



# Perceptions of body size among a multi-ethnic population in Kuwait

Elizabeth Catherine Maclean <sup>1</sup>, Anwar Mohammad<sup>2</sup>, Noureen Khatoon <sup>2</sup>, Smitha Abraham<sup>2</sup> and Manuel Carballo<sup>1,2\*</sup>

<sup>1</sup>International Centre for Migration, Health and Development, 11 Route du Nant d'Avril, Geneva 1214, Switzerland; <sup>2</sup>Epidemiology and Public Health Unit, Dasman Diabetes Institute, Jasim Mohamad Al Bahar St, Kuwait City, Kuwait

**Objectives:** This analysis aimed to determine how people living in Kuwait perceive their body size and to identify possible determinants of this.

**Design:** Data on perceived body size were gathered as part of a larger cross-sectional Knowledge, Attitudes, Behaviours and Practices (KABP) survey of 1124 participants.

**Results:** Over 60% of participants were either overweight or obese. The overall rate of body size misperception was also high, with 19% of participants underestimating their body size. Gender and diabetes status were found to be associated with body size perception.

**Conclusions:** Many overweight individuals may be underestimating their body size. As such, they may not appreciate the need for behavioural interventions designed to control weight and promote health. There is an evident need to strengthen health education and to address this issue within national policies and community engagement activities.

**Keywords:** Obesity, Diabetes, BMI, Education, Health perceptions, Kuwait

## Introduction

Obesity has become a global epidemic. In the past 35 years, rates of obesity have doubled, and it is estimated to now affect over 600 million adults worldwide.<sup>1</sup> This, in turn, has fuelled increases in linked conditions, such as Type 2 diabetes (T2DM), which is seven times more prevalent among people with obesity.<sup>2,3</sup> The Gulf Cooperation Council (GCC) area has been particularly affected, and in Kuwait, obesity and diabetes have become two of the most important public health burdens facing the country. An estimated 74% of men and 77% women in Kuwait are overweight or obese,<sup>4</sup> and the International Diabetes Federation (IDF) estimates that as many as 415 000 adults are now living with diabetes.<sup>5</sup> Rapid economic development, together with the adoption of sedentary lifestyles, new foods, and new eating behaviours are all thought to be implicated in this phenomenon.<sup>6</sup>

How people perceive their bodies and the role of body weight in determining health has been found to influence the degree to which people can be motivated to adopt healthy lifestyles.<sup>7</sup> Attitudes to body size vary widely, however. These are often culturally defined, but as rates of obesity continue to rise, the social thresholds for what body type is considered 'normal' are likely to increase. In some sub-Saharan African communities, for example, large body size is seen as indicative of health and affluence.<sup>8–10</sup> One South African study, for instance, found that women tended not only to underestimate their body size but by

extension did not appreciate the health threats associated with obesity.<sup>10</sup> Other studies have meanwhile shown that socioeconomic status and level of education are often associated with and can affect personal estimates of body mass index (BMI).<sup>11</sup> In the GCC region, studies have pointed to relatively wide variations in how people see and think about body size.<sup>12</sup> Some, for example, have shown that Saudi Arabian women prefer 'midranges of fatness' and do not find either 'very thin' or 'very obese' silhouettes to be attractive. In traditional Arab society being 'curvaceous' was often seen as a beautiful feminine quality<sup>13</sup> and some research suggests that slight overweightness is still the 'socially accepted' body size in parts of the region.<sup>14,15</sup>

The health implication of body image distortion or body size misperception<sup>16,17</sup> is that it can affect attitudes to food, eating patterns, exercise, and health care.<sup>18,19</sup> Underestimation of body weight or size, for example, can make people less likely to seek care for weight-related health problems or to practice healthy eating/exercise routines.<sup>20</sup>

In 2015, a cross-sectional survey was undertaken by the Dasman Diabetes Institute (DDI) to determine what people in Kuwait know, think about, and do with respect to diabetes, diet, and exercise. As part of the study, a pilot analysis was conducted to determine how people view body size. Self-reported anthropometrics and diabetes status, as well as perceptions of individual body size, are reported in this paper. Given the self-reported nature of this study, however, the results

\*Correspondence to: Manuel Carballo, International Centre for Migration Health and Development, 11 Route du Nant d'Avril, 1214, Geneva, Switzerland. E-mail: mcarballo@icmhd.ch

presented should be seen as exploratory and used to inform further research on the subject.

