

## Original Article

# Child anthropomorphy in the mid-20th century in the Maltese Islands

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## Abstract

**Background:** Childhood obesity has over the last decades become a major health issue in the Maltese population. A review of the mid-20<sup>th</sup> century child health concerns in Malta would help elucidate the pathophysiology of this current epidemic and determine whether the rise is genetic or a consequence of changes in nutritional and activity habits.

**Methods:** The present study compares the body weight data of Maltese children aged 5-14 years measured in 1949 and compares these with corresponding published standards for English children published in 1965, and to data for Maltese children aged 5 and 9 years with anthropomorphic data of comparable cohort of children measured in 2009.

**Results:** The data suggests that in the mid-20<sup>th</sup> century, Maltese children were markedly under-nourished when compared to their British counterparts. Maltese children today are shown to be particularly overweight-obese.

**Conclusion:** The problems related to body weight in childhood have come a full circle from concerns with under-nutrition in the mid-20<sup>th</sup> century to concerns with over-nutrition in the later part of the century. Both extremes are associated with metabolic consequences that increase the likelihood of adult-onset metabolic disease, unless controlled and catered for during childhood.

## Keywords

Obesity, anthropomorphic, children, Malta, history

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## Introduction

Obesity in children was identified in the 1990s to be a major health issue in the Maltese population. A 1991 study on a national representative sample of boys and girls aged 5 years showed that the proportion of obese children was 13.0% and 11.5% respectively; for 10-year-olds, the proportions were 18.9% and 24.3%.<sup>1</sup> The childhood obesity rates have increased in the interim so that in 2007, the proportions of overweight-obese children with a mean age of 5.8 years were 19.5% for boys and 12.9% for girls. A further 20.6% and 18.6% were overweight.<sup>2</sup> This rise is a significant increase even if one accepts that assessment methodologies may have been different. It is assumed that the increasing problem of childhood obesity reflects the rather unhealthy nutritional patterns adopted by the Maltese population in the latter decades of the 20th century, though a genetic predisposition cannot be completely ruled out. A review of the anthropomorphy of mid-20th century Maltese children will help place the current situation in perspective.

## Methods

Data relating to child anthropometry and nutritional status during the mid-20<sup>th</sup> century in Malta were obtained from published sources mainly from the annual reports of the School Medical Officers working within the Department of Health. These reports allow for a review of the prevalent child nutrition during the period notably 1937-1949, with mean body weight measurements by gender, age and region being available for the cohort of children aged 5-14 years attending government schools in four different regions in Malta during 1949. A total of 15408 children were examined regarding their state of nutrition during the routine medical inspections.<sup>3</sup> This body weight data available in the English system of measurements was converted into the metric equivalents and a mean overall weight value calculated. This was compared to 50<sup>th</sup> centile body weight standards established for British children in 1965.<sup>4</sup> Birth weight means of a

cohort of Maltese school children aged 5-6 years [girls  $n=92$ ; boys  $n=105$ ] and 9-10 years [girls  $n=92$ ; boys  $n=93$ ] were measured during 2009 allowing for further comparisons between the mid-20<sup>th</sup> century and early 20<sup>th</sup> century child body weights.<sup>5</sup>

## Results

The published data (Table 1) suggests that children residing in Area 4 encompassing the rural Northern region

[Mosta, Naxxar, Gharghur, St Paul's Bay, Mellieha, Mgarr, Mdina, Rabat, Dingli] were generally of a higher mean body weight than their counterparts from the other three regions. Conversely, children from Area 1 encompassing an urban region (Valletta, Floriana, Msida, Gzira, Sliema, St Julians, Mensija, Birkirkara, Lija, Attard, Hamrun, Balzan, Ta' Xbiex, St George, St Venera) were generally of a lower mean body weight than their counterparts.

Boys						
Age [completed years]	Area 1	Area 2	Area 3	Area 4	Overall mean weight [Kg]	1965 British 50 <sup>th</sup> centile weights [Kg]
5-6	18.9	18.6	18.6	19.9	19.0	19.5
6-7	20.4	20.4	20.2	21.0	20.5	21.5
7-8	22.1	22.4	22.3	23.1	22.5	23.7
8-9	24.2	24.3	24.2	24.9	24.4	26.2
9-10	26.7	26.9	26.6	27.2	26.8	28.9
10-11	28.8	28.8	28.8	29.6	29.0	31.9
11-12	31.2	31.2	31.2	32.0	31.4	35.5
12-13	34.4	34.0	34.0	35.6	34.5	40.0
13-14	36.9	37.6	37.6	38.7	37.7	45.5
14-15	41.1	41.5	41.5	42.4	41.7	51.9

