

## REVIEW

## Prevalence of obesity in Malta

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### Summary

### Background

Obesity is a global epidemic with the Mediterranean island of Malta being no exception. The World Health Organization (WHO) has identified Malta as one of the European countries with the highest obesity prevalence.

### Method

A cross-sectional study was conducted (2014–2016) under the auspices of the University of Malta. The prevalence of overweight-obesity in Malta was calculated and then age stratified for comparisons with previous studies.

### Results

The study identified 69.75% (95% CI: 68.32–71.18) of the Maltese population to be either overweight or obese. The men overweight/obese prevalence (76.28% 95% CI: 74.41–78.14) was statistically higher than that for women (63.06% 95% CI: 60.92–65.20) ( $p=0.0001$ ). Age stratification revealed that both genders had the highest overweight prevalence rates between 55 and 64 years (Men=23.25% 95% CI: 20.43–26.33; Women=24.68% 95% CI: 21.44–28.22). Men obesity prevalence rates were highest in the 35 to 44 years group (22.52% 95% CI: 19.65–25.68) while for women it was highest in the 55 to 64 years group (28.90%, 95% CI: 25.44–30.63).

### Conclusion

Over a 35-year period, an overall decrease in the normal and overweight BMI categories occurred with an increase in the prevalence of obesity. An exception was observed in the women, where the prevalence of normal BMI increased over this time period. Also, it appears that while the total population obesity prevalence increased (for 2016), a percentage of the women have shifted from an obese to an overweight status.

**Keywords:** Epidemics, Malta, obesity, overweight.

## Introduction

Obesity is a well-established global epidemic with an estimated 50% of the European population being overweight (1). Multifactorial elements result in this epidemic with the environmental and behavioural interactions declared to contribute a major role in the development of obesity (2). The increase in obesity and overweight among adults is seen across most European Countries (1). Southern European countries tend to exhibit a higher overweight population than their northern counterparts (1). One such southern country is the island of Malta, located in the middle of the Mediterranean Sea. Malta

has been declared to have one of the highest European obesity rates in Europe (3). Malta is an archipelago between Sicily and North Africa, with an area of 316 km<sup>2</sup> and a GDP per capita of 22,779.91 USD (4). The Maltese Islands have a total population of 425,384 (median age 40.9 years), out of which 212,424 are men (median age 39.7 years) and 212,960 are women (median age 42.1 years). In fact, Malta is one of the highest densely populated countries in the world with about 1,265 inhabitants per square kilometre (5).

Over the years, Malta has experienced a change in culture, behavioural attitudes and lifestyle. In the 19th century, Malta was concurred by the British Empire

resulting in the introduction of a Westernized diet. Over the years, a shift from a Mediterranean to a Westernized diet was evident.

Technology advances lead to a change in lifestyles, with the population becoming more sedentary. A cultural and social change gradually occurred because of a migration shift. Malta nowadays hosts a number of different sub populations as residents. These include European, African and Asian natives. All of these social, cultural and behavioural changes could have had a determinant impact on the obesity epidemic within the Maltese Islands (6).

Data for these obesity observations stem from population surveys. The last population representative surveys undertaken were in 1981 conducted by the World Health Organization (WHO) and in 1984 as part of the MONICA project, both of which used a measured height and weight to calculate the body mass index (BMI) (7,8). Apart from a EU pilot Health Examination study conducted by the Department of Health Research and Information in 2010 ( $n=200$ ), there have not been any other recent national surveys (9). Representative population monitoring surveys should be conducted on regular basis to assess the weight gain epidemic (10). Conducting such surveys measures the effectiveness of health promotion policies as well as identifies and targets high-risk population groups that would benefit from prevention strategies (10). In order to update the Maltese picture, a study entitled 'SAHHTEK' set up by the University of Malta undertook a nation-wide cross-sectional health examination survey over the past 2 years (2014–2016).

## SAHHTEK—the Malta Health and Wellbeing survey

SAHHTEK was a cross-sectional survey utilizing a randomized age (18–70 years) and gender representative data that was obtained from the national registry. The data was further stratified to represent an approximate 1% of the population from each Maltese town. The randomized population ( $n=4,000$ ) was invited to participate in a free health check-up. A letter of invitation along with an explanatory pamphlet was sent via post. The check-ups were held in each Maltese town health clinic. Among the different measurements taken during the survey, trained personnel measured height and weight using validated machines. These measurements were used to calculate the body mass index (BMI) by dividing the weight (in kilograms—kg) over the height squared (in metres— $m^2$ ). The Research Ethics Committee of the Faculty of Medicine and Surgery at the University of Malta together with the Information and Data protection commissioner gave their permission for this study.