### Materials and methods

A standardised questionnaire was developed based on previous, validated knowledge, attitudes, behaviours and practices (KABP) surveys of diseases and KABP guidelines.<sup>21</sup> Previous surveys were adapted for diabetes by a national and international team of disease and quantitative research experts. Face-validity of questions was determined by expert review, and the questionnaire was pre-tested in Kuwait by the DDI. The questionnaire was translated and back-translated into English and Arabic. The survey was approved by the DDI International Scientific Advisory Board, and ethics approval was granted by the DDI Ethics Review Committee. Signed informed consent forms were collected from all participants.

Prior to the study, power calculations were performed to estimate the sample size required for the proposed data analysis. Participants were recruited (approached and invited to participate) by interview staff that had been specially trained in the delivery of KABP questionnaires. A convenience sample of people in shopping malls and government offices was taken in order to provide a cross-section of Kuwait city. Malls are popular across all demographic groups in Kuwait, and participant selection at these locations was expected to provide a representative sample of the population, including its large expatriate communities who are otherwise difficult to access. The sample population was therefore multi-ethnic and spanned a broad range of ages, socioeconomic groups and genders. Exclusion from participation was based on language, with the questionnaire being available in English and Arabic.

The survey was undertaken between July and September 2015. Participants either self-completed the questionnaire or were interviewed by data collection staff using the same standard questionnaire. To reduce inter-rater variability, data collectors were specifically trained in the use of the questionnaire and frequently met to discuss any challenges experienced. In order to maintain confidentiality, participants were able to take the questionnaire in a secluded part of the mall if they wished.

Anthropometric data were self-reported, and BMI calculated from these numbers (body weight in kilogrammes divided by height in metres squared). It must be noted that self-reported data on body weight may be less reliable than systematically taken study measurements, and should be considered as a limitation of the study. BMI categories were defined using World Health Organisation (WHO) classifications: underweight (BMI < 18.5), normal (BMI = 18.5–24.9), overweight (BMI ≥ 25–29.9), obese (BMI ≥ 30).<sup>22</sup> Participants were asked if they had ‘ever been told by a healthcare professional that they had diabetes’. Participants were also

asked about their own body size perceptions, i.e. whether they feel that they are ‘underweight’, ‘just the right weight’ or ‘overweight’.

### Data analysis

Data for respondents below the age of 21 years were discounted from the data analysis for ethical reasons. Thus, of the 1224 people who completed the questionnaire, data on 1088 were included in the analysis of body size. Data were analysed using SPSS 21, and significance levels were taken at  $p = 0.05$ . Confidence intervals were calculated to 95%. For height, weight, and BMI, outliers were removed based on z-scores greater or equal to 3 standard deviations from the mean. Descriptive analysis of demographics, BMI, diabetes status and body size perceptions are presented. Under or overestimation of body size (*body size misperception*) was coded based on matching between reported BMI category and body size perceptions. Body size misperception was determined by identifying individuals whose perceived body size did not match their WHO BMI category. For categorical data, Chi-squared tests were used, with Kendall's tau-b being used for ordinal data.

## Results

### Demographics

A total of 1088 adults completed the questionnaire and were included in the analysis. Of these, 48% were male, and 52% were female. The average age of participants was 36. In all, 441 participants (40.5%) were Kuwaiti, and 647 (59.5%) were non-Kuwaiti. The primary countries of origin for non-Kuwaitis were Egypt (30%), India (20%), Philippines (11%), Pakistan (7%), Syria (6%), Lebanon (5%) and Jordan (4%). According to national estimates, 69% of the Kuwait population is expatriate,<sup>23</sup> non-Kuwaitis are therefore slightly underestimated in our sample. The educational level of participants was high; 60% had completed university, and 12% had a post-graduate degree.