Girls						
Age [completed years]	Area 1	Area 2	Area 3	Area 4	Overall mean weight [Kg]	1965 British 50 <sup>th</sup> centile weights [Kg]
5-6	18.2	17.9	19.1	19.6	18.7	19.3
6-7	19.6	20.2	19.6	20.4	19.9	21.5
7-8	21.3	21.9	21.7	22.5	21.8	23.8
8-9	23.6	23.9	23.6	24.2	23.8	26.4
9-10	26.2	25.9	25.9	26.5	26.1	29.3
10-11	28.6	28.9	28.5	29.3	28.9	33.0
11-12	31.6	32.1	31.4	32.6	31.9	37.7
12-13	35.6	35.6	35.3	36.1	35.7	43.1
13-14	40.0	40.0	39.5	40.3	39.9	48.6
14-15	43.1	42.6	43.5	43.1	43.1	52.9

**Table 1:** Mean weights in kilograms by Age and Region

Area 1: Valletta, Floriana, Msida, Gzira, Sliema, St Julians, Mensija, Birkirkara, Lija, Attard, Hamrun, Balzan, Ta' Xbiex, St George, St Venera  
 Area 2: Marsa, Paola, Tarxien, Ghaxaq, Birzebuga, Marsascala, Marsaxlokk, Zabbar, Fgura, Zejtun, Cospicua, Kalkara, Senglea, Vittoriosa  
 Area 3: Gudja, Luqa, Kirkop, Safi, Zurrieq, Qrendi, Mqabba, Siggiewi, Zebbug, Qormi  
 Area 4: Mosta, Naxxar, Gharghur, St Paul's Bay, Mellieha, Mgarr, Mdina, Rabat, Dingli

The overall mean weights by gender shows an expected increase in body weight from 19.0 kg at age 5 years to 41.7 kg at age 15 years in boys, and a similar increase from 18.7 to 43.1 kg in girls (Table 1). The male-female ratio for the overall weight means was above  $\geq 1$  until the age of 10 years reflecting the higher body mass in

boys. At 11 years or more the ratio was  $< 1$  reflecting a higher body mass in girls (Figure 1). This reflects a delay in the growth spurt in girls when compared to 1965 British children since the latter favoured female growth at 8 years of age.

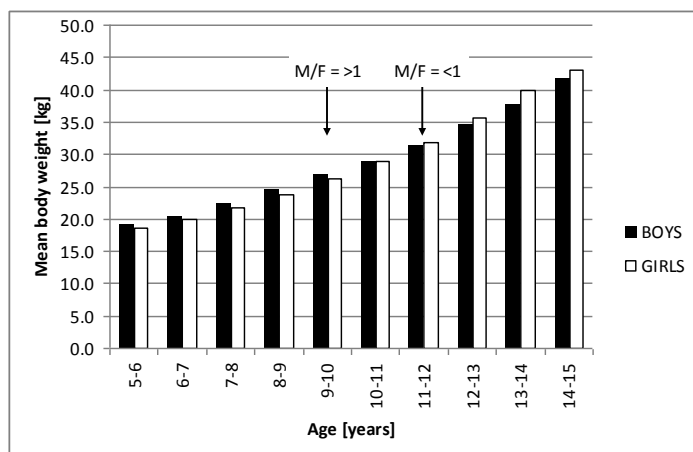


Figure 1: Mean body weight by Age and gender

The mean weight at 5 years in 1949 was below the 50<sup>th</sup> percentile when compared to 1965 British percentile weight standards for boys and girls; while at 9 years of age, the mean body weight was around the 25<sup>th</sup> percentile for both genders. At 14 years of age, the mean body weight for both genders was around the 10<sup>th</sup> percentile (Table 1).<sup>8</sup> This suggests that while childhood nutrition in Maltese children in 1949 may have been nearly comparable to 1965 British standards until the age of five years; nutritional standards appeared to deteriorate in the subsequent childhood years thus affecting growth and physical development. Similar observations can be made when comparing the average body weights at ages 5 and 9 years reported in 1949 to average body weights of similar-aged children measured in 2009 (Table 2).

