of subjects	Age (years)	BMI	Actual body image and self-perception	Ideal body image	Dissatisfaction and FID	Methods
<b>SOUTHERN AFRICA</b>									
Swami et al. (2012)	Zimbabwe	UK (London)	Female: 138	18-49 Mean: 26.6 ± 6.7	BMI: 24.9 ± 4.62	5.89 ± 1.95	Self: 4.39 ± 1.35 Typical female: 4.31 ± 1.47 Most attractive: 3.66 ± 1.19	BAS: + 1.64 ± 0.95; FID: 1.50 ± 1.06	Photographic Figure Rating Scale (10 photographic silhouettes; Swami et al. (2008); BAS: Body Appreciation Scale (Avalos 2005); BMI (self-reported)
Swami et al. (2012)	Zimbabwe (Harare)		Female: 140	18-46 Mean: 25.3 ± 6.87	BMI: 24.81 ± 4.61	4.54 ± 1.91	Self: 4.99 ± 1.10 Typical female: 4.71 ± 1.16 Most attractive: 5.17 ± 1.07	BAS: 1.19 ± 0.93; FID: - 0.45 ± 0.31	Photographic Figure Rating Scale (10 photographic silhouettes; Swami et al. (2008); BAS: Body Appreciation Scale (Avalos 2005); BMI (self-reported)
Tovée et al. (2006)	South Africa (Mshwati Mpolveni)/Zulus	UK	Male: 25; Female: 27	Mean: 26.6 ± 6.87			Female ideal BMI: 23.99		50 high-resolution photographic images (self-administered questionnaire)
Tovée et al. (2006)	Britons of African descent	UK/Second generation immigrants	Male: 34; Female: 32	Mean: 24.4 ± 4.53			Female ideal BMI: 20.68		50 high-resolution photographic images (self-administered questionnaire)
Tovée et al. (2006)	South Africa (Mshwati Mpolveni)/Zulus		Male: 19; Female: 16	Mean: 25.6 ± 4.47			Female ideal BMI: 26.52		50 high-resolution photographic images (self-administered questionnaire)
McHiza et al. (2011)	South Africa (Cape Town, urban area)		Female: 44	Mean: 38.5 ± 9.0	BMI: 32.1 ± 7.1	5.5 ± 1.9	4.4 ± 1.2	FID: 1.1 ± +2.0	8 silhouettes developed by Stunkard et al. (1983)
Swami et al. (2010)	South Africa (Cape Town, urban area)		Male: 52; Female: 48	Mean: 38.4 ± 11.1	BMI: 23.3 ± 3.8	Female Actual: 4.5	Female Ideal: 3.2		9 silhouettes developed by Thompson and Grey (1995); BMI (self-reported)
Swami et al. (2010)	South Africa (KwaZulu-		Male: 45; Female: 60	Mean: 38.4 ± 11.1	BMI: 40.1 ± 10.4	Female Actual: 6.0	Female Ideal: 5.6		9 silhouettes developed by Thompson and Grey (1995); BMI (self-reported)

	Natal, rural area)								
Jaeger et al. (2002)	South Africa (Cape Town)/black origin		Male and Female: 21	19-23 Mean: 19.3 ± 0.9	BMI: 23.9 ± 4.3	4.3	2.6	FID: +1.7	10 silhouettes (self-administered questionnaire)
Peltezer et al. (2012)	South Africa		Male: 100	≥ 18	BMI: 21.1			BASS: 3.95 ± 0.70	The Multidimensional Body-Self Relations Questionnaire (Cash 2000); BASS: Body-Areas Satisfaction Scale.
			Female: 189	≥ 18	BMI: 23			BASS: 3.91 ± 0.73	The Multidimensional Body-Self Relations Questionnaire (Cash 2000); BASS: Body-Areas Satisfaction Scale.
Puoane et al. (2005)	South Africa (Khayelitsha, Cape Town)/black origin		Female: 44	28-60 Mean: 43.2 ± 7.2	BMI: 40.0 ± 8.1 Uw: 0% Nw: 4.7% Ow: 4.7% Ob: 90.7%	Self-perception: Uw: 7% Nw: 48% Ow/Ob: 45%	Preferred BMI: 27		8 silhouettes developed by Stunkard et al. (1983)
Faber et al. (2005)	South Africa (KwaZulu Natal, rural area)/black origin		Female: 187	25-55	Uw: 0% Nw: 28.9% Ow: 41.2% Ob: 29.9%			Sat: 37% Dis: 11% Lose weight: 8% Ow-ob want to lose weight: 25%	Self-administered questionnaire
Senekal et al. (2001)	South Africa (rural and urban area)/black origin		Female: 180	Mean: 20 ± 4.4	BMI: 22.6 ± 3.8 Uw: 25.7% Nw: 52.5% Ow: 16.8% Ob: 5.0%	Self-perception: Uw: 6.1% Nw: 67.0% Ow: 26.3% Ob: 0.6%			Body Shape Questionnaire by Cooper et al. [52]

### ***2.3.2 Studies on North Africans***

All the collected study on North african immigrants and residents are reported in Table 2.1. The study of Nicolaou et al. (2008b) reported the data regarding the body size preferences and body image perception of Moroccan immigrants in the Netherlands (Amsterdam). The results suggested that the majority of Moroccan women desired to lose weight, contrary to the Moroccan males that were satisfied with their body and were unaware of being overweight. This data, consistent with other two studies (Nicolaou et al. 2008a, Nicolaou et al. 2012), confirm that Moroccan females, both migrants in the Netherlands and residents in Morocco, preferred thin and normal-weight bodies, in the same way as Moroccan immigrant men.

The study focused on NA immigrant women in Italy agreed with the results of Nicolaou et al. (2008b) as regard immigrants' preferred body size. Comparing immigrants' data with the data regarding Moroccan and Tunisian resident women (Gualdi-Russo et al. 2016) resulted that Moroccan residents tended to prefer a heavier ideal figure, than the other two groups, although all of them tended to prefer a normal-weight body. Body image dissatisfaction was very high in both migrants and residents and slightly (although not significantly) higher in North African immigrants (FID:  $1.99 \pm 2.31$ ) than in North African residents (Moroccans FID:  $1.50 \pm 1.83$ ; Tunisians FID:  $1.40 \pm 2.41$ ).

From three studies focusing on Moroccan residents of different socio-economic status and ethnic background emerged a misperception of their body weight (Lahmam et al. 2008) and a preference for fat body size (Rguibi and Belahsen 2004, Rguibi and Belahsen 2006) (Table 2.1). In particular, Amazigh men and women from the High Moroccan Atlas underestimated their body mass, despite their high percentage of normal weight and overweight, and wished to gain weight (Lahmam et al. 2008). The desire to lose weight was higher in women than in men. Moroccan Saharoui women (Rguibi and Belahsen 2004, Rguibi and Belahsen 2006) were meanly overweigh but their level of dissatisfaction were quite low (almost 80% satisfaction) with a small percentage of them wishing to gain weight and an even lower percentage wishing to lose weight. Moroccan women living in Casablanca (Jafri et al. 2013) had a high percentage of overweight and obesity (their mean BMI was 29.9), slightly higher than the women analysed by Gualdi-Russo et al. (2016) that were meanly overweight. However, in contrast to the results of Gualdi-Russo et al. (2016) that reported high level of dissatisfaction in Moroccan women because they desired to be thinner, Jafri et al. (2013) enlightened that most of them were not aware of their body size: about half of the normal weight women considered themselves too thin, while most of the overweight and obese women considered themselves "normal weight".

Consistent with the results of Gualdi-Russo et al. (2016) and by Nicolaou et al. (2008b) on NA residents, a high percentage of Egyptian university students were dissatisfied with their body weight, especially women, albeit they were mainly normal-weight (El Ansari et al. 2013, El Ansari et al. 2014).

In a peri-urban area of Tunis, in Tunisia, Tlili et al. (2008) reported that, although some positive attributes were associated with overweight, a normal body size was generally seen in the most positive light. The majority of these women were dissatisfied with their body weight, with most of them preferring a lighter ideal body size, especially among overweight and obese women, and a smaller proportion wanting a heavier one. (Tlili et al. 2008). Consistently with these results, the young Tunisian men and women examined by Jaeger et al. (2002) and Tunisian women examined by Gualdi-Russo et al. (2016) were aware of their body size (normal weight or slightly overweight), but they wished to be thinner.

### ***2.3.3 Studies on Central Africans***

Five studies on Central African residents from different countries are reported in Table 2.2 in order to have a complete picture of body image perception and beauty ideals in all the three African areas. However, there are a lack of studies in the literature focused on Central African immigrants to Europe.

Ghanaian women, as reported in three studies, preferred slightly overweight or normal weight body shape and had a low level of dissatisfaction (Jaeger et al. 2002, Frederick et al. 2008, Benkeser et al. 2012). Ghanaian men and women studied by Jaeger et al. (2002) were almost completely satisfied with their body, because they were meanly normal weight with a preference for normal weight bodies. On the other hand, the studies of Frederick et al. (2008) and Benkeser et al. (2012) found that there was a misperception of the weight status among males and females Gambians because, despite their obesity status, they saw themselves as overweight (Frederick et al. 2008, Benkeser et al. 2012). However, they had a preference for normal weight/slightly overweight body size, in accordance with Jaeger et al. (2012).

Siervo et al. (2006) reported that Gambian men and women of different ages had a general preference for overweight body shapes. Only the oldest group of women wanted to be thinner and had a high level of dissatisfaction because, albeit they desired an overweight body, they had a right perception of their obesity status. The youngest groups, both females and males, were in general satisfied of their body image (Siervo et al. 2006). Slight body dissatisfaction emerged in the data of Senegalese women that had an ideal figure little slimmer than their actual figure (slightly overweight). They had generally a good perception of their body (Holdsworth et al. 2004).

Both male and female residents in Nigeria and Gabon had, on average, low levels of FID and a normal BMI. They had good perception of their body and a preference for normal body size (Jaeger et al. 2002, Okoro et al. 2014). Moreover, the majority of Nairobi slum residents were normal weight with a tendency for men to overestimate their body size and for women to underestimate it. Unlike men, women had low levels of dissatisfaction with a preference for normal body size (Ettarh et al. 2013).

In general, Central African residents showed a preference for normal or slightly overweight body size, with a rather low level of dissatisfaction with their body.

#### ***2.3.4 Studies on Southern Africans***

The studies reporting data on Southern African residents and migrants are reported in Table 2.3. Two studies analysed body image perception and dissatisfaction of Zulu and Zimbabwean immigrant men and women in UK (Tovée et al. 2006, Swami et al. 2012). The Zimbabwean women studied by Swami et al. (2012) reported a preference for normal weight body size and, because they had a good perception of their overweight status, they had a high level of dissatisfaction. This dissatisfaction is highly lower in their non-migrant peers that, albeit they had rather the same main BMI, they desired to be fatter and they saw themselves thinner (Swami et al. 2012).

As concerned the groups of first and second generation Zulus migrants in UK studied by Tovèè et al. (2006), they had general preferences for normal weight body size. However, there were substantial differences in the perception of female attractiveness in the different groups of immigrants examined. Meanwhile in Zulus residents in SA there were a preference for overweight body weight, the ideal BMI tended to decreased along the time of migration. In fact, first generation migrants had an ideal BMI higher than second generation migrants.

Five studies reported the records of Southern African residents in urban (Cape Town) and rural (KwaZulu-Natal) areas (Jaeger et al. 2002, Faber and Kruger 2005, Puoane et al. 2005, Swami et al. 2010, McHiza et al. 2011). Both groups showed dissatisfaction, wishing to lose weight. Urban residents exhibited the greatest body discrepancy preferring normal weight figures in contrast to the rural inhabitants who preferred an overweight body shape. Additionally, other two studies (Senekal et al. 2001, Faber and Kruger 2005, Puoane et al. 2005, Peltzer and Pengpid 2012) found the presence of body dissatisfaction among South African residents in urban and rural areas, with normal weight men and women slightly overestimating their body weight.

### ***2.3.5 Summary and general geographical pattern***

In order to simplify the vast amount of data and the complex picture that emerged from the literature, this paragraph tries to provide a summary of the results in relation to the main aims of this study.

#### **1-Body image and weight perception: general tendency and differences among samples living in the same area or country**

##### *North Africa:*

- General misperception of body weight and preference for normal weight or slightly overweight body silhouettes (Jaeger et al. 2002, Rguibi and Belahsen 2004, Rguibi and Belahsen 2006, Lahmam et al. 2008, Nicolaou et al. 2008, Tlili et al. 2008, El Ansari et al. 2013, Jafri et al. 2013, El Ansari et al. 2014, Gualdi-Russo et al. 2016)
- Underestimation of body weight and preference for overweigh/obesity in rural populations (Rguibi and Belahsen 2004, Rguibi and Belahsen 2006); preference for thinner body and dissatisfaction in urban or peri-urban populations (Jaeger et al. 2002, Gualdi-Russo et al. 2016).

##### *Central Africa*

- General preference for normal- slightly overweight body size and a rather low level of dissatisfaction with their body in rural and urban populations (Jaeger et al. 2002, Holdsworth et al. 2004, Siervo et al. 2006, Frederick et al. 2008, Benkeser et al. 2012, Ettarh et al. 2013, Okoro et al. 2014);
- Gambia: preference for overweight among oldest people and for slightly slimmer body among younger. Older Gambians were the most dissatisfied (Siervo et al. 2006).
- Senegal: preference for a little slimmer figures than actual ones (Holdsworth et al. 2004).
- Ghana: low level of dissatisfaction and preference for normal weight or overweight body size both in rural and urban area (Jaeger et al. 2002, Frederick et al. 2008, Benkeser et al. 2012).

##### *Southern Africa*

- Preference for normal weight figures and great body discrepancy in urban residents (Jaeger et al. 2002, Swami et al. 2010, McHiza et al. 2011); preference for overweight body shape in rural inhabitants (Tovée et al. 2006, Swami et al. 2010, Swami et al. 2012).

#### **2-Body image and weight perception: differences between women and men according to area and country**

##### *North Africa*

- Morocco: weight underestimation in both Amazigh men and women (High Moroccan Atlas) and wish to gain weight (Lahmam et al. 2008);

- Egypt: higher level of satisfaction and less body image concern in male students compared to females (El Ansari et al. 2013, El Ansari et al. 2014).

#### Central Africa

- Gambia: less dissatisfaction and preference for bigger body shape in men than in women (Siervo et al. 2006);
- Nigeria: similar preferences in body shape among men and women, but higher dissatisfaction in men (Okoro et al. 2014);
- Kenya: overestimation of body size in normal weight men and underestimation in women living in slums in Nairobi. Unlike men, women had low levels of dissatisfaction with a preference for normal body size (Ettarh et al. 2013).

#### Southern Africa

- South Africa: similar level of satisfaction in males and females (Peltzer and Pengpid 2012).

### **3-Interaction between weight status and body image perception according to area and country**

#### North Africa

- Morocco: underestimation of body weight and consequent preference for fatter body (Rguibi and Belahsen 2004, Rguibi and Belahsen 2006, Lahmam et al. 2008, Swami et al. 2012).
- Tunisia: awareness of body weight and preference for a thinner body (Jaeger et al. 2002, Tlili et al. 2008, Gualdi-Russo et al. 2016).
- Egypt: good awareness of their body weight and high level of dissatisfaction (El Ansari et al. 2013, El Ansari et al. 2014).

#### Central Africa

- Ghana: misperception of weight status (obesity) in women (Jaeger et al. 2002, Benkeser et al. 2012).
- Nigeria and Gabon: low levels of FID and a normal BMI. Residents had good perception of their body and a preference for normal body size (Jaeger et al. 2002, Okoro et al. 2014).
- Kenya: residents of Nairobi slums were, on average, in normal weight with a differently-oriented misperception in men and women (Ettarh et al. 2013).

#### Southern Africa

- South Africa: low level of body dissatisfaction in normal weight men and overestimation of body weight in women (Peltzer and Pengpid 2012).

#### **4-Comparison in body image and weight perception of African immigrants in Europe with residents in the original country**

##### North Africa

- Moroccan female immigrants in the Netherlands: preference for thin and normal body size such as among the female residents in Morocco urban area. Many of them wished to lose weight (Nicolaou et al. 2008, Nicolaou et al. 2008, Nicolaou et al. 2012).
- NA immigrant women in Italy: preference for thin silhouettes, as among Tunisian residents. The ideal silhouette was slightly heavier in Moroccan residents than in Tunisians and immigrants. Body image dissatisfaction was slightly higher in NA immigrants than in NA residents (Gualdi-Russo et al. 2016).

##### Central Africa

- No studies on CA immigrants in Europe are available.

##### Southern Africa

- Zimbabwean immigrants in the UK: they were highly dissatisfied and with a more negative body image perception than residents in Zimbabwe, with a preference for a thinner body size while women living in Zimbabwe preferred a heavier body (Swami et al. 2012).

To acquire a synthetic overview of body image perception and weight status of African people, both immigrants and not, data obtained from some of the studies taken in consideration in this review were analysed. Due to the heterogeneity of the studies comprised, we included in the analysis only sample with equal or more than 50 women with BMI and FID reported. The studies were divided into four ethnic groups, as previous reported: Southern Africans, Central Africans, North Africans and immigrants from Africa to Europe, as follows:

Southern Africa: 140 Zimbabweans from Swami et al, 2012;

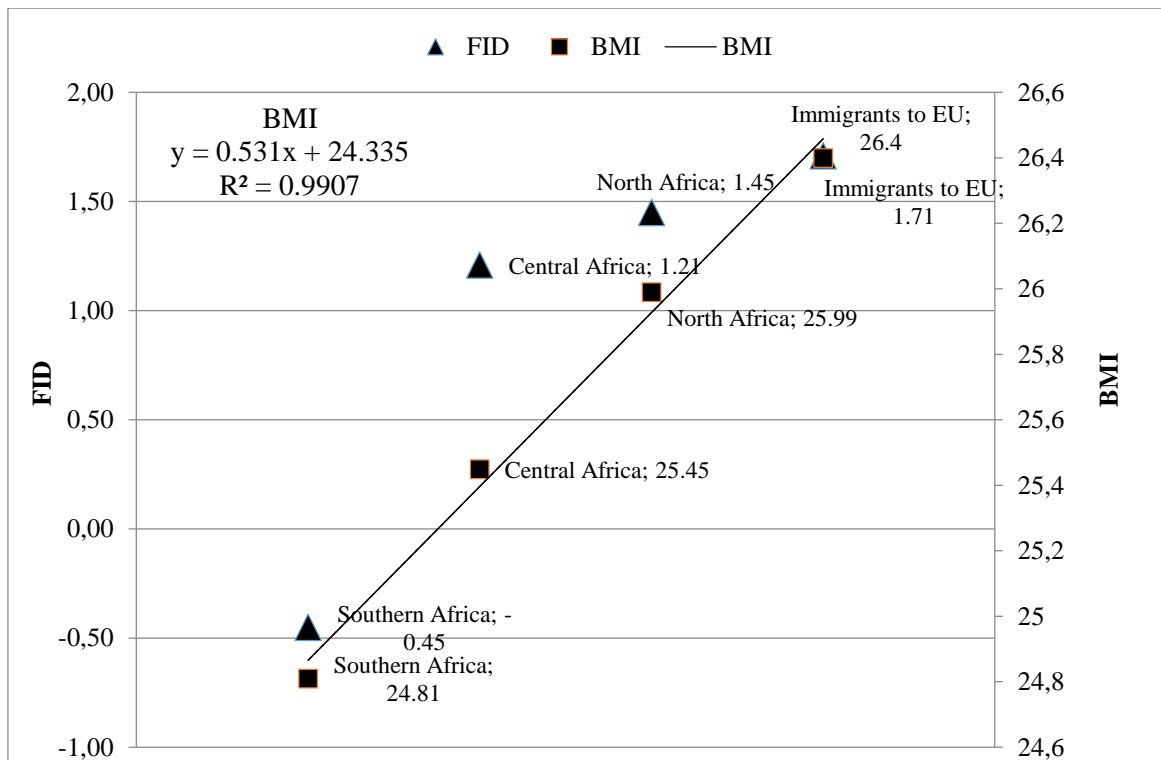
Central Africa: two Gambian samples differently aged, 50 subjects each, from Siervo et al. (2006);

North Africa: 124 Moroccans and 104 Tunisians from Gualdi-Russo et al. (2016);

Immigrants: 138 Zimbabwe immigrants to UK from Swami et al. (2012) and 105 NA immigrants to Italy from Gualdi-Russo et al. (2016)

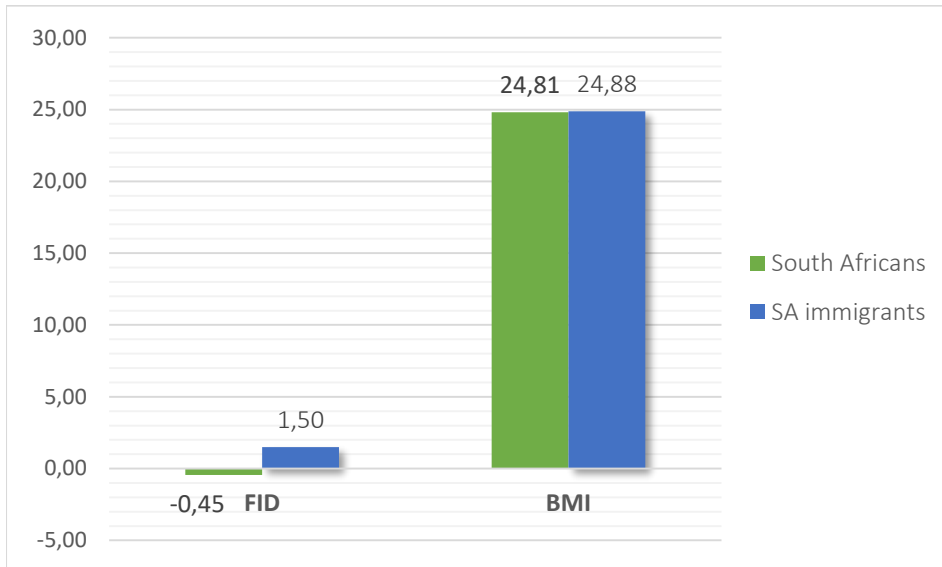
Fig. 2.1 shows the linear relationship between BMI and the geographical areas. The linear regression resulted statistically significant. The mean increase in BMI was 0.53 kg/m<sup>2</sup> per unit increase in geographical area. The FID increased significantly with the geographical gradient (Spearman R=1). (Fig. 2.1).