The SAHHTEK population was divided into three categories according to the established BMI, where  $<24.99$   $kg/m^2$  was labelled as normal BMI,  $25–29.99$   $kg/m^2$  as overweight and  $>30$   $kg/m^2$  as obese (11). The BMI prevalence rate was calculated for each weight category, age and gender category (Table 1). Statistical analysis was conducted using IBM SPSS vs. 21 for Mac software. Chi-square statistical test was used to compare the men and women subgroups by age and BMI status. Statistical significance was considered as  $p$ -value  $<0.05$ . The sample population was weighted according to gender, age

**Table 1** Age stratification of the adult population according to gender and BMI groups and showing the total prevalence and gender prevalence according the different BMI groups

Age	Gender	Normal	Overweight	Obese	Total
		$<25$ $kg/m^2$	$25–29.99$ $kg/m^2$	$\geq 30$ $kg/m^2$	
18–24	Men	147	34	38	219
	Women	148	41	38	227
25–34	Men	122	159	118	399
	Women	189	106	81	376
35–44	Men	59	168	166	393
	Women	164	98	72	334
45–54	Men	54	133	156	343
	Women	111	137	140	388
55–64	Men	59	183	159	401
	Women	56	153	176	385
65–70	Men	33	110	100	243
	Women	52	85	102	239
Total		1194	1407	1346	1194
Prevalence (%)		30.25	35.65	34.10	
Prevalence	Men (%)	23.72	39.39	36.89	
	Women (%)	36.94	31.81	31.25	

and locality in order for the data to be statistically representative of the whole Maltese population and to take into consideration the non-respondents.

## Results

Out of the total number of people invited ( $n=4,000$ ), 49% participated in this study. This positive population response rate to participate was considered adequate and valid ( $<p=0.05$ ). The majority of the population was found to be either overweight (35.65% 95% CI: 34.27–37.15) or obese (34.10% 95% CI: 32.64–35.60), with only 30.25% (95% CI: 28.84–31.70) having a normal body weight. Thus, Malta has 69.75% (95% CI: 68.32–71.18) of the total adult population (18–70years old) suffering from an abnormally high body weight.

The men had higher overweight (39.39% 95% CI: 37.27–41.55) and obese (36.89% 95% CI: 34.80–39.03) prevalence rates when compared to women. These in turn had an overweight rate of 31.81% (95% CI: 29.78–33.91) and obese prevalence of 31.25% (95% CI: 29.23–33.34) ( $p=0.0001$ ). This gender difference is in keeping with a recent study marking southern European countries as having high overweight/obese rates among men (1).

Men with *normal* body weight (BMI) were within the 18–24 age group (67.12% 95% CI: 60.65–73.01). For the women, this was between the 25 and 34 age group (50.27% 95% CI: 45.24–55.29) ( $p=0.0001$ ). The highest age group exhibiting overweight rates was within the 55–64 age group for both genders (Men 45.64% 95%

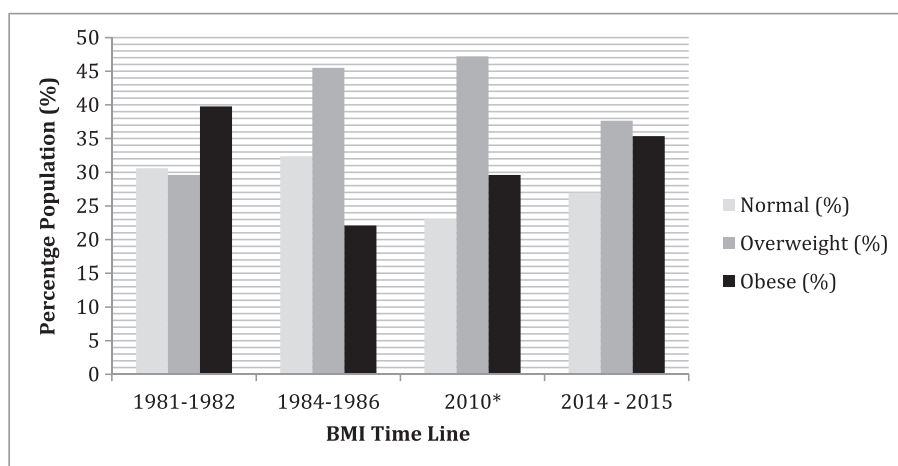
CI: 40.83–50.53; Women 39.74% 95% CI: 34.98–44.71) ( $p=0.006$ ).