### Anthropometrics

Self-reported height and weight information were available for 958 and 991 participants, respectively; BMI was calculable for 905 participants. Mean height was 166.5 cm (CI = 165.9–167.1) and mean weight was 74.5 kg (CI = 73.5–75.6). Mean BMI was 26.7 (CI = 26.4–27.1), indicating that on average the population is overweight. As shown in Table 1, 37.8% of the population was found to be in the overweight range; and 23.8% were obese. A total of 101 participants (9.3%) stated that they had been diagnosed with diabetes. Crude characteristics associated with BMI are illustrated in Table 1. Gender, diabetes status and age were all significantly associated with BMI status, whereas completion of higher education (university, post-graduate or technical college), and nationality were not.

### Body size perceptions

Over half (56.1%) of the participants said they saw themselves as overweight, 37.5% thought that they were ‘just the right weight’, and 6.4% felt that they were underweight. Women were more likely than men to perceive themselves as being overweight ( $p = 0.015$ ): 60% compared to 51%.

As can be seen in Table 2, perceived and reported size varied considerably: for example, of those who felt that they were ‘just the right weight’, 31% were in fact overweight according to their BMI, and a further 5% were obese. Most of the participants who identified themselves as being overweight had a BMI that matched their self-assessment but in 15% of cases, their BMI was within the normal range. Overall rates of body size misperception in Kuwait are summarised in Figure 1, with a total of 18.8% of participants underestimating their body size (believing that they are slimmer than their reported BMI suggests).

Men were more likely to underestimate their weight, but women were more likely to overestimate it (Table 3). People living with diabetes (PLWDM) were less likely to underestimate their weight than was the case with people who did not have diabetes, and in general, their perceptions of their body size were more accurate (however this was not significant) (Table 3).

Age groups ( $p = 0.287$ ), Kuwaiti nationality ( $p = 0.538$ ), and completion of higher education ( $p = 0.368$ ) were not statistically associated with body size misperceptions in crude analyses.

### Discussion

Obesity has become a major health problem in Kuwait and calls for more targeted action than it has received to date. This initial analysis shows that over a third of the sampling population is overweight and that almost a quarter is obese. Similarly high rates have been found in previous studies.<sup>4,24</sup> Indeed, recent investigations have found that not only does Kuwait have the highest rate of adult obesity in the region, but levels of childhood obesity are also becoming a major concern with over 30% of children being affected.<sup>25</sup> With rapid development and urbanisation, many countries in the Arab region have seen significant alterations in eating habits and sedentary behaviours,<sup>26</sup> and despite the now obvious obesity crisis, rates of exercise and healthy eating patterns remain low.<sup>27</sup> Whether perceptions of weight have affected the uptake of obesity prevention and response interventions in Kuwait is unclear, but this initial study serves to highlight the challenge.

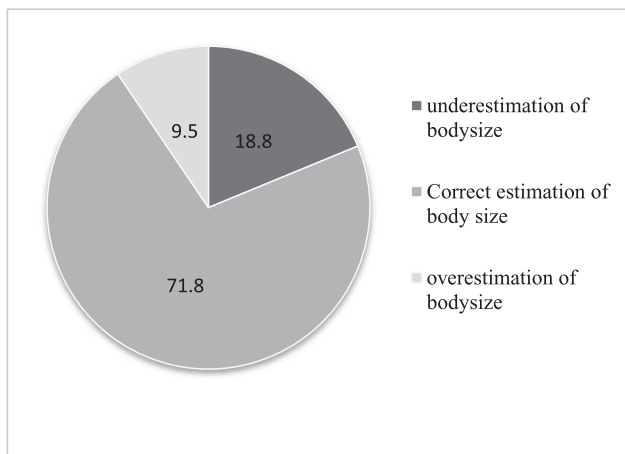
As far as perceived body size was concerned, the majority of those who answered were indeed consistent