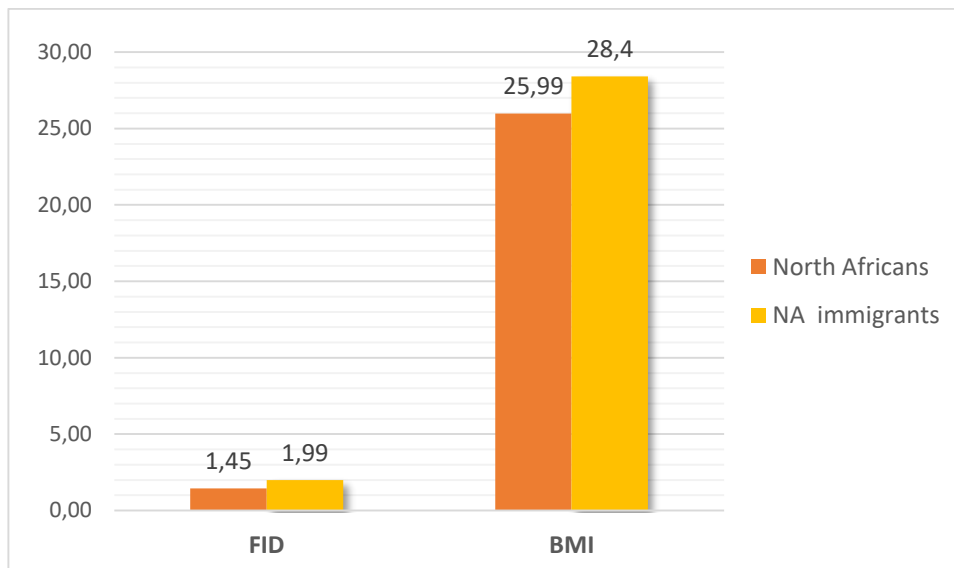


**Fig. 2.1** Geographical pattern

In figure 2.2 and 2.3 the column graphs show the comparisons of FID and BMI between Southern African residents and Southern African migrants (fig. 2.2) and between North African residents and North African migrants (Fig. 2.3). Southern African immigrant women had higher values of FID than Southern African residents, but similar BMI values (Fig. 2.2); North African immigrant women had significantly higher values of BMI ( $p < 0.05$ ) than NA North African residents, but similar values of FID (Fig. 2.3).



**Fig. 2.2** Comparisons between immigrants in Europe and African residents for FID and BMI. Graphs show the differences between the mean values of subjects with Southern African origin



**Fig. 2.3** Comparisons between immigrants in EU and African residents for FID and BMI. Graphs show the differences between the mean values of subjects with North African origin.

## 2.4 DISCUSSION

Western population values thinness in women, that is considered associated with success and high economic status (Bush et al. 2001) and a lean and muscular physique in men (Pope et al. 1999) meanwhile fatness is associated with poverty and diseases (Tlili et al. 2008). On the contrary, in many traditional non-Western and low-income countries fat bodies are associated with prosperity and health both in males and females (Mokhtar et al. 2001). This is confirmed by a study of South Africans (Okop et al. 2016) that reported and underestimation of their size in overweight women who didn't understand the health risk that obesity represents. However, it was suggested that the degree of preference for plumpness in non-Western societies has been exaggerated by Western studies and that the fear of fatness is more likely to be expressed in those who have had a greater exposure to Western culture (Soh et al. 2008). After the migration in a Western society, though the process of acculturation, migrants are most likely to adopt the body size ideals of the "host" population (Cachelin et al. 2006). The migration process, and therefore the acculturation, implies changes in food habits, social and family relationships and lifestyle habits (Toselli et al. 2014).

The studies included in this research reported an enormous variability among body image perception, body size ideals and body dissatisfaction in the African continent. Usually African residents showed a preference for heavier body size than their immigrant peers, but these preferences were strongly correlated to area of residence, ethnicity, and social and cultural background even in the same population. An example of this can be found in the Moroccan region, where populations with a low SES tended to prefer fatter body than people living in urban area. Gadridge et al. (2015), in this study regarding the changes in body composition of black urbanised South African women, reported the presence of two population groups with different preferences. The first group was more aligned with Western values and preferred thin bodies, meanwhile the other one, still maintaining an ancestral ideal of beauty, was satisfied of its body size. The misperception of the body size and the preferences for fat bodies puts these groups at higher risk of obesity and without the desire to lose weight. On the other hand, a high level of body size dissatisfaction can lead to eating disorders and poor eating habits (Sarwer et al. 2016).

Hence this review shows great heterogeneity in body image perception and body size awareness among the examined groups, with different consequences for health and well-being. Throughout the analysis of the general geographical pattern is evident that the body image dissatisfaction (FID) increased with the increase in BMI from south to north, reaching the highest values in African immigrants in Europe, who also had the highest values of BMI (on average, above the cut-off of overweight). These results indicate different beauty ideals of African populations and thus different degrees of satisfaction in the perception of their body image from SA to NA and, to a greater degree, with the migration to Europe. In addition to differences in ideals, there were changes in weight status, which increased from SA to NA and to Europe. Furthermore, this review highlights that, generally,

migrants had a higher level of dissatisfaction of their body than their non-migrant peers, and this difference is clear especially in Southern Africans. In fact, as already mentioned, Southern African residents tended to prefer fatter bodies in contrast to North African residents who are coming through a Westernization of the beauty ideals.

An example of this trend can be found in the difference between Zulu immigrants and those resident in SA. Zulu migrants, though the acculturation process, acquired the beauty ideals of the host population (Tovée et al. 2006). The adaptation to the new environment was supported by the comparison between UK Africans and UK Caucasians (BMI: 20.85) since both preferred medium BMI values.

This review has some limitations. Firstly, the heterogeneity of the methods utilized to assess body weight, body image dissatisfaction and body size preferences made difficult a comparison between the studies. In fact, some studies were based on self-reported height and weight and this could result in an incorrect estimate of the BMI. Many authors did not utilize appropriate silhouettes for their studies or used self-administered questionnaires without figural references. Moreover, the studies did not report the same information, often overlooking one or more data (i.e. actual self-perception or the ideal body size).

Moreover, our synthesis of the African trend according to a geographical gradient is limited by the uncertainty involved in the data used to calculate the mean values of FID and BMI for each area. This uncertainty relates to the fact that only a few countries and small samples were available for each area. Finally, only a few studies considered individuals of both sexes and the majority of them focused on female body shape or did not separate the results between the two sexes.

In conclusion this research is a state of the art of the principal data regarding body image perception and body ideals in populations of African origin. The trend reported in this review suggests that body dissatisfaction is increasing in correlation to ethnic background, country of origin and host country. The general tendency is a simultaneous increase in BMI and a decrease in FID from SA to NA and Europe. This review highlights and confirms that: a) although in some region there are still an ideal of beauty correlated with plumpness, the majority of the Africa continent are facing a Westernization of the beauty ideals; b) the process of acculturation brings to a change of the beauty ideals; c) these preferences for thin bodies even in developing countries can lead to body dissatisfaction and risk of nutritional disorders.

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## **CHAPTER 3**

# **WEIGHT STATUS AND PHYSICAL ACTIVITY IN CHILDREN OF NORTH AFRICAN IMMIGRANTS IN EUROPE**

In this study we focalized on NA children, providing an overview of the prevalence of overweight and obesity among NA children living in their own countries and children of NA people that migrated to Europe. The problem of nutritional disorders in children is global and children with a migrant background seem to be particularly at risk of developing overweight and obesity. The aim of this research is to analyse the existing relationship between the migration process and the prevalence of overweight and obesity in children, and to discuss possible contributing factors.

This review confirmed the higher prevalence of overweight and obesity among children of North African origin in Europe than North African residents. This trend is evident especially in North African girls. The factors linked to childhood overweight and obesity are confirmed to be acculturation in the host society and factors related to the country of origin.

### **3.1 INTRODUCTION**

Overweight and obesity have increased substantially in the last decades especially among children and adolescent (Ben-Sefer et al. 2009). It has been estimated that over 170 million children were overweight or obese in 2012 worldwide. The highest prevalence is among upper and middle-income countries, but it is rising in all the world (World Health Organization 2012). Overweight and obesity are related to important consequence in physical and psychological health, especially in youth. In particular, obesity is associated with the development of non-communicable diseases, such as cardiovascular diseases and diabetes, and high risk of morbidity and mortality (Lobstein et al. 2004, Haslam and James 2005, Misra and Khurana 2011). Moreover, it can lead to a worsening in quality of life in children (Williams et al. 2005, Tsiros et al. 2009).

The causes associated with this increase of overweight and obesity in youth are, besides genetics, environmental (i.e. family) and cultural. In particular, bad lifestyle habits such as decreased PA, increased sedentary lifestyle and unfavourable changes in eating habits, negatively influence the weight status of youth (World Health Organization 2000, Lee 2005). In immigrant children the prevalence of overweight and obesity seem higher than in the host population (Dotevall et al. 2000, Papadaki and Scott 2002, Satia-Abouta et al. 2002). This can be due to the changes in lifestyle habits that migration and the acculturation process imply. Migrants tend to abandon their traditional food

habits to adopt westernized dietary patterns, with high levels of fat, sugar and salt (Ebenegger et al. 2010). Another aspect responsible for the increasing childhood obesity is the high exposure to media, in particular television, which exposes children to advertising for high-energy snacks, promotes a sedentary lifestyle and reduces PA (Gilbert and Khokhar 2008). PA has an important role in the health status of individuals because, according to the World Health Organisation, “interacts positively with strategies to improve diet, discourages the use of tobacco, alcohol and drugs, helps reduce violence, enhances functional capacity and promotes social interaction and integration” (Lee 2005). Higher presence of physical inactivity among certain groups of migrants has been found (Lindstrom and Sundquist 2001), but in general the research into the association between ethnicity and children’s PA in various countries has yielded discordant results (Fredriks et al. 2005, Sagatun et al. 2008).

Another aspect that can influence the nutritional status in immigrant youths can be the cultural preference for the larger body size. Migrants coming from developing countries usually have preferences for larger body sizes, as they are considered signs of health and wealth, leading the parents to be unconcerned about their children’s overweight or obesity (Fredriks et al. 2005, Labree et al. 2011)

The purpose of this research is to investigate the prevalence of overweight and obesity in children of North African origin migrated to Europe, comparing these data with those obtained from North African resident children. North African migrants form a large part of the population currently living in Europe and seem to be at particular risk of developing overweight and obesity. The researches focused on this topic are scarce, because it has been investigated more extensively in the US than in Europe (Labree et al. 2011). Furthermore, we added data in regard to PA practice and body image perception in these groups. Important factors contributing to the increase of overweight and obesity among children and adolescents are discussed, in particular the westernization of eating habits, the level of physical activity and body image perception. We also discuss the importance of developing specific interventions for these groups at an early stage in order to prevent long-term health problems.

## **3.2 METHODS**

A systematic search in PubMed of original longitudinal or cross-sectional research focused on the prevalence of childhood and adolescent overweight and obesity among ethnic groups from NA compared to the native population was conducted. The researches published on these topics from 2000 to 2014 were included.

The data set included data on: country of origin; size and age of participants; methods used to assess obesity and overweight; body image perception; level of PA.

Studies that included participants under 21 years and reported BMI and percentage of overweight and obesity were eligible for the inclusion. The participants in the included studies were aged from 0 to 21 years. Numerous studies grouped pre- and post-pubescent participants together. In almost all papers (Fredriks et al. 2005, Snoek et al. 2007, de Wilde et al. 2009, de Hoog et al. 2011, de Hoog et al. 2012, Gualdi-Russo et al. 2012, Khanolkar et al. 2013, Veldhuis et al. 2013, de Wilde et al. 2014, Toselli et al. 2014) the body weight status of children was categorized according to BMI values based on IOTF (International Obesity Task Force) recommended cut-off criteria (Cole et al. 2007). Kumar et al. (2004) instead used the US Centers for Disease Control and Prevention (CDC)/National Center for Health Statistics (NCHS) age- and sex-specific BMI reference distributions (Kuczmarski et al. 2000).

Table 5.1 presents an overview of the studies regarding North African immigrant children meanwhile Table 5.2 reported the studies on North African resident children included in this research.

### **3.3 RESULTS**

#### ***3.3.1 Overweight and obesity among North African children in Europe***

Table 3.1 reported the characteristics of the studies focused on the prevalence of overweight and obesity among North African immigrant children in Europe in comparison to native-born. Twelve studies were included. The majority of them reported data on Moroccan immigrants and this can be due to the fact the Moroccans represent one of the largest ethnic minority groups in France (500,000 persons), Belgium (125,000 persons), and the Netherlands (280,000 persons) (Uitewaal et al. 2004).

Moroccan children immigrated to the Netherlands showed to have higher prevalence of overweight and obesity than native children (De Hoog et al 2011, De Hoog et al. 2012, De Wilde et al. 2009, De Wilde et al. 2014, Fredriks et al. 2005, Snoek et al. 2007, Veldhuis et al. 2013). Only the study of Snoek et al. (2007) reported higher prevalence of overweight in Dutch males, although not in females. Fredriks et al. (2005) reported higher prevalence of overweight and obesity in Moroccan and Dutch children living in urban cities than in rural areas. In particular, the biggest prevalence was among Moroccan immigrants aged 4-7 years old and higher in girls than in boys. The results of de Wilde et al. (2009, 2014) highlight that obesity declined significantly in Dutch and Moroccan children between 1999 and 2011, whereas overweight (including obesity) only declined in Dutch children. The differences can be a result of an interaction between biological, cultural, socio-economic and environmental factors.

Immigrant children in Sweden and Norway from NA had higher level of overweight and obesity than the host population (Kumar et al. 2004, Khanolkar et al. 2013). However, it is important to underline that the percentage of overweight is very low in Norway, both in immigrants (4.4%) and in natives (0.6%).

Conversely, in Italian samples, Gualdi-Russo et al. (2012) and Toselli et al. (2014) reported a lower prevalence of overweight in immigrant and African children than in Italian ones. But these two studies reported mixed data of migrants with different countries of origin, not only North African. This results are similar to those of immigrants in Switzerland (Ebenegger et al. 2010), but, in this case, the prevalence of overweight and obesity is strictly connected with the level of parents' education. Higher was the level of parents' education, lower the prevalence of overweight and obesity (Ebenegger et al. 2010).

As regards PA, several studies demonstrate that being less active increases the risk of developing nutritional disorders, such as overweight and obesity (Lee et al. 2012, World Health Organization 2003). In Norway a high proportion (64.1%) of 15-16-year-old adolescents from the Middle East and North Africa watched TV/video/used a computer for more than 3 hours a day and 68.7% were inactive (less than 1 hour of PA a week outside of school) (Kumar et al. 2004). A similar situation was observed in Sweden: adolescent students (mean age 18.1 years) with a foreign background were significantly more physically inactive than students with a Swedish background (54.4% vs 41.1%) and this trend is underlined especially among girls (72.4% vs 44.8%) (Kahlin et al. 2009). In Germany, Lammle et al. (2012) found that immigrant children and those with a lower SES were less physically active than non-immigrant children and those with a higher SES. In Denmark, Nielsen et al. (2013) reported that 6-7-year-old children with an immigrant background had significantly lower participation in organized sports based on self-reported data; however, if their amount of daily PA was objectively measured, they were not less physically active than children from the ethnic majority (86.4 daily minutes of PA vs. 83.3 daily minutes of PA, respectively) because they played outside more often.

As previously reported in the literature, nutritional disorders are strictly connected with body image perception, body dissatisfaction and body size ideals (Pelegrini et al. 2013, Zaccagni et al. 2014). Is therefore important to evaluate these aspects in immigrants and non-immigrants children. In their study Gualdi-Russo et al. (2012) found a good perception of weight status in children of immigrants. In particular, this study reported that the main preference for all the groups was for thin bodies and that body image satisfaction was lower among Italian girls than among migrants. This results are consistent with those of Toselli et al. (2014). Moreover, the latter paper reported that overweight Africans of both sexes had a wrong perception of actual self, perceiving themselves to be thinner than they were. The differences discovered among ethnic groups might be due to different cultural pressure, media influence and comparison with peers (Fitzgibbon et al. 2000). In a study conducted on an Egyptian sample (Jackson et al. 2003), adolescent schoolgirls showed a strong correlation between perceived body size and BMI, reflecting strong acceptance of their body size. Most girls, from both urban and rural areas, wanted to be thin (respectively 51.3% and 40%), while 29.7% of the urban girls wanted to be normal-weight. In the rural sample, 9.1% wanted to be normal-weight



and 9.7% wanted to be overweight, indicating an influence on body image of both the ethnic group to which they belong and the cultural environment in which they live.