Regarding obesity, the highest prevalence rate for men was in the 35–44 age group (42.24% 95% CI: 37.45–47.18), whereas for women it was in the 55–64 age group (45.71% 95% CI: 40.80–50.71) ( $p=0.0001$ ).

### Time trends of overweight and obesity prevalence in Malta

With the passage of time, three epidemiological studies have been performed (WHO 1981, MONICA 1984, EHES 2010), all of which measured BMI by means of height and weight examinations. These studies along with SAHTEK study followed the same BMI definition and were age stratified between 25 and 64years (but were not age standardized) for ease of comparison. Figure 1 shows the BMI distribution over time for the total population in each study.

On direct age standardization using the 1981 study rates and comparing with the current study (Table 2), there was an increase in the *obese* population (1.21). On the other hand, *overweight* and *normal* weight categories decreased (0.96; 0.9, respectively). On gender stratification, the men with obesity ratio showed an increase (1.88) while the women with obesity ratio declined (0.88) over 35years. The overweight men and women exhibited a decline in expected rates (0.91, 0.97, respectively). The normal weight women showed an increase in expected rate (1.18), while the normal weight men showed a decrease in the expected rate (0.41).



\* Pilot study performed in 2010 ( $n=200$ )

**Figure 1** BMI distribution for the Malta population aged 25–64years 1981–2015. \* Pilot study performed in 2010 ( $n=200$ ).

**Table 2** Direct age standardization between the two national representative epidemiological studies by BMI

	Total population—Normal BMI			Men—Normal BMI			Women—Normal BMI		
	1981	2014–2016	1981	2014–2016	1981	2014–2016	1981	2014–2016	
Sum total	29.9	814	37.96	588	24.13	520	356	520	
	%	Expected	%	Expected	%	Actual	Expected	Actual	
		905		814		520		520	
		Total population—Overweight BMI							
		2014–2016							
		Expected		Actual		Actual		Actual	
		1181		1137		643		494	
		Total population—Obese BMI							
		2014–2016							
		Expected		Actual		Actual		Actual	
		882		1068		599		469	
Sum total	29.23		20.95	318	35.51	532		469	
	%		%	Expected	%	Actual	Expected	Actual	

## Discussion

The Maltese population is predominately overweight or obese. Over 35 years, there has been a general increase in the obesity rate and a decline in the overweight and normal weight rates. This increase in body weight has been a gradual but progressive problem over the years across the world. It was observed in a recent U.S. study where the overall obesity rates increased from the 1980s to the present day (12). The same phenomenon is observed in Europe where more than half of the adult population (52%) within the European Union are either overweight or obese (13).

Interestingly, different countries exhibit divergent gender predominance. Between 2013 and 2014 the U.S. has had a significant linear increase in women's obesity rates as compared to men (12). This is in keeping with the European countries of Latvia, Turkey and Hungary (13). But the contrary has been found in Malta, where the men exhibited a higher obesity proportion than the women. The same trend was observed in the European countries of Iceland and Norway (13).

The overweight-obese epidemic is also present in children. In the most recent Health Behaviour in School-Aged Children (HBSC) survey (2013–2014), Malta ranked as the country with the highest prevalence of obese children aged between 11 and 15 (14).

Obesity can contribute to the development of other chronic diseases such as diabetes mellitus type 2 and cardiovascular disease (15). This leads to higher overall health care costs (13). Expenditures caused by obesity are the result of direct and indirect costs. This impacts both the individual person as well as the whole country. The WHO stated that the obesity expenditure contributed to 2–8% of the total national expenditure in the 53 European countries (16). In Malta, the estimated (underestimated) annual obesity health costs by 2020 amounted to €27 million (17).

Although public health policies and strategies for prevention and management of obesity are in place, still more work need to be done (1). Maltese diet relies to a big extent on imported foods. Therefore, taxation and importation regulations may need to be revised to meet the growing needs of Malta's population (1). An inter-sectoral approach to prevent the obesity epidemic needs to be undertaken. This includes the conduction of regular prevalence studies such as SAHHTK. These enable the targeting of high-risk groups, while making it easier to address inequalities that warrant immediate action in any European country. This obesity epidemic is highlighted for priority action in the 2017 EU Presidency hosted by Malta (aimed to target childhood obesity) (18).

## Conflict of interests

None

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