**Table 1** Determinants of BMI in Kuwait.

Factor	Weight categories based on BMI				P-value
	Underweight (frequency (valid %))	Normal weight (frequency (valid %))	Overweight (frequency (valid %))	Obese (frequency (valid %))	
Total	22 (2.5%)	319 (36.0%)	335 (37.8%)	211 (23.8%)	
<i>Age groups</i>					$p < 0.001$
21–30	12 (3.8%)	150 (47.2%)	120 (37.7%)	36 (11.3%)	
31–40	5 (1.8%)	95 (34.2%)	104 (37.4%)	74 (26.6%)	
41–50	3 (1.8%)	43 (25.9%)	63 (38.0%)	57 (34.3%)	
51 and over	0 (0.0%)	20 (20.2%)	41 (41.4%)	38 (38.4%)	
<i>Nationality</i>					$p = 0.137$
Kuwaiti	11 (3.2%)	137 (39.5%)	117 (33.7%)	82 (23.6%)	
Non-Kuwaiti	11 (2.0%)	182 (33.7%)	218 (40.4%)	129 (23.9%)	
<i>Gender</i>					$p < 0.001$
Male	4 (1.0%)	119 (28.5%)	177 (42.3%)	118 (28.2%)	
Female	18 (4.0%)	195 (43.0%)	153 (33.7%)	88 (19.4%)	
<i>Education</i>					$p = 0.327$
Did not complete higher education	8 (3.5%)	89 (38.7%)	78 (33.9%)	55 (23.9%)	
Completed higher education	14 (2.1%)	229 (35.0%)	256 (39.1%)	155 (23.7%)	
<i>Diabetes status</i>					$p < 0.001$
Living with diabetes	1 (1.2%)	19 (22.6%)	26 (31.0%)	38 (45.2%)	
Never diagnosed with diabetes	22 (2.5%)	314 (36.0%)	305 (38.7%)	168 (21.3%)	

**Table 2** Actual versus perceived body size.

Perceived weight status		Weight categories based on BMI				Total
		Underweight	Normal	Overweight	Obese	
Underweight	Underweight	12 (21.1%)	41 (71.9%)	4 (7.0%)	0 (0.0%)	57 (100%)
	Just the right weight	8 (2.4%)	204 (61.3%)	104 (31.2%)	17 (5.1%)	333 (100%)
	Overweight	2 (0.4%)	74 (14.9%)	227 (45.9%)	192 (38.8%)	495 (100%)



**Figure 1** Rates of body size misperception among the population of Kuwait.

with their estimated BMI. Even so, 19% of the respondents underestimated their body size and felt their weight was either normal or underweight when in fact they fell into an overweight or obese category. The phenomenon of body size underestimation has been described in other countries as well, and is thought to be prevalent in both low- and high-income settings.<sup>23,28,29</sup> In both Kenya and Peru, for example, studies have reported that over half of overweight participants underestimated their weight; and in Kenya, the majority of overweight participants’ ideal body image was either overweight or obese.<sup>23,30</sup> Cultural definition of ideal body size is a well-established theory and heavier body size is often viewed positively and seen as being indicative of affluence in lower socioeconomic contexts.<sup>31</sup> Exposure to Western media has also been shown to impact on body weight ideals and body dissatisfaction.<sup>31</sup> In Kuwait, however, there is little information on how body size is viewed and if it has become considered attractive to be what is technically obese.

As rates of obesity increase across the globe, it is likely that concepts of the ‘normal’ or ideal body-types will also evolve. In our study, the fact that almost a third of people in the overweight BMI category thought they were ‘just the right weight’, may reflect these ideas of body satisfaction and body norms. In a society where the majority of the population is overweight, impressions of ‘normal’

body size may not be consistent with WHO definitions of normal, healthy BMI (18.5–24.9). Indeed, studies from other GCC countries have suggested that overweightness is increasingly being considered as the norm.<sup>14,15</sup>

Gender differences in body size perceptions seen in this study point to the need for interventions on weight management to be gender-tailored. Our study confirms what has been previously reported in Europe, whereby men were found to be worse at classifying their body size and more likely to underestimate their weight.<sup>29,32,33</sup> However, variable results have been found elsewhere,<sup>30</sup> suggesting that gender differences may also be culturally defined. Other earlier studies in the Middle East have reported that over half of normal-weight women aspire to have a slimmer body shape,<sup>13</sup> and if this were the case in Kuwait as well, it might have influenced how women viewed their body size. Given that studies have found gender differences in how people perceive weight-related health risks, with men being less likely than women to accept their high BMI as a health risk,<sup>18</sup> advocacy campaigns may need to be revised to better capture male audiences.