**Table 3.1** Overview of studies on the prevalence of overweight/obesity in North African immigrant children in comparison to European populations

First author and publication year	Ethnic group	Sample size	Sex	Age (years)	Prevalence of overweight (and obesity)* (%)	Prevalence of obesity (%)
THE NETHERLANDS						
<b>Fredriks, 2005</b>	Moroccan	2855	Males	0-21	15.8*	3.1
			Females	0-21	24.5*	5.4
	Dutch urban	14500	Males	0-21	12.6*	1.6
			Females	0-21	16.5*	2.8
rural		Males	0-21	8.7*	0.8	
		Females	0-21	11.3*	1.4	
<b>Snoek, 2007</b>	Moroccan	90	Males	11-16	9.1	0.0
			Females	11-16	10.9	2.2
	Dutch	7239	Males	11-16	10.2	0.8
			Females	11-16	6.4	0.6
<b>De Wilde, 2009</b>	Moroccan 1999	1063	Males	3-6	12.8	5.1
				7-10	10.7	7.9
				13-16	9.5	0
				Total	12.1	5.6
			Females	3-6	20.3	7.7
				Total	20.1	7.2
	2007	1480	Males	3-6	11.8	5.9
				7-10	20.8	8.7
				13-16	22.7	8.3
				Total	16.7	7.2
			Females	3-6	18.0	6.3
				Total	20.5	6.6
Dutch						

	1999	5349	Males	3-6 7-10 13-16 Total	7.6 10.8 11.5 8.8	1.8 3.3 0.9 2.2
			Females	3-6 7-10 13-16 Total	10.8 16.2 13.2 12.6	3.4 4.5 3.1 3.7
	2007	5793	Males	3-6 7-10 13-16 Total	5.2 13.1 12.2 8.9	1.2 4.2 2.5 2.3
			Females	3-6 7-10 13-16 Total	8.4 14.1 12.7 10.9	3.5 3.6 2.3 3.3
<b>De Hoog, 2011</b>	Moroccan	245	Males and Females	2	16.7*	-
	Dutch	1718	Males and Females	2	7.1*	-
<b>De Hoog, 2012</b>	Moroccan	161	Males and Females	6.1 (0.5)	28.0*	-
	Dutch	1744	Males and Females	5.7 (0.5)	7.4*	-
<b>Veldhuis, 2013</b>	Moroccan	152	Males and Females	5.8 (0.5)	19.1*	-
	Dutch	7302	Males and Females	5.7 (0.4)	8.2*	-
<b>De Wilde, 2014</b>	Moroccan					
	1999	1059	Males	3-16	18.1*	6.0
			Females	3-16	26.1*	7.6
			Males and Females	3-16	22.1*	6.8
	2007	1484	Males	3-16	23.9*	7.1
			Females	3-16	27.5*	7.2
			Males and Females	3-16	25.7*	7.2
	2011	1606	Males	3-16	23.2*	5.3
			Females	3-16	22.5*	5.5
			Males and Females	3-16	22.8*	5.4
	Dutch					

	1999	5346	Males Females Males and Females	3-16 3-16 3-16	11.3* 16.0* 13.6*	2.2 3.9 3.0
	2007	5793	Males Females Males and Females	3-16 3-16 3-16	11.3* 14.3* 12.8*	2.3 3.4 2.8
	2011	7114	Males Females Males and Females	3-16 3-16 3-16	10.6* 12.3* 11.4*	1.6 1.9 1.8
SWEDEN						
<b>Khanolkar, 2013</b>	North African	97	Males and Females	4.8	28*	-
	Swedish	9342	Males and Females	4.8	16*	-
NORWAY						
<b>Kumar, 2004</b>	Middle East/North African <sup>a</sup>	340	Males Females	15-16 15-16	4.4 0.6	- -
SWITZERLAND						
<b>Ebenegger, 2011</b>	Migrant <sup>b</sup> Low PEL	189	Males and Females	5.2±0.6	17.1	-
	Medium/high PEL	197	Males and Females	5.2±0.6	10.3	-
	Non-migrant Low PEL	11	Males and Females	5.2±0.6	27.3	-
	Medium/high PEL	145	Males and Females	5.2±0.6	6.2	-
ITALY						
<b>Gualdi-Russo, 2012</b>	Migrant <sup>c</sup>	321	Males Females	8-9 8-9	16.9 (28.3)* 16.8 (21.3)*	11.4 4.5
	Italian	2385	Males Females	8-9 8-9	22.1 (31.4)* 20.2 (29.1)*	9.3 8.9
<b>Toselli, 2014</b>	African	60	Males Females	8.2 (1.5) 8.4 (1.7)	12.9 17.2	3.2 10.3
	Italian	1208	Males Females	8.3 (1.2) 8.4 (1.4)	20.9 22.3	8.7 6.8

PEL = Parental Educational level; <sup>a</sup> Algeria, Morocco, Turkey, Iran and Iraq; <sup>b</sup> European and non-European countries (Africa, Asia, Latin America);

<sup>c</sup> Moroccans, Albanians, Romanians, Chinese and Tunisians.

### ***3.3.2 Overweight and obesity among North African children living in NA***

In Table 3.2, the data regarding the prevalence of overweight and obesity in North African resident children are reported. The results highlight that several countries in NA had high levels of childhood overweight/obesity. In particular, Egypt shows a prevalence of overweight/obesity over 25% in preschool children, meanwhile the prevalence of obesity increased from 2.2% in the 1970s to 8.6% in 1996 (Martorell et al. 2000). Similar trends are found in other parts of NA. In Morocco the prevalence of obesity (WHZ>2) among preschool children rose from 3.1% (2.6% for boy and 3.6% for girls) in 1987 to 13.3% in 2003-2004, being slightly higher among boys (14.3%) than girls (12.4%). In Tunisia increased from 3.5% in the late 1980s to 12.8% in 2007 (de Onis et al. 2010). In general, the prevalence of obesity was higher among urban children than rural ones (14% vs. 12.6% in Morocco) (Mokhtar et al. 2001). Furthermore, the prevalence of overweight/obesity is reported to be higher in older children and adolescents in comparison to pre-schoolers in NA countries (Jackson et al. 2003, Salazar-Martinez et al. 2006, Kelishadi 2007), with reported prevalence of obesity among under-age-five higher than the overall prevalence in developing countries (de Onis et al. 2010).

The study of Mokhtar et al. (2001) showed that 9.1% of adolescent Tunisian girls were at risk of overweight, meanwhile Ghannem et al. (2003) reported higher rates in rural areas (13.7% overall: 16% of girls and 11% of boys). The same authors, in another study (Ghannem et al. 2001), reported a rate of 9.5% overweight among adolescents in a rural area of Tunisia (Sousse) (7.6% among males vs. 11.1% among females). Another study on Tunisian adolescents found out that 20.4% of girls and 17.4% of boys aged 15-19 years were overweight.

In Algeria, the rates of overweight/obesity in boys aged 6-10 years old were 6.8% in 2001 and 9.5% in 2006 (Oulamara et al. 2009), meanwhile the rates in girls were 8.7% (World Obesity Epidemics 2014). According to one of the latest surveys conducted in Algeria (2010-2011), 4.5% of girls aged 15-18 were obese and 15.5% were overweight (Musaiger et al. 2012). A decreasing trend of obesity and overweight, from 17.39% in 1995/98 to 8.49% in 2005/2007, was observed in a study of 21,618 4-13-year-old children in eastern Algeria, but this finding was not corroborated by those from other cities in Algeria or other NA countries (Oulamara et al. 2009, Taleb et al. 2010).

In Egypt (1998), the prevalence of obesity was 4.9% of 6-10-year-olds, 14.7% of 10-14-year-olds and 13.4% of 14-18-year-olds in children (Galal 2002). In another study of Egyptian female adolescents, 35% of girls were overweight and 13% were obese (Jackson et al. 2003). According to a recent study, 12.1 percent of Egyptian adolescents (7% of boys and 18% of girls) were overweight and 6.2% (6% of boys and 8% of girls) were obese (Salazar-Martinez et al. 2006). The only available data in Morocco on prevalence of overweight among adolescents are from two studies conducted among school-age children, one in Marrakech and the other in Rabat (Cherkaoui Dekkaki et al. 2011, Sebbani et al. 2013). The first study showed that the rates of overweight and obesity were 8% and 3% based on the WHO reference, while the respective values were 12.2% and 5.4% based on the

IOTF reference. The other study, a cross-sectional survey of children enrolled in government primary schools, reported a prevalence of overweight/obesity of 8.7%, while overweight affected 5.1% and obesity affected 3.6%.

In Morocco, Tunisia and Algeria the percentage of overweight/obese children was inversely proportional to the number of times a week they played sports (Ben Amara et al. 2008, Taleb et al. 2010, Cherkaoui Dekkaki et al. 2011, Saker et al. 2011). A survey of young Moroccans in 2006 reported a strong lack of awareness of the benefits of PA and its role in the prevention of obesity. This survey also showed that maintaining an ideal weight by practicing PA was devalued among less educated and poorer young people. Only 14% of girls were reported to consider sport the means to maintain a healthy weight as compared to 27% of boys.

**Table 3.2** Overview of studies on the prevalence of overweight/obesity in North African children

First author and publication year	Ethnic group	Sample size	Sex	Age (years)	Prevalence of overweight (and obesity)* (%)	Prevalence of Obesity (%)
<b>ALGERIA</b>						
Ben Amara, 2008	Algerian (East)	251		8-12	15.9 (21.5)*	5.6
Oulamara, 2009	Algerian	19263	Total (2001) Total (2006)	6-10 6-10	6.8 9.5	
Taleb, 2009	Algerian (urban area)	912	Total	6-12	18.6 (23.9)*	5.3
Musaiger , 2011	Algerian	459	Males Females	15-18	9.3 (13.4)* 15.5 (20)*	4.1 4.5
Saker, 2011	Algerian	1520	Total Females Males	6-8	8.2 7.5 8.8	6.5 6.2 6.8
Raiah 2012	Algerian (Oran)	2252	Total Males Females	6-11	10 (13.1)* 7.7 (10)* 12.4	3.1 2.3 4
<b>EGYPT</b>						
de Onis, 2000	Egyptian	9766	Total	0-4.99	8.6	-
Salazar-Martinez, 2006	Egyptian	1502	Total Females  urban rural  Males Females	11-19 11-14 15-19  11-19 11-19  11-19 11-19	12.1 7.2 6.5  11.1 4.6  7 18	6.2 6.6 5.9  11.4 3.5  6 8
Jackson , 2007	Egyptian	340	Females	10-19	35	13
National Nutrition Institute, 2008	Egyptian	6018	Males Females	10-18	11.5 15.2	6.5 7.7
<b>MOROCCO</b>						
MdS, 2005	Moroccan	5621	Total Males Females urban	0-5	13.3 14.3 12.4 14.0	-

			rural		12.6	
Rguibi, 2007	Moroccan	4654	Total	<36 months	3.1	-
			Males		2.6	
			Females		3.6	-
			urban		4.3	
			rural		2.5	
Rguibi, 2007	Moroccan	4502	Total	0-5	9.2	-
			Males		9.5	
			Females		8.8	-
			urban		10.1	
			rural		8.6	
Cherkaoui Dekkaki, 2011	Moroccan (Rabat)	1570	Total	7-14	5.1 (8.7)*	3.6
			Females		6.5	4.2
			Males		3.7	3
Sebbani, 2013	Moroccan (Marrakech)	1418	Total	8-15	8	3
<b>TUNISIA</b>						
Ben Miled, 2000	Tunisian	951	Total	6-12	-	5.25
Ghannem, 2001	Tunisian (Sousse-rural area)	793	Total	12-17	9.5	4
			Males		7.6	
			Females		11.1	
Ben Slama, 2002	Tunisian (Ariana)	3148	Total	6-10	-	3.7
Ghannem, 2003	Tunisian (Sousse-urban area)	1569	Total	13-19	13.7	7.9
			Males		16	6.0
			Females		11	9.7
Aounallah-Skhiri, 2005	Tunisian	2928	Males	15-19	17.4	4.1
			Females		20.4	4.4
			Males urban		21.7	4.8
			Males rural		10.4	2.8
			Females urban		21.7	4.6
			Females rural		19.2	4.2
ONEP/UNICEF, 2007	Tunisian	2741	Males	0-4.99	5.6	-
			Females		7.2	
			urban		6.8	
			rural		5.5	
Boukthir, 2011	Tunisian	1335	Total	6-12	19.7	5.7
			Males		10.98	5.96
			Females		16.67	5.58



### 3.4 DISCUSSION

In the past decades the prevalence of childhood overweight and obesity has risen both in high-income and low-income and middle-income countries (Lobstein et al. 2015). The risk of developing overweight and obesity is especially high in children of immigrants because low SES and migration from developing countries have been indicated as predictors of nutritional disorders (Lahmann et al. 2000).

The main findings of this research is the high and increasing prevalence of overweight and obesity both in North African immigrant children living in Europe and in North African resident children. In several European countries the prevalence of overweight and obesity was higher among children of North African immigrants than the native children of both sexes (De Hoog et al 2011; De Hoog et al. 2012; De Wilde et al. 2009; De Wilde et al. 2014; Fredriks et al. 2005; Khanolkar et al. 2013; Kumar et al. 2004; Snoek et al. 2007; Veldhuis et al. 2013), even if this trend is not uniform among all the countries of migration, for example in Italy (Gualdi-Russo et al. 2012; Toselli et al. 2014) and Switzerland (Ebenegger et al. 2011). The prevalence of overweight and obesity seems to be higher in North African female children and adolescents than in males both in Europe and in North African countries, suggesting that girls are particularly at risk (De Wilde et al. 2009; Fredriks et al. 2005; Musaiger et al. 2011; Raiah et al. 2012). These differences among migrants and non-migrants and among ethnic groups are likely to be explained by socioeconomic and socio-cultural factors. Childhood overweight and obesity among North African immigrants in Europe are conditioned by factors linked to acculturation in the host society (the acquisition of Western eating habits) and other aspects maintained from the country of origin (e.g. body image perception, low PA, women's status and their place in society, etc.).

The relationship between childhood overweight/obesity and the immigrant status of the mother has already been studied in the literature, but the results are not always consistent. For example, in Italian studies (Gualdi-Russo et al. 2012; Toselli et al. 2014) the prevalence of overweight in both sexes was higher in children of Italian mothers than in those of immigrant mothers. As regard obesity, Gualdi-Russo et al. (2012) found a higher prevalence in Italian daughters than in immigrants (multi-ethnic sample), meanwhile Toselli et al. (2014) found a higher prevalence in African girls than in Italian girls. On the other hand, Ebenegger et al. (2010) found no influence of parents' immigrant status on adiposity and eating habits in children in Switzerland. Veldhuis et al. (2013) found that, as early as 5 years of age, children of Moroccan ethnic background were at increased risk of overweight compared to Dutch contemporaries owing to parental weight status.

In addition to this, de Hoog et al. (2012) found that Moroccan mothers are more likely to underestimate their normal weight and overweight children and this can lead children at higher risk of developing nutritional disorders: first-generation immigrant mothers are more tied to their culture

of origin than the mothers born in the Netherlands and they have a more favourable approach toward a condition of obesity. Ethnic differences in maternal underestimation are partly explained by their lower educational level. Snoek et al. (2007) and Ebenegger et al. (2010) found that Moroccan and Dutch children with lower educational levels had a higher prevalence of overweight and obesity than those with higher education, although Dutch adolescents had lower percentages of overweight and obesity than Moroccan ones. Ebenegger et al. (2010) found that parental migrant status and low educational level were related to a higher BMI.

In addition to genetic factors, food habits, environment and lack of PA, further explanation for the increasing obesity levels in children can be the influence of maternal pre-pregnancy BMI (Hassan et al. 2016). Women from ethnic minority groups show high prevalence of overweight and obesity and this may be a predictor of the higher level of nutritional disorders in their preschool children. Maternal weight gain during pregnancy is associated with the child's weight and weight gain in the first period of life, due to genetic factors and feeding practice. In fact, in support of this theory, children of Moroccan and North African origin had higher overweight than native Dutch and Swedish children already from 2 to 5 years of age (de Hoog et al. 2011, Khanolkar et al. 2013, Veldhuis et al. 2013). Moreover, Hof et al. (2011) found a higher BMI in Moroccan infants of all ages compared to Dutch children.

Another major predisposing factor is the lack of a health-conscious exercise culture among NA societies (Mokhtar et al. 2001). In particular, the lack of exercise is higher in North African girls than in boys. This fact can explain also the higher prevalence of overweight/obesity in girls than in boys. Despite the evidence of a positive relationship between PA and health, technological progress results in a more inactive lifestyle from an early age due to the wide diffusion of static games. Watching TV was more prevalent in children of immigrants or with low educational level parents and could contribute to overweight and obesity through an increase in caloric intake and inactivity.

As regard North African residents a relatively high percentage of overweight was observed among adolescents at age 15-18 years in Algeria (9.3%) and at age 13-14 years in Tunisia, while in Egypt the most consistent factors correlated with BMI were age and rural residence (Salazar-Martinez et al. 2006). Childhood obesity was most prevalent in urban areas and among the higher socio-economic classes in NA. In Tunisia, for example, obesity was more frequent in males of high SES, and about half of obese adolescents had excess calories and fat intake and a family history of obesity. A similar picture was seen in Egypt, where the prevalence of obesity among high SES adolescents was more than double that among low SES groups and more prevalent in urban girls than in rural girls (Ibrahim et al. 2000, Jackson et al. 2003). As reported by Kanter and Caballero (2012), gender disparities in overweight and obesity are exacerbated among females in developing countries, particularly in the Middle East and NA. This was the case of Tunisia and Morocco, where the risk of overweight among adolescent girls was found to increase with age, while it decreased in boys (Kanter and Caballero

2012). The suggested underlying factors that appear to affect this gender disparity in overweight and obesity include socio-cultural beliefs and practices. These differences between sexes and areas of residence are still very important, particularly in young women. This cannot be explained only by cultural and sociological factors, but it reveals another aspect of the status of women within the society and their place in the public space (Ministere de la Santé 2005).

Body image perception and beauty ideals among North African societies can exacerbate the problem, as overweight and obesity are not perceived as a threat to health but are considered desirable and are associated with good health, higher social status, fertility and prosperity (Mokhtar et al. 2001)

There are some limitations to this review. Firstly, some studies were based on self-reported height and weight: self-reported height tends to be slightly overestimated and weight underestimated, resulting in a misperception of BMI. Secondly, the ethnic origin of children was based on the country of birth of one or both parents. Moreover, in most studies the generation of immigration was not reported. Since the assessment of migration status is not uniform, comparisons between studies are difficult. Therefore, accurate quantification of PA levels is required: the principal limit is the absence of a valid instrument for measuring the full complexity of PA in children, as they perform a large amount of unplanned play activities that cannot be assessed by self-report methods.

As overweight and obesity in childhood are associated with serious health risks, it is important to target the most at risk groups (i.e. daughters of immigrants) with health promotion messages and lifestyle intervention strategies aimed at preventing overweight, e.g. promotion of a healthy diet, information on the health risks linked to overweight and obesity and on the role of PA in weight control.

### **3.5 REFERENCES**

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## **CHAPTER 4**

# **NORTH AFRICAN WOMEN MIGRATED TO ITALY: WEIGHT STATUS, FATNESS AND BODY IMAGE PERCEPTION**

International migration is one of the major challenging phenomena of the modern World. Immigrants has to face a lot of difficulties and stressful events during and after the migration process. In particular, immigrant women from developing countries have to face the change of culture and lifestyle habits and this can negatively influence their psychological well-being and health status.

The objective of this study is to investigate the nutritional status of North African immigrant women in Italy examining their body size, adiposity and body image perception in comparison to Italian natives and North African residents. For this purpose, the data collection comprised anthropometric measures for the assessment of weight status and body composition, the assessment of body image perception and body dissatisfaction by silhouette drawings, and a questionnaire for the collection of data on physical activity levels and socio-demographic characteristics.

The study's results state a high prevalence of overweight and obesity in immigrant women, who have the greatest values of general, abdominal and peripheral obesity. All the ethnic groups investigated show a preference for normal weight bodies and immigrants are the most dissatisfied.

This research highlights and confirms that immigrants are at high-risk of developing and maintain obesity.

### **4.1 INTRODUCTION**

Overweight and Obesity are a major burden of health system worldwide that affects mainly low-income populations and ethnic minorities (Candib 2007, Ng et al. 2014). Overweight and obesity are risk factors for type 2 diabetes, heart disease, high blood pressure, and other health problems (Ng et al. 2014, Haslam and James 2005). The causes of overweight and obesity are a result of a complex issue that comprises dietary habits, physical inactivity and a wide range of cultural and psychological factors (Jebb 2004, World Health Organization 2000).

The change of environment caused by the migration process might increase the risk of developing overweight and obesity (Fu and VanLandingham 2012). In many European countries the prevalence of overweight and obesity is higher among immigrants than the host population (Dijkshoorn et al.

2008) and in some cases, the prevalence of nutritional disorders is also higher among immigrants than their compatriots still residing in the country of origin (Agyeman et al, 2009). Moreover, although limited information is available, they seem to show a higher prevalence in abdominal obesity than residents in their countries of origin (Carlsson et al. 2014, Toselli et al. 2014) and host country natives (Carlsson et al. 2014). In addition to general obesity, evaluated through BMI (World Health Organization 2000), central obesity (evaluated as WC, WHR and WSR) is a well-established indicator of increased cardiovascular risk (Ho et al. 2003, Huxley et al. 2010). Furthermore, the probability of being overweight/obese rises with the increasing time of residence in the host country (Lauderdale and Rathouz 2000). The process of acculturation implies a change in immigrants' lifestyle habits, resulting in an immigrant's contact with the obesogenic environment typical of the Western society and the lack of PA practice. In addition, migrants' attitude is influenced by host population's socio-cultural context (Mavoa et al. 2010).