Mean Body Weight [kg]

Age [years]	Boys 1949	Boys 2009	Girls 1949	Girls 2009
5-6 years	19.0	20.58 + 3.69 [n = 105]	18.7	20.60 + 3.95 [n = 92]
9-10 years	26.8	37.16 + 10.15 [n = 93]	26.1	34.87 + 9.1 [n = 92]

Table 2: Anthropometry by Age and Gender: 1949 & 2009

## Discussion

In the mid-20<sup>th</sup> century, child nutrition was a topical issue with the Department of Health. The issue however was not one of over-nutrition, but rather of under-nutrition. During the scholastic year 1937-38, the School Medical Officers examined 25264 children. Their report “..... stated that the number of newly admitted children showing signs of undernutrition was larger this year. A marked improvement was noticed at later inspections especially amongst those who were given the daily ration of milk which is issued free to school children.” During that year, the childhood mortality under 5 years of age stood at 72.47 per 1000 children of that age group. In comparison, the overall death rate was 20.09 per 1000 population.<sup>3</sup> Serious

efforts were made by the Maltese health authorities to address infant and child health in the subsequent years with impressive results.<sup>5</sup> By 1949, the childhood mortality had fallen significantly to 3.70 per 1000; while the overall death rate was 10.69 per 1000 population. During that year, the School Medical Officers reported that while there was “a good deal of improvement in the nutrition of children, when compared to that of previous years”, 7.2% of the 15468 children examined were reported to be in a bad or poor state of nutrition. A further 14.3% were reported as being in a fair or slightly sub-normal state. During 1948, bad and fair nutritional-state children accounted for 10.2% and 29.3% respectively. The improvement was attributed to “the provision of free milk, cod liver oil, and other medicines to children in schools, and the co-operation of parents in providing a better diet for their children.”<sup>3</sup>

The prime concern for the public health authorities then was the promotion of better nutrition practices. The 1949 report further observes that “border-line cases of malnutrition were frequently met among children belonging to large families of the poorer classes, probably due to the fact that less of the protective food is consumed. Children suffering from malnutrition manifested the following characteristics:- Height and weight below average; sallow complexion; pallor of mucous membranes; lack of subcutaneous fat; poorly developed and flabby muscles; mental capacity below average and catarrhal condition of the respiratory tract. Many of the children showing indications of fatigue, such as sleep, drooping posture and general lack of emotional balance, improved considerably when their state of nutrition was corrected.” During that year, no less than 9000 children received  $\frac{1}{3}$  pint of milk daily; while a total of 1058 gallons of cod liver oil, 19697 iron tablet supplements, 34023 yeast food tablet supplements, and 77268 calcium tablet supplements were also administered.<sup>3</sup>

The available data for the mid-20<sup>th</sup> century clearly confirms that Maltese children were in the majority reaching their teenage years in a state of relative under-nutrition. This had its consequences on subsequent development and affected subsequent pregnancy outcomes. As reported in 1946: “Working class mothers are often underfed and their diets tend to be of poor quality. Poor diets lead to poor physique and to maternal ill health; there occur more often premature birth and inability of the mother to suckle and care for her child. Breast feeding should be our first aim, but the mothers must be well fed if they are to produce the necessary quantity and high quality of breast milk.” During that year, the infant mortality rate was reported at 130.8 per 1000 live births; the stillbirth

rate was 25.7 per 1000 total births. Infant deaths resulting from congenital debility and premature birth were reported to contribute to 23.8% and 7.4% respectively.<sup>3</sup> The low birth weight rate defined as an infant less than 5lbs 8ozs (approx. 2500g), was reported to be of the order of 4.4% in Maltese women from the higher socio-economic class delivering in the private maternity unit during 1947-54, and of the order of 9.5% in women of a lower socio-economic status delivering in the public sector during 1954-55.<sup>6</sup>

Low birth weight resulting from intrauterine growth retardation and prematurity has important consequences on subsequent development. In normal weight infants, adipose tissue increases rapidly during the first year of life. Thereafter, the amount of adipose tissue falls only slightly until the pre-pubertal growth spurt. Malnourished infants during intrauterine and first year of life will adapt their physiology towards coping with a “thrifty diet” through epigenetic changes. Thrifty diet phenotype individuals will tend to metabolic maladjustment if exposed to generous nutritional habits predisposing to obesity and other features of the metabolic syndrome – Barker’s hypothesis.<sup>8,9</sup> The mid-20<sup>th</sup> century Maltese infants born to generally underweight women were exposed to dramatic socio-economic changes that drastically provided abundant nutrition that overloaded their metabolic setting and resulting in the metabolic syndrome epidemic of the late 20<sup>th</sup> century. This led to a generation of pregnant women plagued by obesity and disorders of carbohydrate metabolism resulting in intrauterine over nutrition predisposing to macrosomia.<sup>10,11</sup>

We have now gone a full circle where overweight over nourished women are having big obese babies who through different mechanisms also are predisposed to

obesity and development of the metabolic syndrome – Pederson’s hypothesis.<sup>9,12</sup>

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