The fact that people living with diabetes were more aware than others of their actual body weight and were less likely to underestimate their body size suggests that they may be more concerned about, and sensitive to, their weight and weight gain. If this is the case, it may indicate that health messages on BMI are effectively reaching PLWDM. There is now an opportunity for targeted health information campaigns and a need for weight counselling to be made more available to those seeking care.

Because other studies have shown that body size misperceptions can adversely affect how people perceive weight-related health risks,<sup>19,34</sup> in Kuwait, there is a need to give this theme more attention and to target overweight individuals with precise information and counselling tailored to how they see themselves. The fact that over half of the respondents felt that they were overweight is meanwhile encouraging if this indeed is indicative of a sensitivity to the problem of obesity, and a willingness to take action to correct this. Primary health care nurses would be ideally placed to provide information and education to those at risk of diabetes because of their BMI. In Kuwait, several studies have found nurses to be underutilised in diabetes and nutritional care, despite their effectiveness in providing patient support.<sup>35,36</sup> Training new cadres of nutrition specialised nurses could provide the backbone of expanded obesity education and advocacy campaigns in Kuwait. What people are willing to do to manage their weight, however, is not clear and much remains to be done to effectively promote behaviour change, particularly among those who tend to underestimate their body size.

It goes without saying that much more needs to be done in terms of health education in schools, the work place, and in the public arena in general to alert the

**Table 3** Determinants of body size misperception in Kuwait.

	Body size misperceptions		
	Underestimated	Correct estimation	Overestimation
Male	117 (28.0%)	287 (68.7%)	14 (3.3%)
Female	46 (10.2%)	337 (74.6%)	69 (15.3%)
PLWDM	8 (9.5%)	69 (82.1%)	7 (8.3%)
Never diagnosed with DM	155 (19.7%)	557 (70.7%)	76 (9.6%)

public to the dangers of obesity. Enabling this will also require greater engagement by the government and private sectors that are influential in terms of food subsidies and food marketing. A truly multi-sectorial involvement is now called for if people are to be helped to understand the inherent dangers of obesity and poor food management.

### Limitations

The fact that anthropometrics in this analysis were self-reported is a key limitation of this study. As indeed has been reported elsewhere, women and certain ethnic minorities are more likely to understate their weight in interview situations.<sup>37</sup> Given that BMI is more often under than overstated in self-reported surveys, the level of body size underestimation may well be even more pronounced than that found in this study. Findings presented should, therefore, be considered as preliminary, and be used to prompt further research on this topic utilising measured and not self-reported BMI.

This study recruited participants from shopping malls and government offices, with the aim of maximising the likelihood of capturing a cross-section of the Kuwait population, including expatriates who can be difficult to access using other sampling methods. Selection at these locations may have resulted in a degree of selection bias, especially regarding socioeconomic status, but given that previous research in Kuwait has highlighted how difficult it is to reach Kuwaiti nationals by phone or through household surveys this method was considered acceptable.

### Conclusions

Obesity and diabetes have become major sources of disability and precocious mortality, and call for exceptional measures to be taken to reverse what is now becoming a worldwide trend with massive implications for global health. The fact that people's perception of their weight and size can be determined by cultural or fashion norms should not be allowed to obviate the very clear need for new public health action to encourage healthy lifestyles and good nutrition. Within the sphere of public health and health education, where increasing attention has been given to motivating individual health self-protection, the time may have come for more top-down action by governments and health authorities in general to ensure the systematic promotion of healthy living. Given the high rates of body size misperception found in this study, particularly among men, action is needed by governments and others to ensure that people are protected against information that can be misleading in terms of the dangers of obesity, unhealthy diets and lifestyles. This pilot analysis should now be used to inform further research on body image and health perceptions within the GCC.

### Acknowledgements

Authors acknowledge and thank Kuwait University Medical Students for their help with data collection.

### Declaration of interest

The authors report no declarations of interest.