As reported previously, physical inactivity is one of the major cause connected with nutritional disorders, non-communicable diseases and adverse health outcomes (Kohl et al. 2012, Lee et al. 2012). Relatively few researches have been done regarding the relationship between PA and immigration/acculturation process (Unger et al. 2002), reporting lower levels of PA in immigrants than in the host population with an increasing risk for immigrants of poor health, nutritional disorders and psychological distress (Epstein et al. 2008, Gerber et al. 2012).

Obesity and overweight are strongly correlated also with psychological and cultural factors. After migration, the new socio-cultural context is likely to influence food intake (Lawton et al. 2008), PA patterns (Slattery et al. 2006), as well as perception and desire regarding body weight (Batnitzky 2010). The influence of culture in body size preferences is a well-studied topic, but only few studies have considered this issue among non-Western migrants to European countries (Brug et al. 2006; Bush et al. 2001). Migrants are expected to adopt the body size ideals of the host society, preferring thin bodies (Nicolaou et al. 2008). The importance of body perception is evident because of its association with risks of eating disorders, depression and low self-confidence (Stice and Whittenton 2002). This is exacerbated also by the age at the time of migration and period of residency in the new country (Calzada and Anderson-Worts 2009). The perception of one's body image has an important role in the etiology of obesity since awareness of weight status is an important factor in weight loss attempts (Acevedo et al. 2014).

Body perception and body size ideals vary accord to ethnicities and cultural background (Dorsey et al. 2009). In higher social classes of developing countries, such as North African ones, thin bodies preferences begin to gain ground (Nicolaou 2008, Gualdi-Russo et al. 2016), meanwhile other sub-groups would prefer a heavier body, misperceiving their overweight/obesity (Rguibi et al. 2004; Duncan et al. 2011). In general, the adoption of Western ideal of beauty puts immigrants at risk of body dissatisfaction and correlated nutritional disorders (Nicolaou et al. 2008, Swami et al. 2012).

The aim of the present research is to investigate the differences between North African immigrant women in Italy and both North African residents in their countries of origin and Italian natives in regard to 1) prevalence of obesity and fat distribution (generalized, central and peripheral fatness), 2) body image perception and preferences.

## **4.2 METHODS**

### ***4.2.1 Subjects***

Participants to the present research were 463 women aged 18-60 years living in Italy, Morocco and Tunisia, randomly selected. The women belonged to four sub-samples: North African immigrants in Italy, Moroccan residents, Tunisian residents and a sample of Italian natives used as a control group. The inclusion criteria for immigrants were: women aged 18 years or older, non-pregnant, apparently in healthy status, born in NA and residing in Emilia-Romagna region (northern Italy) for at least 2 years. Inclusion criteria for Italians and North African residents were: women aged 18 years or older, non-pregnant, apparently healthy and with an Italian, Tunisian or Moroccan origin.

The anthropometric survey and the questionnaire fill in were performed in Bologna and Ferrara (Emilia-Romagna region, northern Italy) at public health clinics (gynecological surgeries) for North African immigrants and Italian natives or, only for immigrants, at community centers where they used to meet. The North African resident women were recruited at public health or social centers in Tunis (Tunisia) and Casablanca (Morocco) in accordance with local ethics regulations. The study was approved by the Independent Ethics Committee, Azienda Unità Sanitaria Locale (AUSL), Bologna, Italy.

At the end of the selection process, the total sample consisted of 433 women (93%). We excluded respondents with missing information on body image perception or anthropometric data. Of a sample of 117 immigrant women, 105 fulfilled the selection criteria. The final immigrant sub-sample included 85.7% Moroccans, 7.6% Tunisians, and 6.7% women from other countries (Algeria and Egypt). They were all first-generation immigrants and their mean duration of living in Italy was  $9.2 \pm 6.16$  years.

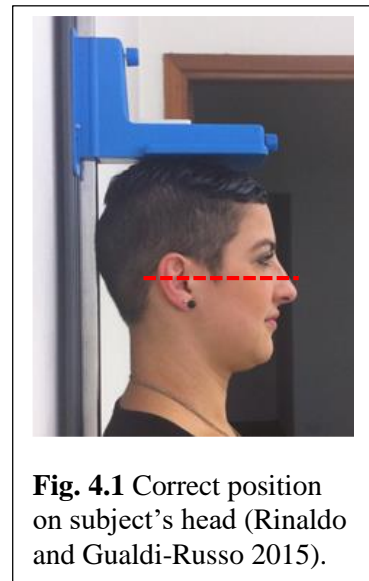
Of the 138 Moroccan women living in Morocco and 105 Tunisian women living in Tunisia surveyed in January and February 2014, 124 Moroccans and 104 Tunisians met the selection criteria. A sub-sample of 100 native Italian women (out of 103) was selected as a control.

#### 4.2.2 Data collection

Face to face interviews were held from June 2013 to January 2015 in Italy and NA by a female interviewer with the help of a cultural mediator. A structure questionnaire available in Italian and Arab was used (see Appendix 1). We included questions regarding demographic characteristics of the participants (age, marital status, number of pregnancies), migration status (years since immigration) and educational level. All the participants signed an informed consent.

#### 4.2.3 Anthropometric measures

Height (Ht) was measured to the nearest 0.1 cm using an anthropometer (GPM, Swiss), correctly positioning the head in the Frankfurt horizontal plane in an upright position (Fig. 4.1). BW was measured to the nearest 0.1 kg using a calibrated electronic scale after removal of shoes, jackets, heavy clothes and pocket contents. BMI was calculated as BW (kg) divided by Ht (m) squared. This index was used to assess the weight status of each subject, according to World Health Organization (WHO) cut-off points (World Health Organization 2000), classifying women as underweight (BMI <18.5), normal weight ( $18.5 \leq \text{BMI} < 25.0$ ), overweight ( $25.0 \leq \text{BMI} < 30.0$ ) and obese (BMI  $\geq 30$ ) (James et al. 2001).

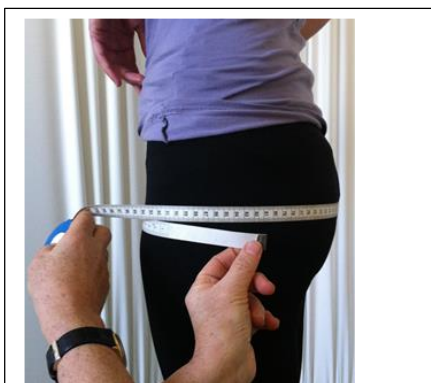


TST was measured to the nearest 0.1 cm on the left side (Weiner and Lourie 1981) (Fig. 4.2) with a Lange caliper (Beta Technology Inc., USA).





**Figure 4.3** Waist circumference (Rinaldo and Gualdi-Russo 2015)



**Figure 4.4** Hip circumference (Rinaldo and Gualdi-Russo 2015).

WC (Fig. 4.3) and HC (Fig. 4.4) were measured to the nearest 0.1 cm with a non-stretchable tape:



**Figure 4.5** Mid-upper arm girth (relaxed) (Rinaldo and Gualdi-Russo 2015).

WC was measured between the lowest rib and the iliac crest and HC at the widest part of the hip. Mid-UAC (Fig. 4.5) was measured to the nearest 0.1 cm with a non-stretchable tape on the left side at the level of the TST. WHR was computed as  $W/H$  and WSR as  $WC/stature$  in cm. TUA, UMA, UFA and AFI (%) were computed from measurements of upper arm circumference and triceps skinfold thickness (Frisancho 2008).

For a detailed description of the measures utilized for the assessment of weight status and body composition and the related anthropometric indices see chapter 1 of this thesis. The practical rules for a correct collection of the anthropometric

data have already been reported in Rinaldo and Gualdi-Russo (2015).

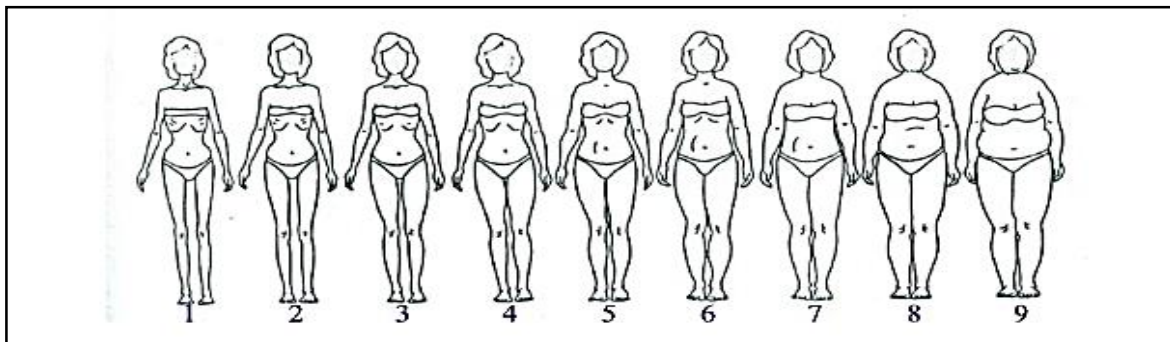
#### **4.2.4 Body image perception**

The nine silhouette drawings designed by Thompson representing female figures of varying fatness were used for all the questions related to body size perception and preferences (Thompson and Gray 1995) (Fig. 3.6). The women were instructed to indicate the silhouette that represents better their body size and their ideal figure in order to assess both the perceived and desired body image (See appendix 1).

The discrepancy score FID (McIza et al. 2005) was obtained subtracting the ideal from the perceived silhouettes chosen by participants: a 0 score indicates no discrepancy, a positive score that the perceived figure is bigger than the ideal, a negative score that the perceived figure is thinner than the

ideal. In the last two cases, the extent of discrepancy represents the degree of dissatisfaction in body image perception.

The new index FAI (Zaccagni et al. 2014) was used to evaluate the potential misperception of weight status. The method developed by Zaccagni et al. (2014) was applied to Thompson's silhouettes (Fig. 4.6) and then the inconsistency score FAI was calculated by subtracting the conventional code assigned to the actual weight status of the subject (1: underweight; 2: normal weight; 3: overweight; 4: obese) from the code of her perceived figure (1: figures 1 and 2; 2: figures 3-5; 3: figures 6 and 7; 4: figures 8 and 9). A 0 score of FAI indicates no inconsistency in weight status perception, a positive score that weight status is overestimated, a negative score that weight status is underestimated.



**Fig. 4.6** Silhouette drawings of female figures of varying fatness (Thompson and Gray 1995)

#### **4.2.5 Data Analysis**

The data analysis was performed using “Statistica” for Windows, Version 11.0 (StatSoft Italia srl, Padua, Italy). The whole sample was divided in four sub-groups according to ethnicity and migration status. The normality of variables was checked by the Shapiro-Wilk W test. Triceps skinfold values were logarithmically transformed (10-based) before statistical comparisons.

Descriptive statistics were computed for each sub-sample (mean, standard deviation, frequency). For categorical variable  $\chi^2$  test was applied; continuous data were analyzed using t-test or ANOVA. The comparisons were performed between immigrants and Italian natives and between immigrants and NA residents. For the comparisons of the anthropometric traits and body image perception analysis of covariance (ANCOVA), controlling for age was used. Tukey post-hoc test was then used among ethnic groups.

$P < 0.05$  was considered as statistically significant.



## 4.3 RESULTS

### 4.3.1 *Sample characteristics*

In the first part of table 4.1 are reported the socio-demographic and biological characteristics of the four sub-sample, whereas the second part of the table reports data regarding sport and physical activity practice. The mean age of the participants is significantly different between the four sub-samples, with Moroccan residents ten years older than Tunisian residents and more than three years older than Immigrants. The differences between Italians and Immigrants is lower (three years) although significant. Immigrant sample has the greater number of children and pregnancies, three times higher than Italians and Tunisian residents (who are however significantly younger) and slightly higher than that of residents in Morocco. The age at menarche of immigrant women is significantly higher not only than Italians, but North African residents as well. As regard the level of education, immigrants have the lowest level, especially in comparison to Italians: more than half of the immigrant women had attended primary or junior schools or had no education at all. Despite that immigrants have the lower percentage of higher education, the sample of Moroccan residents is the group with the higher rate of illiteracy. Approximately 80% of immigrants are unemployed (or homemakers) compared to less than 10% of unemployment in Italians (the lowest percentage). The percentage of unemployment is significantly lower even among NA residents, especially Tunisians, that have also the higher rate of students. Nearly 90% of the NA immigrant women are married and this value is much higher than in the other groups (with the lowest percentage in Italian natives). Almost all the North African immigrant women reported that they are non-smokers, while a third of the Italian sub-sample consists of smokers. In the few smokers in the immigrant sub-sample, there was a later start to smoking ( $21.7 \pm 5.12$  yrs) and a lower average daily consumption ( $8.2 \pm 6.09$  cigarettes) than in the Italian natives (onset age:  $19.2 \pm 5.43$ ; cigarettes/day:  $9.3 \pm 5.43$ ) and Tunisians (onset age:  $19.6 \pm 6.94$ ; cigarettes/day:  $11.1 \pm 10.0$ ).

The second part of the table (Table 4.1, second part) reports the percentage of sport practice and the amount of physical activity described as days per week and hours per week. The percentage of Italian women that play sport is higher than immigrant women even though it is not statistically significant. Both immigrants and Italian residents practiced physical activity less than two days per week and no more than two hours. Comparing immigrant women with North African resident women we can see slight differences in the sport practice, with immigrants less active than the other groups. All the groups practiced PA only one day and a half per week but the differences between the hours per week is almost significant because Tunisians practiced physical activity more than two hours meanwhile immigrants and Moroccans less than two hours.

**Table 4.1** Socio-demographic and biological characteristics of participants and sport practice by ethnic group (Italians =100; NA immigrants = 105; Tunisians =104; Moroccans =124)

	ITALIANS		NA MIGRANTS IN ITALY		TUNISIANS		MOROCCANS		NA MIGRANTS VS ITALIANS	NA MIGRANTS VS NA RESIDENTS
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	<i>P</i> value <sup>a</sup>	<i>P</i> value <sup>b</sup>
Age, yrs	33.1	12.0	36.3	7.8	28.7	11.5	39.5	13.1	0.023	<0.001
N. children	0.6	1.0	1.9	1.3	0.6	1.1	1.6	2.0	<0.001	<0.001
N. pregnancies	0.7	1.3	2.2	1.5	0.8	1.4	1.7	2.2	<0.001	<0.001
Age at menarche, yrs	12.2	1.4	13.7	1.5	12.8	1.5	13.2	1.3	<0.001	<0.001
	%		%		%		%		<i>P</i> value <sup>c</sup>	<i>P</i> value <sup>c</sup>
School degree									<0.001	<0.001
None	0.0		12.4		2.9		22.1			
Primary	1.0		14.3		11.5		12.3			
Junior high	7.0		28.6		12.5		10.6			
High school	27.0		27.6		21.1		10.6			
University	65.0		17.1		51.9		44.3			
Marital status									<0.001	<0.001
Single	69.0		6.7		66.3		41.0			
Married	26.0		85.7		30.8		54.1			
Divorced	4.0		7.6		1.9		3.3			
Widow	1.0		0.0		1.0		1.6			
Work status									<0.001	<0.001
Paid employment	53.0		19.0		29.7		42.2			
Unempl./home maker	9.0		78.1		13.9		33.6			
Student	38.0		2.1		56.4		24.2			
Smoker									<0.001	<0.001
Yes	30.0		5.7		17.3		0.8			
No	64.0		94.3		77.9		99.2			
Ex	6.0		0.0		4.8		0.0			
Sport practice										
Yes (%)	51.0		38.5		47.1		48.7		0.064	0.291
No (%)	49.0		61.5		52.9		51.3			
Days/week (mean ± SD)	1.6 ± 1.5		1.4 ± 2.2		1.5 ± 2.2		1.5 ± 2.2		0.451	0.975
Hours/week (mean ± SD)	1.8 ± 2.2		1.7 ± 2.6		2.4 ± 4.1		1.4 ± 2.1		0.689	0.055

<sup>a</sup> Comparisons performed using t test; <sup>b</sup> comparisons performed using ANOVA; <sup>c</sup> comparisons performed using chi square test.

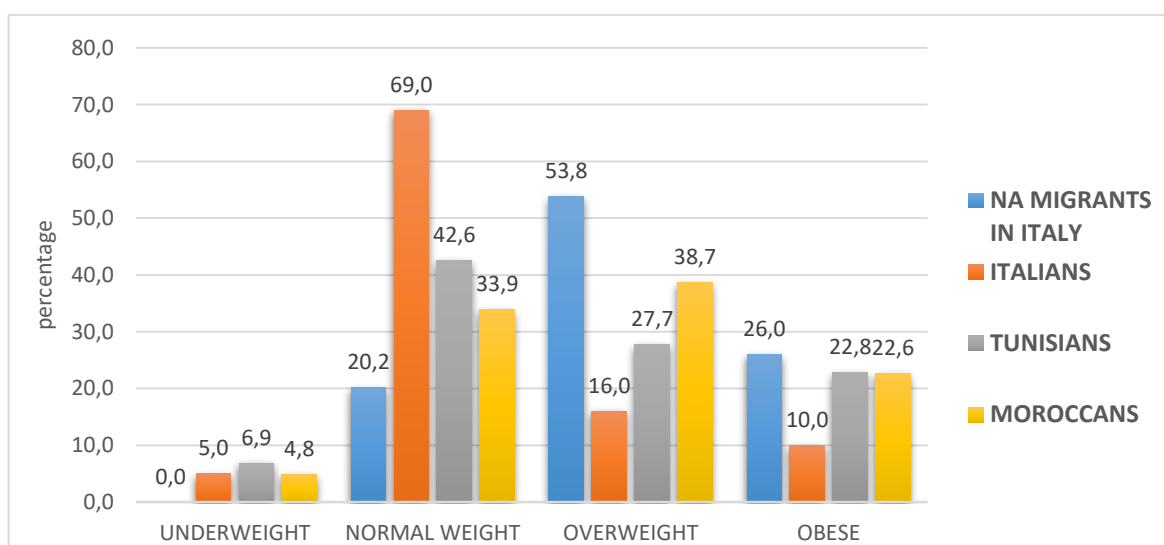
### 4.3.2 Weight status, anthropometric traits and indices

The highest prevalence of overweight/obesity was observed in immigrants (79.8%), followed by Moroccans (61.3%) and Tunisians (50.5%) (Table 4.2, Fig. 4.7). Italian women have the lowest prevalence (26%). There is also a total lack of underweight subjects among the immigrants, unlike in the other groups. The differences are statistically significant.

**Table 4.2** Prevalence (%) of nutritional status (BMI) by ethnic group (Italians =100; NA immigrants = 105; Tunisians =104; Moroccans =124).

	ITALIANS	NA MIGRANTS IN ITALY	TUNISIANS	MOROCCANS	NA MIGRANTS VS ITALIANS	NA MIGRANTS VS NA RESIDENTS
	%	%	%	%	<i>P</i> value <sup>c</sup>	<i>P</i> value <sup>c</sup>
Weight status					<0.001	<0.001
Underweight	5.0	0.0	6.9	4.8		
Normal weight	69.0	20.2	42.6	33.9		
Overweight	16.0	53.8	27.7	38.7		
Obese	10.0	26.0	22.8	22.6		

<sup>c</sup> Comparisons performed using chi square test.



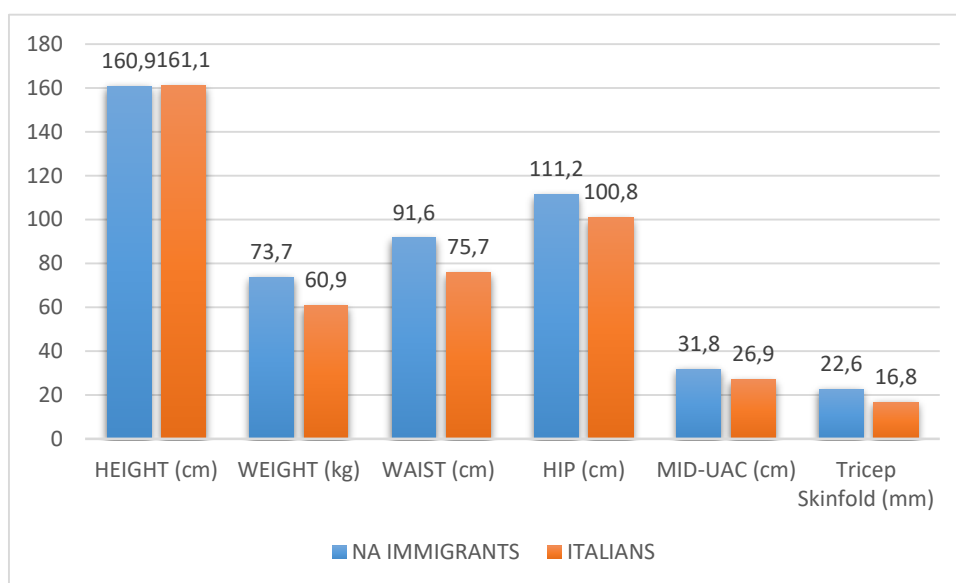
**Fig. 4.7** Histogram representing the weight status of the four ethnic groups.

Table 4.3 and 4.4 display the sub-sample characteristics and results of the ANCOVA. Table 4.3 shows the anthropometric characteristics of North African immigrants and Italian natives based on measured data. The analysis of the covariance adjusted for age reports a difference between immigrants and Italians in all anthropometric traits, with the exception of height, and all anthropometric indices. North African immigrants had higher general (BMI), central (WC, WHR and WSR) and peripheral (AFI) fatness. However, North African immigrants had also higher values of muscularity in the upper arm area (UMA) (Fig. 4.8-4.9).

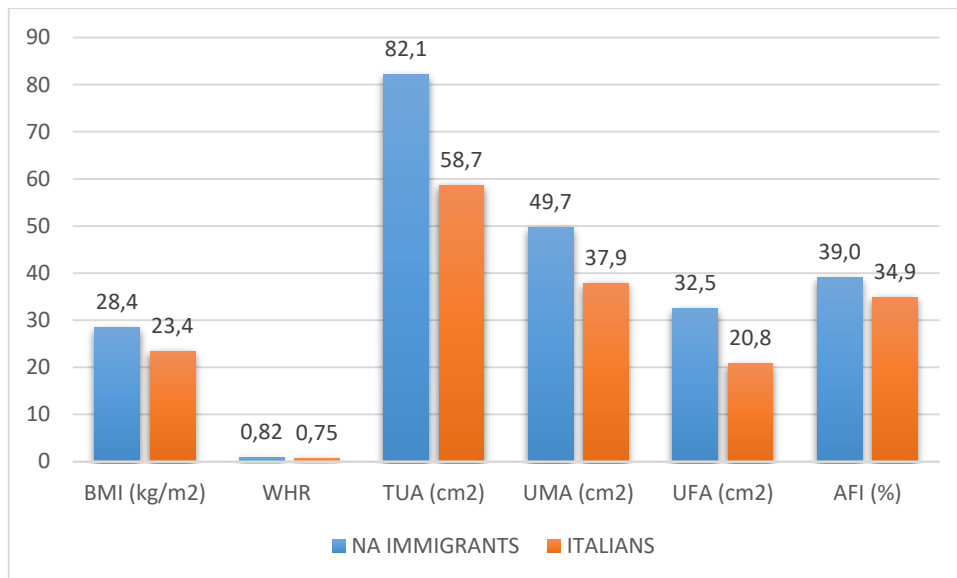
**Table 4.3** Anthropometric traits by ethnic groups in Italians ( $n=100$ ) and NA immigrants ( $n=105$ )

	NA MIGRANTS IN ITALY			ITALIANS			F ANCOVA	P value
	Mean	SD	95% CI	Mean	SD	95% CI		
Wt (kg)	73.7	13.8	71.0, 76.4	60.9	13.0	58.3, 63.5	41.96	<0.001
Ht (cm)	160.9	6.0	158.8, 162.1	161.1	6.0	159.9, 162.3	0.13	0.719
BMI (kg/m <sup>2</sup> )	28.4	4.8	27.5, 29.4	23.4	4.5	22.5, 24.3	52.99	<0.001
W (cm)	91.6	10.9	89.5, 93.8	75.7	11.3	73.4, 77.9	99.07	<0.001
H (cm)	111.2	9.4	109.3, 113.0	100.8	10.5	98.7, 102.9	49.75	<0.001
WHR	0.82	0.06	0.81, 0.83	0.75	0.07	0.74, 0.76	62.57	<0.001
WSR	0.56	0.09	0.55, 0.58	0.47	0.07	0.46, 0.48	68.68	<0.001
Mid-UAC (cm)	31.8	4.2	31.0, 32.7	26.9	3.9	26.1, 27.7	67.21	<0.001
TST (mm)	22.6	6.8	21.2, 23.9	16.8	4.8	15.8, 17.7	40.74	<0.001
TUA (cm <sup>2</sup> )	82.1	22.3	77.7, 86.5	58.7	18.2	55.1, 62.3	59.11	<0.001
UMA (cm <sup>2</sup> )	49.7	13.7	47.0, 52.4	37.9	10.7	35.8, 40.0	39.89	<0.001
UFA (cm <sup>2</sup> )	32.5	12.5	30.0, 35.0	20.8	8.9	19.1, 22.6	5.62	<0.001
AFI (%)	39.0	8.2	37.4, 40.6	34.9	6.2	33.6, 36.1	14.34	<0.001

Abbreviations: Wt, weight; Ht, height; BMI, body mass index; W, waist; H, hip; WHR, Waist-hip-ratio; Mid-UAC, Mid-upper arm circumference; TST, Triceps skinfold thickness; TUA, Total upper arm area; UMA, Upper arm muscle area; UFA, Upper arm fat area; AFI, Arm fat index; CI, Confidence interval.



**Fig. 4.8** Histogram representing the anthropometric characteristics of NA immigrant and Italians



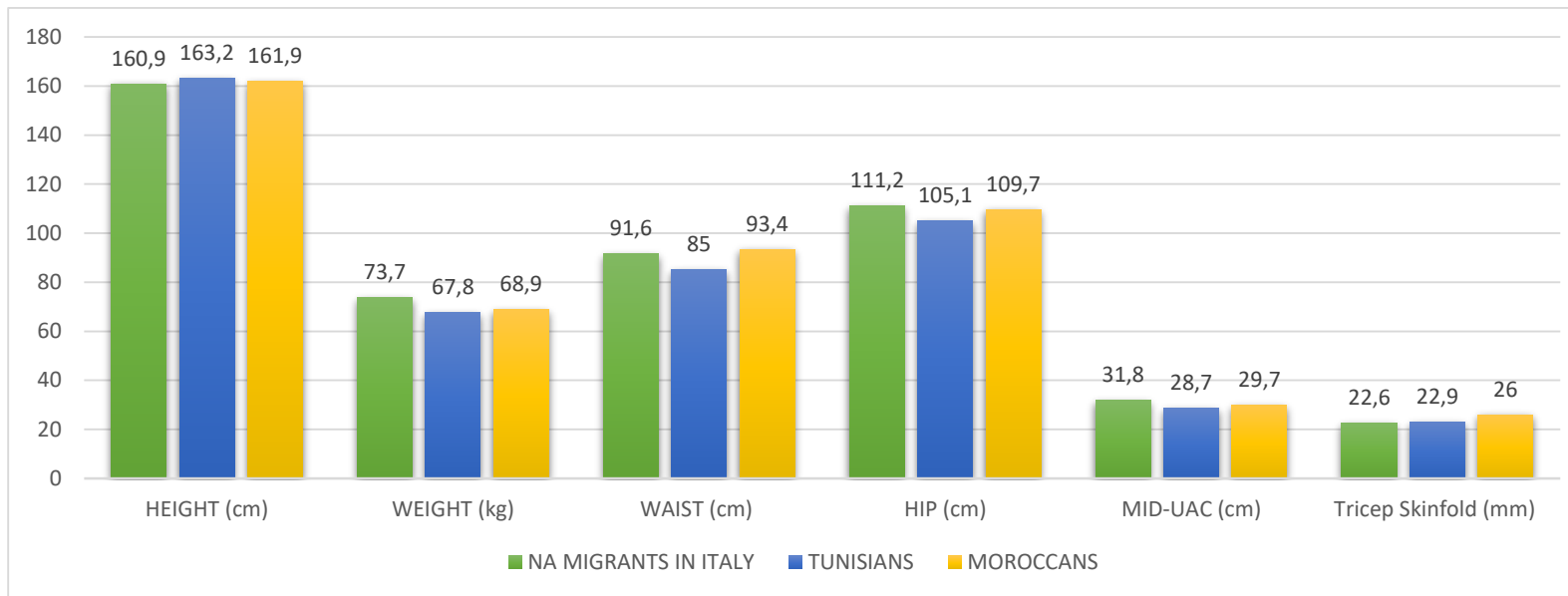
**Fig. 4.9** Histogram representing the anthropometric indices of NA immigrant and Italians

Table 4.4 displays anthropometric characteristics and indices of North African immigrants and North African residents. The immigrant women had greater BW, BMI, HC, Mid-UAC, TUA and UMA than the North African residents. However, there are no significant differences for W and WHR between immigrants and North African residents (Fig. 4.10) and WSR is similar with those of Moroccan residents but significantly lower than Tunisian residents. In fact, North African immigrants exhibited a WSR slightly higher than Moroccan residents, albeit it is not statistically significant, but significantly lower than Tunisian residents. The immigrants had a more developed TUA, UMA and less percent fat in the upper arm (AFI) than the North African residents. Their triceps skinfold thickness was thinner compared to Moroccan women (Fig. 4.11).

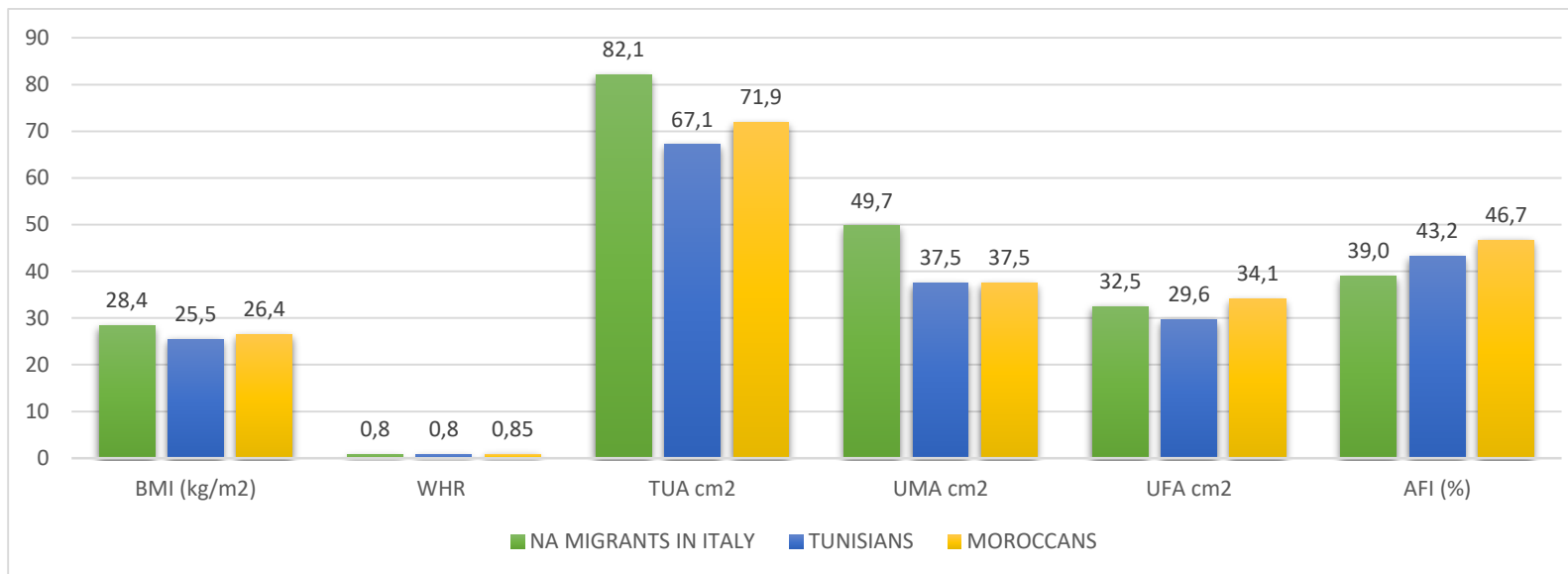
**Table 4.4** Anthropometric traits by ethnic groups in NA immigrants (*n*=105), Moroccan residents (*n*=124) and Tunisian residents (*n*=104).

	1- NA MIGRANTS IN ITALY			2- TUNISIANS			3- MOROCCANS			F ANCOVA	P value	Pairwise comparisons (only when F has p<0.05)
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI			
<b>Anthropometry</b>												
Wt (kg)	73.7	13.8	71.0, 76.4	67.8	14.8	64.8, 70.7	68.9	13.7	66.5, 71.4	5.26	0.006	1>2;1>3; 2=3
Ht (cm)	160.9	6.0	158.8, 162.1	163.2	7.0	161.9, 164.5	161.9	7.0	160.7, 163.1	1.38	0.253	-
BMI (kg/m <sup>2</sup> )	28.4	4.8	27.5, 29.4	25.5	5.6	24.4, 26.6	26.4	5.2	25.4, 27.	8.27	<0.001	1>2; 1>3; 2=3
W (cm)	91.6	10.9	89.5, 93.8	85.0	13.4	82.3, 87.6	93.4	14.0	90.9, 95.8	1.02	0.363	-
H (cm)	111.2	9.4	109.3, 113.0	105.1	11.9)	102.7-, 107.4	109.7	10.2	107.4, 111.5	3.30	0.038	1>2; 1=3; 2<3
WHR	0.82	0.06	0.81, 0.83	0.81	0.07	0.79, 0.82	0.85	0.07	0.84, 0.86	2.47	0.0863	-
WSR	0.56	0.09	0.55, 0.58	0.52	0.10	0.50, 0.54	0.58	0.09	0.56, 0.59	12.49	<0.001	1=2 ; 1<3; 2>3
Mid-UAC (cm)	31.8	4.2	31.0, 32.7	28.7	4.3	27.9, 29.6	29.7	4.3	30.0, 30.5	11.76	<0.001	1>2, 1>3; 2=3
TST (mm)	22.6	6.8	21.2, 23.9	22.9	6.3	21.7, 24.2	26.0	7.6	24.6, 27.4	5.24	0.006	1=2; 1<3; 2<3
TUA (cm <sup>2</sup> )	82.1	22.0	77.7, 86.5	67.1	21.0	63.0, 71.3	71.9	20.8	68.2, 75.6	11.04	<0.001	1>2; 1>3; 2=3
UMA (cm <sup>2</sup> )	49.7	13.7	47.0, 52.4	37.5	10.6	35.4, 39.6	37.5	10.2	35.6, 39.3	39.23	<0.001	1>2; 1>3; 2=3
UFA (cm <sup>2</sup> )	32.5	12.5	30.0, 35.0	29.6	11.7	27.3, 31.9	34.1	13.2	31.6, 36.5	0.17	0.841	-
AFI (%)	39.0	8.2	37.4, 40.6	43.2	6.8	41.8, 44.5	46.7	8.6	45.1, 48.2	26.22	<0.001	1<2; 1<3; 2<3

Abbreviations: Wt, weight; Ht, height; BMI, body mass index; W, waist; H, hip; WHR, Waist-hip-ratio; Mid-UAC, Mid-upper arm circumference; TST, Triceps skinfold thickness; TUA, Total upper arm area; UMA, Upper arm muscle area; UFA, Upper arm fat area; AFI, Arm fat index; CI, Confidence interval.



**Fig. 4.10** Histogram representing the anthropometric characteristics of NA immigrant and NA residents



**Fig. 4.11** Histogram representing the anthropometric indices of NA immigrant and NA residents



### ***4.3.3 Body image perception***

Tables 3.5 and 3.6 illustrate the results of the body image perception assessment. Comparing North African immigrants and Italian residents no significant differences emerge in the actual perceived figure and in the ideal figure chosen. Both the groups saw themselves as slightly overweight and had a preference for normal-weight bodies, although little thinner in immigrants. Immigrants had a significantly higher FID value than the Italian natives, meaning that they were more dissatisfied with their body image. However, both the groups had high level of dissatisfaction. The FAI score is not significantly different between the two groups and in general both the groups has a quite right perception of their weight with a little tendency of overestimation in Italians and underestimation in Immigrants. (Table 4.5; Fig. 4.12)

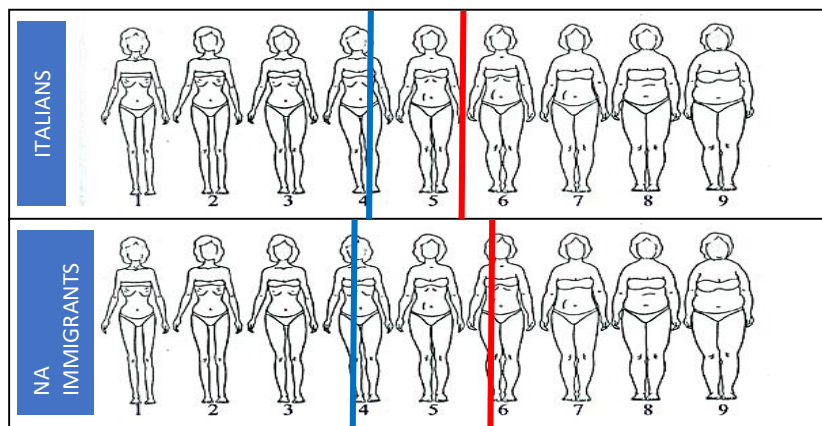
There is a significant difference in the choice of the actual figure among North African residents and North African migrants but, analyzing the ideal figures, the immigrants would prefer to be significantly leaner than the Moroccans and slightly fatter (albeit not significantly) than Tunisians. Tunisian residents are the sub-group with the thinnest preference in the body size. The level of dissatisfaction (FID) is almost equally high in all the three ethnic groups, but the most dissatisfied were immigrant women. The mean FAI values indicate a tendency of underestimation in the immigrants and Tunisians (negative values) and a realistic perception in the Moroccans (0 value) (Table 4.6; Fig. 4.13).

Among overweight/obese subjects (Table 4.7), the immigrants' actual and ideal figures had the lowest values, differing significantly from the Italian and North African resident women for ideal figure. A significantly lower FAI value was observed only for immigrants compared to Italians, meaning greater underestimation of weight in immigrants.

**Table 4.5** Body image perception by ethnic groups in Italians ( $n=100$ ) and NA immigrants ( $n=105$ )

	NA MIGRANTS IN ITALY			ITALIANS			F ANCOVA	P value
	Mean	SD	95% CI	Mean	SD	95% CI		
Actual figure	5.9	2.1	5.5, 6.3	5.4	1.7	5.1, 5.8	1.89	0.171
Ideal figure	3.9	1.6	3.6, 4.2	4.1	1.1	3.8, 4.3	0.97	0.326
FID	+ 1.99	2.31	1.54, 2.44	+ 1.37	1.31	1.11, 1.63	4.39	0.037
FAI	- 0.28	2.61	-0.44, -0.12	+ 0.24	0.57	0.13, 0.35	25.07	<0.001

Abbreviations: FID, Feel minus ideal difference; FAI, Feel status minus actual status inconsistency; CI, Confidence interval.



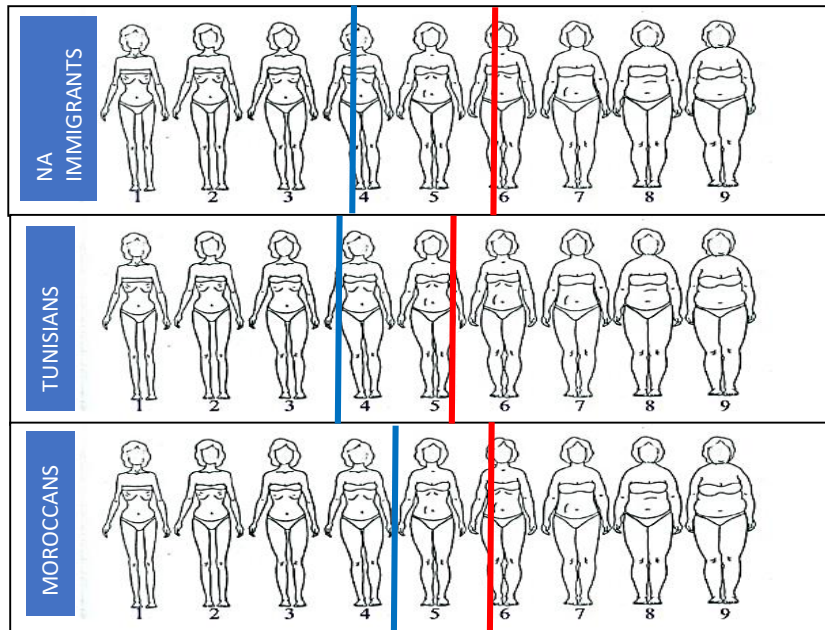
**Fig. 4.12** Body image perception in Italian natives and NA immigrants

Note. Red line: actual perception; blue line: ideal figure.