### Ethical disclosure

Ethical approval for the survey was granted by the Dasman Diabetes Institute Ethical Review Committee. Written informed consent was obtained from all participants.

### Funding

This study was fully funded by the Dasman Diabetes Institute (KW) following approval by their International Scientific Advisory Board.

### ORCID

Elizabeth Catherine Maclean  <http://orcid.org/0000-0001-6522-5145>

Noureen Khatoun  <http://orcid.org/0000-0001-6661-2825>

### References

1. World Health Organisation. Obesity and overweight fact sheet. 2016. WHO website. <http://www.who.int/mediacentre/factsheets/fs311/en/> (accessed Jul 2016).
2. Abdullah A, Peeters A, de Courten M, Stoelwinder J. The magnitude of association between overweight and obesity and the risk of diabetes: a meta-analysis of prospective cohort studies. *Diabetes Res Clin Pr.* 2010;89(Suppl. 3):309–19.
3. Gattineau M, Hancock C, Holman N, Outhwaite H, Oldridge L, Christie A. Public Health England. Adult obesity and type 2 diabetes. London: Public Health England; 2014. PHE 2014211.
4. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C. Global, regional and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet.* 2014;384(Suppl. 9945):766–81.
5. International Diabetes Federation (IDF). Diabetes atlas 7th edition. Brussels: IDF; 2015. ISBN: 978-2-930229-81-2
6. Ziyab AH, Mohammad A, Maclean E, Behbehani K, Carballo M. Diabetes: a fast evolving epidemic. *Kuwait J.* 2015;47(Suppl. 4):291–301.
7. Swami V, Frederick DA, Aavik T, Alcalay L, Allik J, Anderson D. The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: results of the International Body Project I. *Pers Soc Psychol Bull.* 2010;36(Suppl. 3):309–25.
8. Holdsworth M, Gartner A, Landais E, Maire B, Delpuech F. Perceptions of healthy and desirable body size in urban Senegalese women. *Int J Obes Relat Metab Disord.* 2004;28(Suppl. 12):1561–8.
9. Puoane T, Tsolekile L, Steyn N. Perceptions about body image and sizes among black African girls living in Cape Town. *Ethn Dis.* 2010;20(Suppl. 1):29–34.
10. Okop KJ, Mukumban GC, Mathole T, Levitt N, Puoane T. Perceptions of boy size, obesity threat and the willingness to lose weight among black South African adults: a qualitative study. *BMC public health.* 2016;16:365.
11. Ettarh R, Van de Vijver S, Oti S, Kyobutungi C. Overweight, Obesity and Perceptions of Body Image among Slum Residents in Nairobi, Kenya 2008–2009. *Prev Chronic Dis.* 2013;10:E212.
12. Gremillion H. The cultural politics of body size. *Ann Rev Anthropol.* 2005; 34:13–32.
13. Khawaja M, Afifi-Soweid RA. Images of body weight among young men and women: evidence from Beirut, Lebanon. *J Epidemiol Community Health.* 2004;58(Suppl. 4):352–53.