**Table 4.6** Body image perception ethnic groups in NA migrants ( $n=105$ ), Moroccan residents ( $n=124$ ) and Tunisian residents ( $n=104$ ).

	1- NA MIGRANTS IN ITALY			2- TUNISIANS			3- MOROCCANS			F ANCOVA	P value	Pairwise comparisons (only when F has $p < 0.05$ )
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI			
Actual figure	5.9	2.1	5.5, 6.3	5.2	2.4	4.7, 5.7	5.9	2.0	5.6, 6.3	0.36	0.697	-
Ideal figure	3.9	1.6	3.6, 4.2	3.8	1.6	3.5, 4.1	4.4	1.4	4.2, 4.7	3.24	0.040	1=2; 1<3; 2<3
FID	+ 1.99	2.31	1.54, 2.44	+ 1.40	2.41	0.93, 1.87	+ 1.50	1.83	1.17, 1.84	2.61	0.075	-
FAI	- 0.28	2.61	-0.44 , -0.12	- 0.10	0.61	-0.22, 0.02	+ 0.01	0.70	-0.12, 0.13	4.14	0.017	1=2; 1>3; 2=3

Abbreviations: FID, Feel minus ideal difference; FAI, Feel status minus actual status inconsistency; CI, Confidence interval.



**Fig. 4.13** body image perception in NA residents and NA immigrants  
Note. Red line: actual perception; blue line: ideal figure.

**Table 4.7** Body image perception characteristics of overweight/obese subjects (BMI  $\geq 25$  kg/m<sup>2</sup>) by ethnic group.

	NA MIGRANTS IN ITALY			ITALIANS			TUNISIANS			MOROCCANS			NA MIGRANTS VS ITALIANS	NA MIGRANTS VS NA RESIDENTS
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI	<i>P</i> value	<i>P</i> value
Actual figure	6.4	1.8	6.0, 6.8	7.1	1.3	6.6, 7.7	6.9	1.6	6.4, 7.3	6.9	1.4	6.6, 7.2	0.473	0.177
Ideal figure	3.9	1.6	3.6, 4.3	4.8	1.4	4.2, 5.3	4.1	1.7	3.6, 4.6	4.6	1.4	4.3, 4.9	0.025	0.048
FID	2.47	2.22	1.99, 2.95	2.38	0.94	2.00, 2.76	2.80	2.16	2.19, 3.41	2.29	1.39	1.96, 2.61	0.888	0.330
FAI	-0.35	0.85	-0.53, -0.16	-0.04	0.53	-0.25, 0.17	-0.20	0.64	-0.38, -0.02	-0.15	0.63	-0.29, -0.00	0.070	0.151

Abbreviations: FID, Feel minus ideal difference; FAI, Feel status minus actual status inconsistency; CI, Confidence interval.

## 4.4 DISCUSSION

The main aim of the present study was to gain an understanding of the socio-cultural and migration-related influences on BW and body image perception of North African immigrant women in Italy, comparing their data with those of their compatriots still living in NA (in particular Morocco and Tunisia) and with those of Italian natives. Despite the high rate of migration from North African countries to Europe, the studies focusing on nutritional status and body image perception of immigrant women in Europe are few. At first January 2016 the number of non-EU citizens was estimated to be 3.931.133. Morocco is the most represented country (510.450) and among North African countries the most represented are Morocco, Egypt and Tunisia. (Istat 2016). Among Moroccan, migrant women represent 45.1% of the total, among Tunisian 37.35% and among Egyptian 30.7% (Istat 2016). To our knowledge, the present study, part of a larger project on North African immigrants, is the first carried out in Italy to compare body size, anthropometric traits and body image perception of immigrant women from NA to those of women still living in NA and women native to the host country (Italy).

In this research emerged that almost 80% of North African immigrant women are overweight or obese, according to BMI cut-off (James et al. 2001). This percentage is similar to the prevalence of overweight/obesity recorded in Moroccan immigrant women in the Netherlands (78%) (Dijkshoorn et al. 2008) but much higher than the prevalence (34.6%) recorded by Nicolaou et al. (2008) in her study on Moroccan and Turkish immigrants in Netherland. The last study showed different data even in the socio-demographic characteristics of Moroccan immigrant women. They declared to have greater level of education than our sample and they had lower percentage of unemployment and marriage (Nicolaou et al. 2008).

In my research the four sub-groups showed high variability terms of education, working status, smoking habits: North African immigrant and North African resident women displayed a lower level of education and higher unemployment than Italian women; the percentage of smokers is low in immigrants and Moroccans, but increases in Tunisians and especially Italians. The mean age of the groups is also significantly different. The Italians stated to be more physically active than the North African women and this confirm the data reported in the literature that usually the ethnic minorities are less active than the residents (Epstein et al. 2008, Gerber et al. 2012).

After the comparison of the demographic and biological characteristics and the sport practice of the samples, we can affirm that the high prevalence of obesity, and in general poor health, in immigrants with respect to Italian natives and North African residents could be due not only to the age difference, but also to the socio-economic conditions, diet and genetic characteristics, and lack of PA. Poor health may be in fact a consequence of genetic, biological, behavioral, environmental and socio-

economic determinants (Gushulak et al. 2009). Additionally, non-Western immigrants tend to acquire the typical dietary habits and disease patterns of the host country (Lesser et al. 2014).

After adjustment for age differences, the immigrant women have more generalized (BMI) and central fatness (WC, WHR, WSR) than Italian natives. Anthropometric measurements indicating abdominal adiposity, such as WC, WHR and WSR (positively correlated with visceral adipose tissue) (Lee et al. 2008, World Health Organization 2008), have been identified as predictors of CVD and diabetes risk (Zimmet and Alberti 2006, Huxley et al. 2010, Seidell 2010). Examining more in details the abdominal adiposity indices, immigrant women are at high risk to develop metabolic complications because they are above the female cut-off for WC (cut-off for W >88 cm), as reported by World Health Organization Report (World Health Organization 2000). However, their mean WHR is below the cut-offs that indicate increased health risk for women (Lean and Han 2002), but their WSR is higher than 0.5, indicating high risk of coronary diseases (Hsieh et al. 2005). All these anthropometric indices are significantly lower in Italian natives under the cut-offs for health risk. Immigrant women's UMA is significantly higher than in Italians, with mean values above the 75<sup>th</sup> percentile of standards based on NHANES III (Frisancho 2008). Instead, UFA and AFI are around the 50<sup>th</sup> percentile. Weight, BMI and Mid-UAC are higher and AFI lower than in the other sub-samples of North African residents. WSR was lower than Tunisian residents, who show the higher values for abdominal obesity of the four groups and therefore the higher risk to develop metabolic and cardiovascular diseases.

An original aspect of our study is the additional analysis of peripheral fatness and muscularity (upper arm measurements and indices) to complete the assessment of weight status among immigrants. It is well known in fact that BMI alone is not a good predictor of weight status because it is unable to distinguish between someone with excess adipose tissue and someone with high muscle mass. For this reason, it is necessary to use this index in combination with other anthropometric ones (Lee et al. 2008). Immigrant women's upper arm muscle area was much greater and the percentage of upper arm fat much lower than would be expected from their BMI values. Hence the overweight/obesity status of these immigrants should not be based only on BMI: overweight may be caused not only by an increase of adiposity, but by an increase of muscularity as well. However, it is important to remember that the risk of overestimation of the muscle area increases with increasing adiposity. (Forbes et al. 1988). In immigrants, overestimation cannot be excluded, even if literature reports suggest that the overestimation is particularly evident in subjects whose triceps skinfold thickness is above the 85<sup>th</sup> percentile (considering age and sex). In our study the sample of North African immigrant women fell well below this percentile (50<sup>th</sup>, according to Frisancho, 2008) (Frisancho 2008). An explanation of the greater level of upper arm muscularity among immigrants than North African residents or Italian natives can be linked to a probable involvement of immigrant women in hard manual work activities, as because many of them are probably involved in irregular work (Eurispes 2012). Another explanation can be connected with the HIE (Lauderdale and Rathouz 2000)

that states that migrants are healthier than their compatriots or the host population on arrival. This is explained by a positive selection bias due to rigorous pre-migration health checks (Delavari et al. 2013).

The age at menarche, significantly higher in immigrants than in North African residents, shows an apparently different trend from literature data indicating precocious puberty in foreign children moving from developing countries to Europe (Montero et al. 1999), with a low median age at menarche in African girls (Talma et al. 2013) being a positive response to improved environmental conditions (Gualdi-Russo et al. 2014). However, most of the North African immigrants in our study spent their childhood and adolescence in their country of origin, living in low-income, disadvantaged conditions with possible effects (slowdown) on their growth and development (Tanner and Benso 1981).

In our study, we did not observe a preference to large body size in either the North African immigrants' sample or in the resident's sample that we surveyed. In contrast, our sample of immigrants expressed a preference for relatively thin silhouettes, even in comparison with Italian women. This results are consistent with other studies where North African immigrants expressed a clear preference for a "thin" bodies (Nicolaou et al. 2008; Nicolaou et al. 2012). Also the other three groups composed of Italians and North African residents declared a preference for normal size bodies. This is in contrast with other studies reported a preference among Moroccan for fat bodies (Rguibi and Belahsen 2006; Mokhtar et al. 2001). This can be explained by the fact that body image preferences are influenced by the SES and the ethnic background, even in the same population (Toselli et al. 2016). In all the four groups the preferred body size was thinner than their current size and immigrants, despite the tendency to underestimate their weight status, had a greater dissatisfaction with body image perception than Italians. A different pattern was found among African-American women, who were more satisfied with their body even if they weighted more than Caucasians (Demarest and Allen 2000). Unlike Moroccan immigrant women in the Netherlands (Nicolaou et al. 2012), the NA immigrants in Italy showed no shift in body size preferences with respect to the NA residents, but only a stronger desire to be thinner in accordance with Western ideals.

One of the main highlight of this research is that, although it confirms the high prevalence of overweight/obesity in North African immigrants in Italy, the high weight values are not only due to a simple increase in fatness. The simple measurements of arm anthropometry proposed in this study satisfy the need to analyze the distribution of fat/muscle without being disagreeable to these women, who are generally reluctant to undress, and permit to avoid misinterpretation of weight status. Arm anthropometry has already proved to be a more sensitive indicator than BMI in the case of inadequate nourishment (Sala et al. 2012), so much so that Mid-UAC and TST have been proposed as acceptable "gold standard" measures of nutritional status (Sala et al. 2008). Their independence of ethnicity is another important requirement for their application (Frisancho 1981).

The study has several limitations that need to be mentioned. A major limitation was the significant differences of mean ages among sub-samples, reason why we decided to use the analysis of the covariance (ANCOVA) adjusted for age. Second, reliable information was not available on the actual work performed by the immigrant women, because of the persistence in Italy of irregular work, nor on their income. We do not know if the immigrants belonged to an urban or rural environment. And last, our immigrant sample is mainly composed of Moroccan natives, so not representative of all the North African population.

In conclusion, the first-generation North African immigrant women preferred a thin physique (confirmed to a lesser extent in the North African residents). Their ideal figure was even thinner than that of the Italian natives. These results, if confirmed by other studies, will reassure us about effectiveness of weight control interventions in the case of excess adiposity.

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## APPENDIX 1

Form N.....

Date.....

<b>Msr.</b>	
<b>Born in</b>	<b>Date of birth</b>
<b>Citizenship</b>	<b>Marital status</b>
<b>Ethnicity</b>	

N. children \_\_\_\_\_ N. pregnancies \_\_\_\_\_ Age at menarche (month and year) \_\_\_\_\_

Educational qualification:  
school

None

Elementary

Middle school

High

University

In Italy since (year) \_\_\_\_\_ In Bologna since (year) \_\_\_\_\_

Occupation \_\_\_\_\_ Date of first employment in Italy (year)  
\_\_\_\_\_

Permanent address \_\_\_\_\_ Temporary address \_\_\_\_\_

Are your parents blood related?.....

Are you blood related with your husband/engaged?.....

Smoker    yes       no     former-smoker

If yes:

At what age did you start smoking?.....

On average, how many cigarettes do you smoke per day?.....

**ANTHROPOMETRIC TRAITS**

**HEIGHT (cm).....**

**WEIGHT (kg).....**

**WAIST CIRCUMFERENCE (cm).....**

**HIP CIRCUMFERENCE (cm).....**

**MID-UPPER ARM CIRCUMFERENCE (cm).....**

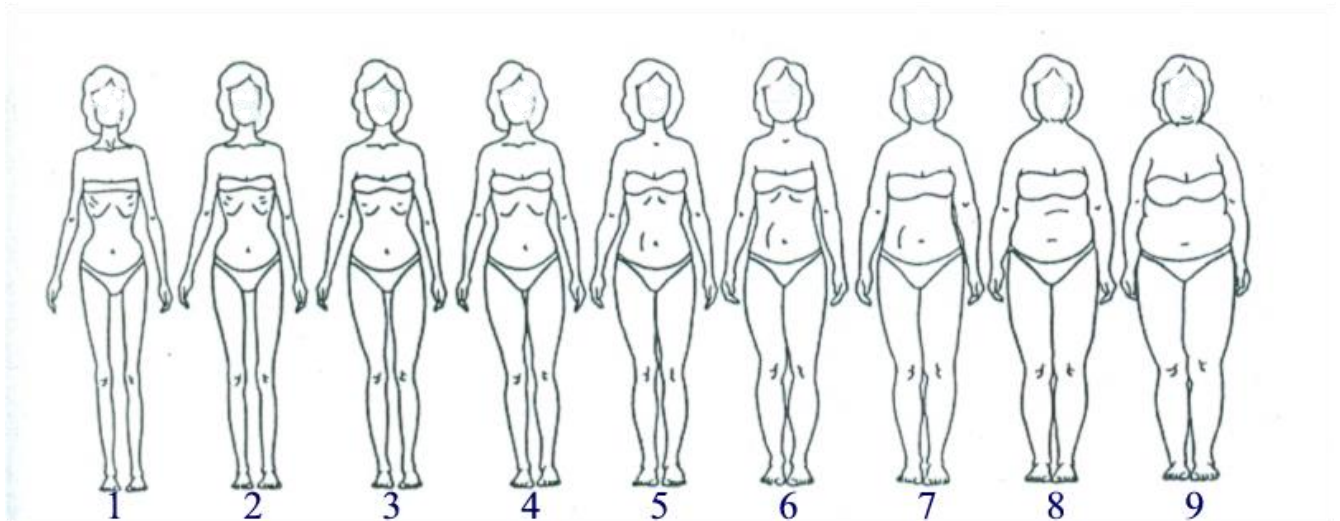
**TRICEPS SKINFOLD THICKNESS (mm).....**

---

Footnotes.....  
.....  
.....



## BODY IMAGE



Fonte: Marjorie A. Thompson & James J. Gray. Development and Validation of a New Body-Image Assessment Scale. Journal of Personality Assessment, 64(2): 258-269, 1995

The silhouette that better represents my body size is the number .....

My ideal silhouette is the number.....

## PHYSICAL ACTIVITY

**P1 - How many days have you done physical activities\* for at least 60 minutes/per day last week?**

Days:     0     1     2     3     4     5     6     7

**P2 - How many days do you do physical activities\* for at least 60 minutes/per day in a typical week?**

Days:     0     1     2     3     4     5     6     7

---

(\*) Examples of physical activities: run, walk, cycling and another sports.

**Do you play any sports?..... How many hours per week?.....**

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## **CHAPTER 5**

# **MENTAL HEALTH OF NORTH AFRICAN RESIDENT AND IMMIGRANT WOMEN IN ITALY**

The present research evaluates the psychosocial health and quality of life of North African immigrant women living in Italy. Migration is a very stressful event due to both the migration phenomenon itself and the change in lifestyle in the new country, that implies an experience of acculturation and adaptation to the new environment. This stress can lead to poor health status and clinical outcomes in immigrants.

In this study we examine the self-reported psychological well-being and quality of life of North African immigrant women in Italy in comparison to Italian women and North African resident women. In particular, considering a group of 205 NA immigrant and Italian women, a multivariate analysis was carried out in order to discover the explanatory factors associated with endogenous stress, well-being, psychological discomfort and self-perceived quality of life.

The results highlight that the main explanatory variable for the psychosocial health was the migrant status. Other explanatory variables were educational level and number of children for psychological discomfort, and weight status for well-being, quality of life and stress.

### **5.1 INTRODUCTION**

The number of immigrants is dramatically increasing worldwide due to both political and economic reasons (Eurostat 2015). In Italy, 8.3% of the population is made up of foreigners and the number of long-term immigrant residents is increasing (Istat 2015). A good percentage of immigrants come from NA and, among them, the majority are from Morocco, Tunisia and Egypt (Istat 2015, International Organization for Migration 2016).

Mental health disorders have become one of the main public health problems, especially on immigrants and ethnic minorities. They are connected to a wide range of communicable and non-communicable diseases and long-term disability (Prince et al. 2007). The studies that focus on the relationship between migration and mental health report contradictory results (Bhugra 2004, Goodman et al. 2008, Abebe et al. 2014). Previous researches proved that the entire migration process can cause negative effects in the mental health of migrants and their offspring, generating mental health disorders, depression and risk of suicide (Roth et al. 2006, Oppedal et al. 2005). In their study Dunlavy and Rostila (2013) reported that poor health and psychological distress were more frequent

in foreign workers than in Swedish-born ones. Even the prevalence of anxiety was higher in immigrants than in native-born people, especially in women (Lofors et al. 2006, Taloyan et al. 2008). On the other hand some studies reported lower levels of mental health problems among immigrants than among host populations. An example are the studies on Hispanic immigrants in US and South Asians immigrants in UK that reported lower rates of psychosocial distress than the host population (Vega et al. 1998, Nazroo 1998).

The migration process comprises the events prior to migration in the country of origin (Pumariiega et al. 2005), to face the socially and culturally different society and the gradual adaptation to the new environment -process known as acculturation-. Acculturation may be defined as a set of changes in response to sustained intercultural contact (Sam 2006). Acculturation and adaptation to the new environment might impact the psychosocial well-being (Duru and Pyrazli 2007), increasing the level of stress, poor psychological and physical health and depression (Pumariiega et al. 2005; Reitmanova and Gustafson 2008, Macdonnell et al. 2012, Toselli et al. 2014, Guruge et al. 2015, Kita et al. 2015). Depression is the most common form of psychological distress experienced by immigrant population and it is linked to a stressful adaptation to cultural differences (Lee et al.2005, Portes and Rumbaut 2006). Several studies reported that immigrants who were more acculturated to the new society tend to have better mental health to those less acculturated (Consedine et al. 2014).

The risk of experiencing psychological distress can increase with stressful experiences of social isolation (Ali and Toner 2001, Katz and Gagnon 2002, Fung and Dennis 2010). Therefore, various factors are involved in the mental health of the immigrant, and their relationships are complex (Toselli et al. 2014, Guruge et al. 2015). Low SES, unemployment and poor social environments can lead to increased depressive and anxiety symptoms (Rask et al. 2016) and to psychiatric illness (Sundquist et al. 2004). The inverse relationship between SES and mental disorders are proved by many studies (Kessler et al. 1994). In addition, studies report greater stress in long-term immigrants than in short-term ones (Uppaluri et al. 2001) because general health of immigrants deteriorates over the time of residence (Vaillant and Wolff 2010, Blair and Schneeberg 2014, Ro 2014, Toselli et al. 2014)

The causes of the contradictory results found in the literature in psychosocial well-being and perceived health of immigrants might depend on other factors beyond SES, such as gender, generation, age at migration and country of origin (Toselli et al. 2014, Rask et al. 2016). In Europe has been detected a North–South gradient with lower values in immigrants than in natives. The possible causes can be the place of origin, the legal framework for immigration and in the health care system (Malmusi et al. 2010, Moullan and Jusot 2014). As regard age at migration, young migrants are more likely to show higher rates of mental disorders than those who migrated at a later age (Takeuchi et al. 2007, Roshania et al. 2008). As previously mentioned, mental health might depend also on gender, since immigrant women present worse indicators of mental health than men

(Schreiber et al. 2000, Spitzer 2005, Guruge et al. 2010, Malmusi et al. 2010, O'Mahony and Donnelly 2013).

Knowledge on the mental health of North African immigrants, especially women, is very limited in Europe (Gilliver et al. 2014). Therefore, this study focused on North African immigrant women in a European setting to provide new data on their psychosocial health. The aims of the study were to compare North African immigrant women with Italian native women and to analyze the influence of different factors and living conditions on psychosocial health.

## **5.2 METHODS**

### ***5.2.1 Participants***

A cross-sectional survey was conducted among 443 women (105 North African immigrants, 100 Italian-born, 134 Moroccan residents and 104 Tunisian residents) residing in the Emilia Romagna region (Northern Italy), Tunis (Tunisia) and Casablanca (Morocco). The mean age of the sample was  $36.3 \pm 7.8$  years for immigrants,  $33.1 \pm 12.0$  years for Italian-born,  $28.7 \pm 11.5$  years for Tunisian residents and  $39.5 \pm 13.1$  for Moroccan residents. A detailed description of the socio-demographic and biological characteristics of the sample is presented in chapter 4.

The data were collected in community centers of Bologna and Ferrara (Northern Italy), public health clinics where outpatients had an appointment for a checkup (*Centro per la salute delle donne immigrate e dei loro bambini*, Bologna), and public health and social centers in Tunis and Casablanca. Exclusion criteria were: an origin different from NA, living in Italy for less than two years for immigrants, being pregnant or being aged outside 18-60 for all participants. Before administering the questionnaire, all participants were verbally informed about the study, the voluntary nature of their participation and the absence of any benefits. All of them signed an informed consent. The study was approved by the Independent Ethics Committee, Azienda Unità Sanitaria Locale (AUSL), Bologna, Italy.

### ***5.2.2 Data collection***

Sociodemographic characteristics. All the participants completed a questionnaire regarding their sociodemographic characteristics (age, country of origin, marital status, work status, number of children and educational level) and sport habits (see Appendix 1 and chapter 3).

Weight status assessment. In order to define the weight status of the participants, several anthropometric measurements were directly measured by expert anthropometrists according to standardized procedures (Weiner and Lourie 1981, Rinaldo and Gualdi 2015). A previous description of the anthropometric measurements for the weight status assessment has been already reported in

Chapter 1. For the purpose of this study we used: Ht, BW, WC and HC. Through this anthropometric measures we managed to evaluate the following indices: BMI (body weight (kg)/stature (m) squared), WSR (waist circumference in cm/stature in cm), WHR (waist circumference in cm/hip circumference in cm) (see Chapter 1). On the basis of BMI, the weight status was assessed for each subject according to World Health Organization (WHO) cut-off points, classifying women as underweight, normal weight, overweight and obese (James et al. 2001) (see Chapter 1). We decided to use three different indices because BMI gives us only an indication of general obesity meanwhile WRS and WHR and indication of abdominal obesity. For a detailed description of the data collection and the data analysis see chapter 4 of this thesis.

Psychosocial questionnaire. The participants were asked to complete a questionnaire (available in Italian and Arabic) concerning their psychosocial status (see Appendix 1). Each questionnaire was interview-administered with the help of a cultural mediator when necessary. For the evaluation of the psychological well-being we used the PsychoSocial Index (PSI), a 24-item questionnaire developed by Raffi et al. (1998). This questionnaire follows a clinimetric approach with both open answers and multiple-choice questions (Raffi et al. 1998). We then added some questions purposefully designed for immigrants. The questions were divided to evaluate five dimensions: (1) exogenous stress, (2) perceived stress, (3) well-being and (4) psychological discomfort, and (5) quality of life. The first dimension implies a yes/no answer, the second, third and fourth dimensions are rated on a scale of 1 to 4: not at all, a little, much and very much, meanwhile the last dimension is evaluated through a five-point scale: excellent, good, satisfying, mediocre and awful (Table 5.1). A detailed description of the questions divided by the five dimensions is reported in Toselli et al. (Toselli and Gualdi-Russo 2008).

In addition to the clinimetric questionnaire, other six questions were asked to immigrant participants to evaluate their satisfaction with access to public health services, desires and prospects for their children in Italy and knowledge of human rights. They were scored on a scale ranging from 1 (not at all) to 4 (very much).

Moreover, immigrant women answered questions regarding the reasons for their Italian choice (open choice question) and the desire to return home (yes/no question) (Table 5.1) (See Appendix 1).

**Table 5.1** Questionnaire scoring scale

<b>Modified Psychosocial Index</b>	<b>Scoring scale</b>
Exogenous stress	yes/no answers
Reason for migration	open answers
Perceived stress	1-4 1: not at all 4: very much
Well-being	1-4 1: not at all 4: very much
Psychological discomfort	1-4 1: not at all 4: very much
Health care services	1-4 1: not at all 4: very much
desires and prospects for their children in Italy	1-4 1: not at all 4: very much
knowledge of human rights	1-4 1: not at all 4: very much
Quality of life	1-5 1: excellent 5: awful

### **5.2.3 Data analysis**

All statistical analyses were performed with the software “Statistica”, Version 11.0 (StatSoft Italia srl, Padua, Italy).

Descriptive statistics were obtained throughout frequency analysis and mean scores, performed separately for each sub-sample (North African immigrants, Italians, Moroccan residents and Tunisian residents). A chi-square test was used to evaluate the association between categorical variables meanwhile Student’s t-test was applied for the comparison of quantitative variables.

Multiple linear regression models were used to test the association between psychosocial indicators (dependent variables), and social status and biological characteristics. For this analysis only a group consisting of 205 NA immigrants and Italian residents was taken in consideration. As dependent variables we tested: (a) endogenous stress; (b) psychological well-being; (c) discomfort; (d) quality of life. Participants with missing data were excluded from this analysis. Two models were used to perform the multiple regression. The first model assesses the relationship between the outcome variables and the sociodemographic characteristics of the sample. In particular, the categorical variables included were: migrant status (MS), work status, educational level, marital status and number of children. For work status we considered if the women were employed or unemployed. Educational level was defined as: none, primary, junior high, high school and university. For marital status we considered only if the women were married or not. For number of children four categories were taken in consideration: 0, no children; 1, one or two children; 2, three or four children; 3, more than four children. As continuous variable we used age in years. Because in this study we wanted to assess also the association between weight status and psychological well-being, in addition to the sociodemographic factors (Model 1), biological characteristics of the sample were included in the second model. For this, we used WSR and WHR as continuous variables and, as categorical variable, weight status of the participants divided into four categories: underweight, normal weight, overweight and obese.

The level of significance was set at 0.05.

## **5.3 RESULTS**

### ***5.3.1 Immigrants' data on reasons of migration, access to public health services, desires and prospects for their children***

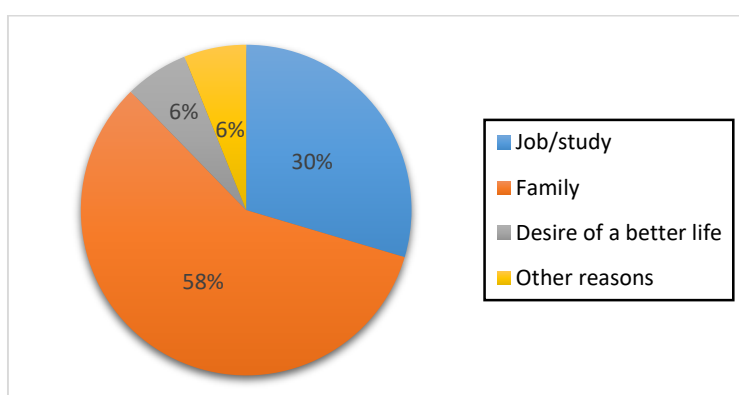
The data regarding the socio-demographic and biological characteristics of the samples are reported in chapter 4 (See Table 4.1).

The majority of interviewed immigrant women desired to remain in Italy. Only 27% of them wanted to return in their country of origin. More than a half stated as reason of migration to rejoin the family, follow by the desire to find a job or to study (Fig. 5.1). Almost 65% of them chose Italy because their family was already there and less than 20% because they liked Italy (Fig. 5.2). As regard the questions related to their children, they affirmed that they want their children to gain the Italian nationality and that they quite know their human rights. The score of 2.8 indicates that they thought their children feel quite well in Italy. The questions on public health services indicate that they felt helped, albeit with some difficulties in gaining access. In addition, they have a low awareness of who could help them if their human rights were not respected (Table 5.2).

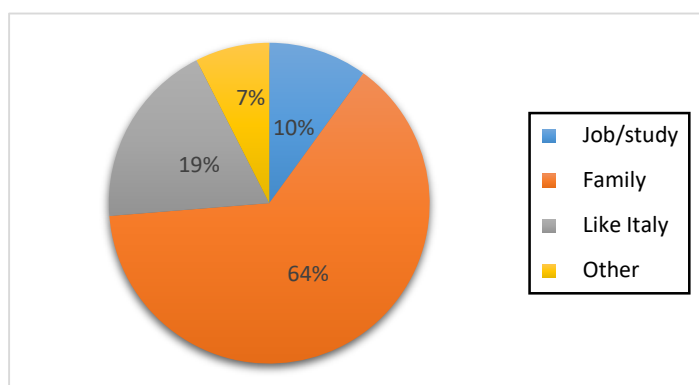


**Table 5.2** Questions regarding reasons of migration, access to public health services, desires and prospects for their children in Italy and knowledge of human rights.

<b>VARIABLES</b>	
<b>Reasons to live their native country</b>	<b>%</b>
Job/Study	29.6
Family	58.1
Desire of a better life	6.2
Other reasons	6.1
<b>Reasons for choosing italy</b>	<b>%</b>
Job/Study	10.0
Family	63.8
They like Italy	18.8
Other	7.5
	<b>Yes %</b>
Do you want to return home?	27.5
	<b>Mean score</b>
Do you think your children find well in Italy?	2.8
Would you like your children attain italian nationality?	3.5
Do you think your children know their human rights?	3.0
Have you felt helped in the use public health services?	2.9
Have you had any difficulties to access to public health services?	1.7
Would you know who turn to if your human rights were not respected?	1.8



**Fig. 5.1** Pie chart illustrating the frequency of each reason to leave their native country



**Fig. 5.2** Pie chart illustrating the frequency of reasons for the choice of Italy

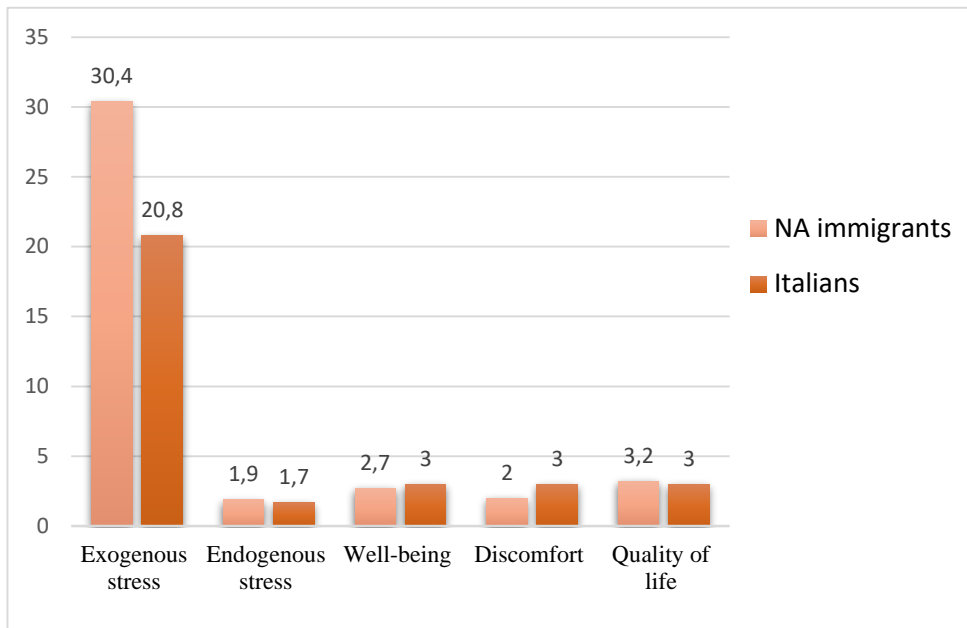
### 5.3.2 Psychosocial health in the four sub-samples

The comparison between North African immigrant women and Italian native women regarding the psychosocial well-being indicated that North African immigrants experienced a significantly higher number of stressful experiences than Italians during the previous year. The mean score for the endogenous stress is significantly higher in immigrants than in Italians, although both groups showed a quite low mean score. The level of discomfort obtained the same results. North African immigrants were more stressed with lower scores, albeit positive, of well-being and quality of life. (Tab. 5.3) (Fig. 5.3).

**Table 5.3** Psychosocial Indicators of Participants: Comparisons Between NA Immigrant and Italian Women

Variable	NA Immigrants (n = 105)	Italians (n = 100)	p value
	%	%	
Exogenous stress (yes %)	30.4	20.8	<b>&lt;0.001<sup>a</sup></b>
	<i>M (SD)</i>	<i>M (SD)</i>	
Endogenous stress (score)	1.9 (0.5)	1.7 (0.5)	<b>0.010<sup>b</sup></b>
Well-being (score)	2.7 (0.5)	3.0 (0.5)	<b>&lt;0.001<sup>b</sup></b>
Discomfort (score)	2.0 (0.5)	1.7 (0.4)	<b>&lt;0.001<sup>b</sup></b>
Quality of life (score)	3.2 (1.0)	3.5 (0.8)	<b>0.040<sup>b</sup></b>

Note. <sup>a</sup>Comparison performed using  $\chi^2$  test; <sup>b</sup>Comparison performed using t test.



**Fig. 5.3** Histogram presenting the percentage of yes (for exogenous life) and mean score of the psychosocial indicators in Italians and North African immigrants

Table 5.4 shows the data concerning the four psychosocial indicators in North African immigrant, Tunisians and Moroccans. All the indicators representing psychological issues (endogenous and exogenous stress and discomfort) displayed no significant differences in the three sub-groups, that had in general quite low levels of stress and discomfort. Tunisians resulted to have higher level of well-being, but lower scores in the quality of life. In general, all the groups stated to have a good quality of life and well-being and reported low level of stress and discomfort (Table 5.4, Fig. 5.4).

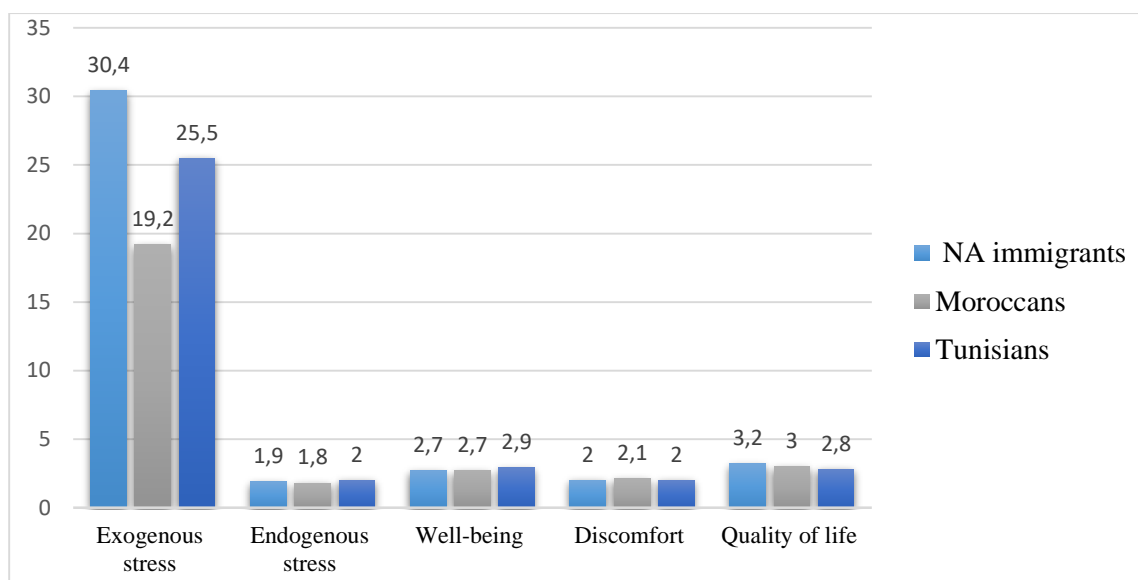
**Table 5.4** Psychosocial Indicators of Participants: Comparisons Between North African Immigrant and Italian Women

Variable	1- NA	2-	3-	<i>p</i> value	Pairwise comparisons (only when $p < 0.05$ )
	Immigrants ( <i>n</i> = 105)	Moroccans ( <i>n</i> = 134)	Tunisians ( <i>n</i> = 104)		
Exogenous stress (yes %)	% 30.4	% 19.2	% 25.5	0.186 <sup>a</sup>	-
Endogenous stress (score)	<i>M</i> ( <i>SD</i> ) 1.9 (0.5)	<i>M</i> ( <i>SD</i> ) 1.8 (0.5)	<i>M</i> ( <i>SD</i> ) 2.0 (0.6)	0.359 <sup>b</sup>	-
Well-being (score)	2.7 (0.5)	2.7 (0.6)	2.9 (0.5)	0.002 <sup>b</sup>	1=2; 1<3; 2<3
Discomfort (score)	2.0 (0.5)	2.1 (0.7)	2.0 (0.6)	0.250 <sup>b</sup>	-
Quality of life (score)	3.2 (1.0)	3.0 (1.0)	2.8 (0.9)	0.005 <sup>b</sup>	1=2; 1>3; 2=3

Note.

<sup>a</sup>Comparison performed using  $\chi^2$  test.

<sup>b</sup>Comparison performed using ANOVA test.



**Fig. 5.4** Histogram showing the percentage of yes (exogenous life) and mean score of the psychosocial indicators in North African immigrants, Tunisians and Moroccans.

### 5.3.3 Multiple regression analysis

In order to understand which variable is explanatory of each psychosocial indicator, in the multiple regression analysis we tested two different models (Tabs. 5.5-5.8). The first model tested the influence of MS, educational level and other sociodemographic variables, while weight status and biological parameters were added in the second one. As shown below, the results for each psychosocial indicator are reported.

Endogenous stress. The socio-demographic variables were significant predictors of endogenous stress with the  $R^2$  explaining 5% of the variance. In the second model, after the addition of weight status, the level of significance increases and  $R^2$  explained 7% of the variance. In the first model migration status is the unique determinant, meaning that being a North African native significantly rises the stress level. In the second model significant predictors of the endogenous stress are, besides MS, also weight status and WSR. Overweight prevalence decreases with increasing level of stress. (Table 5.5)

Well-being. Considering well-being, we discovered a significant positive association with Italian-born status in both models. In first model MS is the only variable significantly associated with well-being. In the second model we identified as significant predictor also the weight status: underweight women have significantly reduced/lower well-being. The total explained variance of the first and second model is 15% and 16%, respectively (Table 5.6).

Discomfort. Even in the case of discomfort MS is the most indicative determinant according to both models. Being immigrants increased the level of discomfort. Illiteracy (present only among

immigrants) and number of children are significantly associated with discomfort in both models. In the first model there is a negative association with number of children, meanwhile not having children increases the level of discomfort in the second model. There were no significant association between the biological variables and the level of discomfort. The first model explains 9% of variance and the second one 8% (Table 5.7).

Quality of life. According to the first model, the variables that significantly influenced the quality of life were: MS, marital status and number of children. In particular, be Italian-born and have few children (or none at all) improve the quality of life, while being unmarried decreases it. The  $R^2$  of the first model is not significant, but adding the biological characteristics involves the achievement of statistical significance in the second model. In fact, in addition to marital status and number of children (but not MS), other predictors that enhance quality of life are: high WHR, being normal-weight and not underweight, and a decreased WSR. The total explained variance is 9% in the second model (only 5% in the first one) (Table 5.8).