14. Musaiger AO, Shahbeek NE, Al-Mannai M. The role of social factors and weight status in ideal body-shape preferences as perceived by Arab women. *J Biosoc Sci.* 2004;36(Suppl. 6):699–707.
15. Atika K, Westergren A, Berggren V, Ekblom O, Al-Hazzaa HM. Perceived and ideal body image in young women in South Western Saudi Arabia. *J Obesity* 2015;5:1–7.
16. Gardner RM. Weight status and the perception of body image in men. *Psychol Res Behav Manag.* 2014;7:175–84.
17. Brooks KR, Mond JM, Stevenson RJ, Stephen ID. Body image distortion and exposure to extreme body types: contingent adaption and cross adaption for self and others. *Front Neurosci.* 2016;10:334.
18. Gregory CO, Blanck HM, Gillespie C, Maynard LM, Serdula MK. Perceived health risk of excess body weight among overweight and obese men and women: differences by sex. *Prev Med.* 2008;47(Suppl. 1):46–52.
19. O'haver J, Melnyk BM, Mays MZ, Kelly S, Jacobson D. The relationship of perceived and actual weight in minority adolescents. *J Pediatr Nurs.* 2009;24 (Suppl. 6):474–80.
20. Neumark-Sztainer D, Paxton SJ, Hannan PJ, Haines J, Story M. Does Body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *J Adolesc Health.* 2006;39(Suppl. 2):244–51.
21. ICMHD. Knowledge, attitudes, beliefs and practices on HIV/AIDS among peacekeepers: the case of UNAMSIL: report of a survey. Geneva: ICMHD; 2004.
22. World Health Organisation. Global Database on Body Mass Index. BMI Classification. 2016. [http://apps.who.int/bmi/index.jsp?introPage=intro\\_3.html](http://apps.who.int/bmi/index.jsp?introPage=intro_3.html) (Accessed Oct 2016).
23. Loret de Mola C, Pillay TD, Diez-Canseco F, Gilman RH, Smeeth L, Miranda JJ. Body mass index and self-perception of overweight and obesity in rural, urban and rural-to-urban migrants: PERU MIGRANT study. *PLoS One.* 2012;7(Suppl. 11):e50252.
24. Harvard TH. Chan School of Public Health. Adult obesity: a global look at rising obesity rates. Available from <https://www.hsph.harvard.edu/obesity-prevention-source/obesity-trends/obesity-rates-worldwide/> (accessed Oct 2016).
25. Elkum N, Al-Aroui M, Sharifi M, Shaltout A, Bennakhi A. Prevalence of childhood obesity in the state of Kuwait. *Pediatr Obes.* 2016;11(Suppl. 6):30–4.
26. Bhurosy T, Jeewon R. Overweight and obesity epidemic in developing countries: a problem with diet, physical activity, or socioeconomic status?. *Sci World J.* 2014;e964236.
27. Carballo M, Mohammad A, Maclean EC, Khatoon N, Waheedi M, Abraham S. Knowledge, attitudes, behaviours and practices towards diabetes in Kuwait. *WHO Eastern Mediterranean Health J.* 2017.
28. Gregory CO, Blanck HM, Gillespie C, Maynard LM, Serdula MK. Health perceptions and demographic characteristics associated with underassessment of body weight. *Obesity (Silver Spring).* 2008;16(Suppl. 5):979–86.
29. Wardle J, Haase AM, Steptoe A. Body image and weight control in young adults: international comparisons in university students from 22 countries. *Int J Obes.* 2005;30:644–65.
30. Ettarh R, Van de Vijver S, Oti S, Kyobutungi C. Overweight, obesity, and perception of body image among slum residents in Nairobi, Kenya, 2008–2009. *Preventing Chronic Disease.* 2013;10:E212.
31. Swami V, Frederick DA, Aavik T, Alcalay L, Allik J, Anderson D, et al. The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: results of the international body project I. *Pers Soc Psychol Bull.* 2010;36(Suppl. 3):309–25.
32. Madrigal H. Underestimation of body mass index through perceived body image as compared to self-reported body mass index in the European Union. *Public Health.* 2000;114(Suppl. 6):468–73.
33. Wardle J, Johnson F. Weight and dieting: examining levels of weight concern in British adults. *Int J Obes Relat Metab Disord.* 2002;26:1144–1149.
34. Mueller KG, Hurt RT, Abu-Lebdeh HS, Mueller PS. Self-perceived vs actual and desired weight and body mass index in adult ambulatory general internal medicine patients: a cross sectional study. *BMC Obesity.* 2014;1:26.
35. Carballo M, Al Wotayan R, Maclean EC. Primary health care staff knowledge and practices towards gestational diabetes mellitus in Kuwait. *J Fam Med.* 2016;3(8):1083.
36. Carballo M, Khatoon N, Maclean EC, Al-Hamad N, Mohammad A, Al-Wotayan R, Abraham S. Infant and young child feeding patterns in Kuwait: results of a cross-sectional survey. *Public Health Nutr.* 2017;20 (Suppl. 12):2201–7.
37. Stommel M, Schoenborn CA. Accuracy and usefulness of BMI measures based on self-reported weight and height: findings from the NHANES and NHIS 2001–2006. *BMC Public Health.* 2009;9:421.