**Table 5.5** Predictors of Endogenous Stress: Results of Multivariate Regression Analysis

Predictor variable	Model 1			Model 2		
	$\beta$	t	p value	$\beta$	t	p value
Age	-0.028	-0.262	0.794	-0.075	-0.648	0.154
Migrant status (native-born)	-0.364	-2.540	0.012	-0.342	-2.236	0.027
Educational level						
None	-0.106	-0.501	0.617	-0.103	-0.488	0.626
Primary	-0.170	-0.994	0.322	-0.174	-1.017	0.311
Junior high	0.054	0.378	0.706	-0.019	-0.131	0.896
High school	0.110	0.753	0.453	0.114	0.758	0.450
Work status (unemployed)	-0.075	-0.649	0.517	-0.070	-0.593	0.553
Marital status (unmarried)	0.179	1.319	0.189	0.218	1.533	0.128
Number of children						
No children	-0.269	-1.560	0.121	-0.113	-0.627	0.532
One or two children	0.032	0.231	0.818	0.184	1.207	0.229
Three or four children	-0.189	-1.646	0.102	-0.106	-0.873	0.384
Weight status						
Underweight				0.313	1.966	0.051
Normal weight				-0.004	-0.033	0.974
Overweight				-0.261	-2.086	0.039
WHR				-0.077	-0.551	0.583
WSR				0.448	1.955	0.052
$R^2$	0.116			0.163		
Adjusted $R^2$	0.053			0.071		
p value	0.049			0.040		

Note.  $\beta$  = regression coefficient; WHR = waist-hip ratio; WSR = waist-stature ratio.

Model 1: Adjusted for socio-demographic factors: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married) and number of children (none/one or two/three or four/more than four).

Model 2: Adjusted for socio-demographic factors, biological characteristics and sport practice: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married), number of children (none/one or two/three or four/more than four), weight status (underweight/normal weight/overweight/obese), WHR and WSR

**Table 5.6** Predictors of Well-Being: Results of Multivariate Regression Analysis

Predictor variable	Model 1			Model 2		
	$\beta$	t	p value	$\beta$	t	p value
Age	-0.017	-0.167	0.868	0.018	0.164	0.870
Migrant status (native-born)	0.496	3.651	0.000	0.497	3.411	0.001
Educational level						
None	0.192	0.954	0.341	0.212	1.055	0.293
Primary	-0.108	-0.665	0.507	-0.091	-0.560	0.576
Junior high	0.060	0.442	0.659	0.057	0.407	0.685
High school	-0.237	-1.706	0.090	-0.234	-1.636	0.104
Work status (unemployed)	0.161	1.459	0.147	0.178	1.579	0.117
Marital status (unmarried)	0.004	0.034	0.973	-0.026	-0.190	0.850
Number of children						
No children	0.053	0.324	0.747	-0.026	-0.150	0.881
One or two children	-0.017	-0.125	0.901	0.100	-0.671	0.503
Three or four children	0.116	1.064	0.289	0.075	0.642	0.522
Weight status						
Underweight				-0.364	-2.425	0.017
Normal weight				0.099	0.776	0.439
Overweight				0.195	1.655	0.100
WHR				0.035	0.260	0.796
WSR				-0.285	-1.296	0.197
$R^2$	0.204			0.246		
Adjusted $R^2$	0.147			0.162		
p value	0.000			0.000		

Note.  $\beta$  = regression coefficient; WHR = waist-hip ratio; WSR = waist-stature ratio.

Model 1: Adjusted for socio-demographic factors: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married) and number of children (none/one or two/three or four/more than four).

Model 2: Adjusted for socio-demographic factors, biological characteristics and sport practice: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married), number of children (none/one or two/three or four/more than four), weight status (underweight/normal weight/overweight/obese), WHR and WSR.

**Table 5.7** Predictors of Psychological Discomfort: Results of Multivariate Regression Analysis

Predictor variable	Model 1			Model 2		
	$\beta$	t	p value	$\beta$	t	p value
Age	0.090	0.861	0.390	0.088	0.772	0.442
Migrant status (native-born)	-0.357	-2.549	0.012	-0.393	-2.584	0.011
Educational level						
None	0.420	2.030	0.044	0.417	1.994	0.048
Primary	-0.175	-1.048	0.296	-0.174	-1.027	0.306
Junior high	-0.083	-0.600	0.550	-0.085	-0.581	0.562
High school	-0.156	-1.095	0.275	-0.186	-1.251	0.213
Work status (unemployed)	-0.058	-0.515	0.607	-0.073	-0.626	0.533
Marital status (unmarried)	0.129	0.977	0.330	0.123	0.878	0.381
Number of children						
No children	-0.319	-1.891	0.060	-0.226	-1.263	0.209
One or two children	-0.312	-2.272	0.024	-0.231	-1.525	0.129
Three or four children	-0.259	-2.304	0.023	-0.220	-1.823	0.070
Weight status						
Underweight				0.255	1.618	0.108
Normal weight				0.010	0.078	0.938
Overweight				-0.195	-1.569	0.119
WHR				-0.121	-0.871	0.385
WSR				0.283	1.241	0.217
$R^2$	0.154			0.176		
Adjusted $R^2$	0.093			0.085		
p value	0.005			0.021		

Note.  $\beta$  = regression coefficient; WHR = waist-hip ratio; WSR = waist-stature ratio.

Model 1: Adjusted for socio-demographic factors: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married) and number of children (none/one or two/three or four/more than four).

Model 2: Adjusted for socio-demographic factors, biological characteristics and sport practice: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married), number of children (none/one or two/three or four/more than four), weight status (underweight/normal weight/overweight/obese), WHR and WSR.



**Table 5.8** Predictors of Quality of Life: Results of Multivariate Regression Analysis

Predictor variable	Model 1			Model 2		
	$\beta$	t	p value	$\beta$	t	p value
Age	-0.137	-1.268	0.207	-0.082	-0.710	0.479
Migrant status (native-born)	0.309	2.153	0.033	0.253	1.664	0.098
Educational level						
None	-0.002	-0.009	0.993	-0.034	-0.161	0.873
Primary	0.162	0.925	0.356	0.161	0.932	0.353
Junior high	-0.059	-0.408	0.684	0.001	0.004	0.997
High school	-0.153	-1.038	0.301	-0.139	-0.926	0.356
Work status (unemployed)	0.062	0.533	0.595	0.048	0.414	0.680
Marital status (unmarried)	-0.278	-2.050	0.042	-0.349	-2.493	0.014
Number of children						
No children	0.383	2.219	0.028	0.232	1.296	0.197
One or two children	0.273	1.932	0.055	0.069	0.451	0.652
Three or four children	0.393	3.401	0.001	0.269	2.225	0.028
Weight status						
Underweight				-0.337	-2.137	0.034
Normal weight				-0.161	-1.207	0.229
Overweight				0.230	1.856	0.066
WHR				0.285	2.061	0.041
WSR				-0.741	-3.256	0.001
$R^2$	0.116			0.182		
Adjusted $R^2$	0.053			0.092		
p value	0.052			0.015		

Note.  $\beta$  = regression coefficient; WHR = waist-hip ratio; WSR = waist-stature ratio.

Model 1: Adjusted for socio-demographic factors: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married) and number of children (none/one or two/three or four/more than four).

Model 2: Adjusted for socio-demographic factors, biological characteristics and sport practice: age, migrant status (native-born/migrant), educational level (none/primary/junior high/high school/university), work status (unemployed/employed), marital status (unmarried/married), number of children (none/one or two/three or four/more than four), weight status (underweight/normal weight/overweight/obese), WHR and WSR.

## 5.4 DISCUSSION

This study investigates the mental health of North African immigrant women in Italy, comparing their characteristics with those of a sample of Italian natives and subsequently with Moroccan and Tunisian residents. Then, considering a sample composed only of North African immigrant and Italian women, we tested a possible relationship between psychosocial indicators (stress, psychological discomfort and well-being) and perceived quality of life, with socio-demographic variables and biological characteristics, in order to define potential predictors of psychological well-being. Knowledge of the mental health status of immigrants in European countries is still very scant, but it is known that immigrants usually show a higher prevalence of affective problems and psychopathology than natives, with higher values in women than in men (Levecque et al. 2009, Breslau et al. 2011, Gonzalez-Castro and Ubillos 2011, Font et al. 2012, Toselli et al. 2014). As reported previously, a detailed description of the socio-demographic and anthropometric data of the four sub-groups is reported in chapter 4 of this thesis.

In regards to the questions realized purposely for immigrants, we found that, in contrast with the literature (Kita et al. 2015) North African migrant women in Italy felt helped, with just few difficulties in the use of care services. As evidence of the good adaptation to Italy, only a little percentage of immigrants desired to go home (27.5%). Moreover, we registered high scores on the questions regarding whether they think their children enjoy Italy and if they would like their children to acquire Italian nationality. The major problem is that they usually do not know who can help them in case their human rights were not respected.

As already mentioned the migration process influences men and women in different ways. Health well-being of women is more strongly linked with their relationship with the relatives so immigration, that involves a break in the family ties, has a stronger impact on it (Levecque et al. 2009). Our results confirmed this theory, as the primary reason to leave their native country and their choice of Italy was to join the family. The second reason for the migration's choice was the search of a job or for study purpose. According to Nesterko et al. (2013), one of the major reasons for migration is to improve the quality of life, yet only 6.2% of our NA immigrant women were driven to migrate by the desire to improve their living conditions. However, ISTAT data on immigrants in Italy in 2015 are consistent with our results given that 83% of Moroccan migrants left their country of origin to rejoin the family and only 8.8% to find a job (Istat 2016).

Our findings on psychological health revealed that North African immigrants experienced a higher number of stress factors than the Italians, as indicated by the percentage of negative events in the previous year. Moreover, they had a higher mean discomfort score, and lower mean well-being and quality of life scores than Italian natives. These results are consistent with those of other European studies in which immigrants generally show poorer psychosocial health than non-immigrants, with

women generally at higher risk (Levecque et al. 2009, Font et al. 2012, Toselli et al. 2014; Gilliver et al. 2014). The average frequency of exogenous stress among North African immigrants in the present sample is higher than that reported for Moroccan immigrant women in Italy studied ten years ago (Toselli and Gualdi-Russo 2008). In addition the sample of North African immigrants considered in this study showed higher level of endogenous stress and discomfort and lower level of well-being than the previous considered sample (Toselli and Gualdi-Russo 2008). In particular, the level of stress of women from NA is higher than that of the Moroccan immigrant women (1.9 vs 1.5), while they have the same score for discomfort (2.0) (Toselli and Gualdi-Russo 2008). However, the level of well-being is slightly higher in the North African immigrants than in the Moroccans. This may be due to a progressive worsening of living conditions faced over time by immigrants before, during and after the migration process (Consedine et al. 2014).

The significant differences in the psychosocial indicators between North African immigrants and Italians, with poor results in immigrants, can be explained with the increase of stress resulting from the migration process or due to their ethnic background. The last hypothesis is confirmed by the analysis between migrants and their non-migrant's compatriots. The level of exogenous stress, endogenous stress and discomfort is in fact similar in all the three groups. The only significant differences are in the well-being scores (higher in Tunisians, but similar in North African immigrants and Moroccans) and in the quality of life (higher in North African migrants). This results show that, in this case, the migration process didn't negatively influence the level of stress of the migrants, that is instead negatively influenced by the ethnic background. However, it positively influenced the quality of life, higher in immigrants (Toselli et al. 2014, Rask et al. 2016).

The multivariate analysis revealed a number of interesting findings. First of all, our results highlight that the migration status is the main predictive variable for all dimensions of psychosocial status. Being immigrant increases the level of stress and discomfort and decreases the psychological well-being. In addition to MS, we discovered that other social and family characteristics are significantly related with psychosocial indicators. In particular, discomfort is influenced by educational level and number of children: a low educational level and a small number of children increase it. Family characteristics also affect quality of life: having more children improves it, while being single decreases it. As showed in the tables, all the psychosocial indicators, except discomfort, adding biological variables (weight status, WHR, WSR) in the second model increase the  $R^2$ . In particular, all these variables are significantly associated with quality of life, BMI and WSR with endogenous stress and weight status with well-being.

This study has several limitations and strengths. The major strength of this study is that the immigrant women were directly interviewed and measured by trained staffs. However, these findings should be interpreted with caution because of several limitations. First of all, due to low resources available, participants of the study were recruited through convenience sampling. The second limitation is the

cross-sectional nature of this study. In fact, with a cross-sectional design, it is hard to ensure the direction of causal relationships among the major variables tested in the model. Therefore, longitudinal and population-based studies would be preferable. Third, in addition to the variables tested, there are still many other factors that may influence the mental health of immigrant women, but are not controlled in this research. Further studies are needed to analyze migration experiences in terms of gender differences and their relationship to psychological and social stressors and to continue exploring other variables that can be potentially related with migrants' mental health.

Despite the limitations, this study gives insight into the mental health of North African immigrant women in Italy, providing further evidence of higher psychological stress and discomfort and lower well-being and quality of life in immigrants than in natives.

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## APPENDIX 1

### PSYCHOSOCIAL QUESTIONNAIRE

**Indicate (yes-no answer) if you experienced each of the following situations in the last year**

1. Loss of a relative or a very close friend	YES	NO
2. Separation from your spouse or from a stable partner	YES	NO
3. Recent change of job	YES	NO
4. Relocation to a new house	YES	NO
5. Relocation to another city	YES	NO
6. Financial difficulties	YES	NO
7. Legal issue	YES	NO
8. Beginning of a new relationship	YES	NO

**Please answer the following questions:**

9. Why did you leave your country?

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10. Why did you choose Italy?

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11. Do you want to return to your country of origin or do you want to stay here?	I want to stay in Italy		I want to come back in my country of origin	
12. If you have children, do you think they feel good in Italy?	Not at all	Yes, a little	Yes, pretty much	Yes, very much

13. If you have children, would you like them to acquire the Italian citizenship?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
14. If you have children, do you think they know their human rights?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
15. If you have benefit from public health services for yourself or your children in the last year, have they been useful?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
16. If you have benefit from public health services for yourself or your children in the last year, have you had any difficulties to access?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
17. Would you know to whom do you turn if your or your children human rights were not respected?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
18. Did you have difficulties in integrating into the Italian society?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
19. Did you feel discriminated?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
20. Do you feel stressed at work?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
21. Has someone of your relatives get seriously ill last year?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
22. Is there a lot of tension in your home?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
23. Do you feel isolated and cut off from other people?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
24. Did you feel that you were helped?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
25. Are you happy with your job?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
26. Do you get along with your coworkers?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
27. Do you get along with your spouse or partner?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
28. Do you have a good relationship with your house mates?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
29. Do you have someone you can truly confide in?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
30. Did you get along with people?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
31. Have you got friend? If yes, are they Italians or foreigners?	Not at all	Yes, a little	Yes, pretty much	Yes, very much

31. Are you satisfied with your actual situation?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
33. Does it take you a long time to fall asleep?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
34. Have you got restless sleep with frequent awakenings?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
35. Do you suffer from early morning awakenings?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
36. Do you wake up more tired?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
37. Do you suffer from an upset stomach?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
38. Do you feel like your heart-is beating too hard or too fast without reasons?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
39. Do you feel emotional instability?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
40. Do you feel oppression, head or body pressure, heaviness?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
41. Do you experience breathlessness or difficulty breathing?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
42. Do you feel tired or without energy?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
43. Do you feel irritable?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
44. Do you feel sad or depressed?	Not at all	Yes, a little	Yes, pretty much	Yes, very much
45. Do you feel tense, nervous?	Not at all	Yes, a little	Yes, pretty much	Yes, very much

**37. How do you judge the quality of your life?**

Excellent	Good	Satisfying	Mediocre	Awful
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## CHAPTER 6

### CONCLUSIONS

The aim of this dissertation was to evaluate the prevalence of body weight, body image dissatisfaction and preferences, and psychosocial well-being in immigrants from Africa to Europe.

The results of the first part of the thesis have highlighted that body image preferences in adults are strongly correlated with their ethnic background, country of origin, socio-economic status and host country. In particular, it was confirmed that the African continent is facing a Westernization of the beauty ideals, with a tendency to preferring thin bodies. This trend was not uniform across the African continent, with a general tendency to an increase both in BMI and body dissatisfaction going from S to Central and then to North Africa. However, there are still cultures that idealize the body plumpness as representation of success and health, especially in Southern Africa and in some ethnic groups of North Africa.

Acculturation is confirmed to be responsible for the change of immigrants' beauty ideals, that tend to be similar to those of the host population. In general, African immigrants in Europe had a greater preference for slimmer body size than they non-immigrant peers. This general trend is evident especially in women, that are the gender with the greater body dissatisfaction. Also children of immigrants are highly susceptible to body image dissatisfaction because they are exposed to the pressure of parents and peers and susceptible to media's influence.

The stress and the nutritional transition that follow immigration process can cause also a change in the weight status of immigrants, that have in general higher percentages of overweight and obesity than their non-migrant peers. This is evident not only in adults but also in children of immigrants, that have higher prevalence of overweight and obesity than their non-migrant counterparts. This trend should be connected with the acculturation process, that is proved to cause stress, psychological pressure and changes in food habits. Also the country of origin is demonstrated to be correlated with the prevalence of nutritional disorders. The group most at risk are North African girls migrated to Europe. Both the increase of body dissatisfaction, that can make them susceptible to inappropriate dieting patterns, and weight status put immigrants at greater risk of developing nutritional disorders and weight-related problems.

The original researches presented in this thesis, exploring the body image perception, weight status and psychosocial well-being of North African immigrant women in Italy, have highlighted that migration and acculturation processes were likely to influence the psychological and physical health of these women. North African migrant women show higher level of overweight and obesity than their non-migrant counterparts and the host population, with high risk of non-communicable diseases, such as hypertension, diabetes and cardiovascular disease

One of the new findings of this research is that North African immigrants had also higher level of arm fat muscle area, and this means that high values of BMI are not only due to an increase of fatness. In addition to the general recommendation from previous studies to use measurements instead of self-reports, in the evaluation of nutritional status and body composition, it is important to evaluate other measurements and indices rather than BMI. Waist circumference, waist-to-hip ratio and waist to stature ratio can be used for the evaluation of abdominal adiposity and middle upper arm circumference and triceps skinfold thicknesses for the evaluation of the body composition. Regarding body image dissatisfaction and perception, this research confirms the results highlighted in previous studies reporting that first generation NA immigrant women preferred a normal weight body with an ideal figure thinner than that of Italian natives and NA non-migrant women. They had also great level of body dissatisfaction because, although they were fatter, they would like a thinner body size than the other sub-groups.

Another major finding of this thesis is that migration is confirmed to be the major explanatory variable for the psychosocial well-being of women. Women with a migrant background have a higher level of stress and discomfort and a lower level of well-being and perceived quality of life. Other explanatory variables were educational level and number of children for psychological discomfort, and weight status for well-being, quality of life and stress. However, NA women migrated to Italy had a general good perception of their quality of life and the majority of them didn't want to return home, indicating that they see migration as an improvement for their life.

In conclusion, as relations between acculturation and health status is complex, it is important to assess and to evaluate the risk of nutritional disorders and mental health issues in immigrants in Europe, as immigration process is proved to have a negative effect on weight status, body image dissatisfaction and psychological well-being.

## Abbreviations

**AFI%:** Arm Fat Index

**BDD:** Body Dysmorphic Disorder

**BMI:** Body Mass Index

**BW:** Body Weight

**CA:** Central Africa

**FAI:** Feel weight status minus Actual weight status Index

**FFM:** Fat Free Mass

**FID:** Feel-Ideal Difference Index

**FM:** Fat Mass

**GI:** Glycogen

**HC:** Hip Circumference

**HIE:** Healthy Immigrant Effect

**Ht:** Height

**Mid-UAC:** Mid-Upper-Arm Circumference

**MM:** Mineral Mass

**MS:** Migrant Status

**NA:** North Africa

**PA:** Physical Activity

**PM:** Protein Mass

**PSI:** PsychoSocial Index

**SA:** Southern Africa

**SD:** Standard Deviation

**SES:** Socio-Economic Status

**TBW:** Total Body Water

**TST:** Triceps Skinfold Thickness

**TUA:** Total Upper Arm Area

**UFA:** Upper-Arm Fat Area

**UMA:** Upper-Arm Muscle Area

**WC:** Waist Circumference

**WHR:** Waist to Hip Ratio