

Full Length Research Paper

The level of physical activity and the body mass index as factors that influence absenteeism and health behaviours

Konstantinos Spanos^{1*} and Athanasios Strigas²

¹Department of Sport Organization and Management, Faculty of Human Movement and Quality of Life Sciences, University of Peloponnese, Greece.

²Department of Kinesiology, Recreation and Sport, College of Health and Human Services, Indiana State University, USA.

Received 18 February, 2018; Accepted 6 June, 2018

Obesity and health problems have been observed to reduce productivity and increase absenteeism. Although the relationship between health and productivity is strong, few studies have examined whether the level of obesity and physical activity affect the absence from work and how the health-related habits are affected. The aim of this study was to examine the relations between Body Mass Index (BMI), physical activity, health-related habits and absenteeism, among 103 employees of the Greek General Secretariat of Sports. Significant differences observed in the absence days between normal weight (NW) individuals (3.07 ± 1.7), overweight (8.56 ± 3.08) and obese (12.62 ± 10.1). Significant correlations were observed between BMI and days absent from work ($R = 0.673$), between BMI and activity level ($R = -0.497$) and between days of absence and physical activity ($R = -0.368$). NW employees showed significantly higher physical activity score (35.87 ± 15.79) than overweight (24.31 ± 12.8) and obese (14.62 ± 5.9377). In addition, NW employees consume significantly less fast food meals (2.26 ± 1.76) a week compared to overweight (3.72 ± 1.91) and obese (3.54 ± 1.61). This study provides evidence that obesity and lack of physical activity affect the absent days from work. Higher BMI is also associated with unhealthy attitudes and health problems.

Key words: Body mass index, health behaviours, absenteeism, physical activity.

INTRODUCTION

In recent years, obesity and health problems have been observed in workplaces due to an unhealthy lifestyle, such as poor eating habits, smoking, and reduced physical activity. Overweight and obesity are usually defined by means of the body mass index (BMI), which is defined as the individual's body weight (in kilograms) divided by the square of the height (in square meters).

According to world health organization (WHO),

overweight is defined when BMI is greater than or equal to 25, and obesity is defined when BMI greater than or equal to 30. More specifically, obesity and high BMI are associated with high-risk factor levels for type 2 diabetes, heart disease and high blood pressure (Gregg et al, 2005; Dua et al, 2014). Long sedentary working time has been associated with overweight and obesity, reduced exercise, alcohol consumption and unhealthy diet

*Corresponding author. E-mail: k-spanos@hotmail.com.

(Mummery et al., 2005; Lallukka et al., 2004). Obesity is a risk factor for numerous health problems and many chronic diseases, and its prevalence has increased by 10 to 40% in most European countries over the last decade (WHO, 2002, 2003).

The most important factors that affect people's health are their lifestyle, nutrition habits and physical activity along with the living and working environments. Despite the presence of strong indications that people who exercise are healthier than those who do not, most adults do not incorporate enough physical activity to their daily routine to achieve benefits related to their health and well-being (Troiano et al., 2008). According to WHO (2010), the factors affecting people's health are social, economic and environmental. A great number of health and well-being benefits relate to the working environment of individuals as they "spend" a significant portion of their lives at the workplace; therefore, people and their working environment are interrelated. Health habits and behaviours are directly affected by the type and the quality of work. The health status of individuals greatly affects their efficiency at work and this greatly contributes to the growth and well-being of businesses. Subsequently, the type and the working conditions can have negative effects on the health of the employees.

Obesity is a multifactorial phenomenon. It depends on genetics, environmental factors, individual health behaviours and access to the healthcare system (Centers for Disease Control and Prevention, 2008). The increase in medical expenditures is not the only economic cost associated with obesity. Obesity is also expected, through its impact on health, to lead to decreased productivity, restricted activity and worker absenteeism, although the estimated influence of obesity varies across studies. The obesity-absenteeism relationship has not been explored in European countries. Understanding such relationship is interesting, given that the US and Europe have different health systems and labor market institutions (Sanz-de-Galdeano, 2007).

Obesity is also an economic problem. In a recent large sample survey conducted in the USA, obesity-attributable medical expenditures and absenteeism were examined. Particularly, the research investigated the annual medical costs and missed work days due to injury or illness. The cost of obesity (excluding overweight) at a firm with 1000 employees was estimated to be \$285,000 per year. Obesity is associated with a significant increase in medical expenses and absenteeism from the workplace. Increased absence accounts for 30% of the total cost, and although people with Grade III obesity account for only 3% of the population employed, they account for 21% of the cost of obesity (Finkelstein et al., 2005).

Obesity and unhealthy behaviours may lead to both direct and indirect medical costs related to morbidity and mortality which can reduce, for instance, efficiency through lost days of work. These costs are likely not to affect just the obese but also non-obese individuals who

bear the costs of others' obesity through public programs, risk pooling and other channels (Sanz-de-Galdeano, 2007). The review of the literature revealed that overweight and obese employees had higher levels of absenteeism and higher sick leave or disability use. The overweight and obese individual also presented more workplace injuries. From an economic point of view, the data analysis showed that health care costs were higher for employees with higher body mass indices (Schmier et al., 2006).

According to a study conducted by Goetzel et al. (2010), it was recognized that obese workers had 20% more medical visits and 26% more emergency visits than normal-weight employees. This increase in absenteeism reduces workers' productivity levels, and add increased costs for the employer to ensure adequate coverage of work, both in planned and unplanned absences. Other studies showed that obese employees and workers with higher self-reported BMI values experienced higher absenteeism rates than overweight or normal weight employees (Quesenberry et al., 1998).

Gates et al. (2008) found that extremely or moderately obese workers have higher absenteeism rates and showed significantly fewer productivity levels than mildly obese workers. In contrast, in a recent study, the results indicated that obese employees who reduced their weight, also experienced reduced preabsenteeism (Gifford, 2015). Although these results should be interpreted with some caution, given the small number of observations per country, the evidence presented suggests that there are interesting geographical patterns in the way obesity affects individuals' self-perceived health, possibly linked to differences in beliefs about the harms of obesity and rates or the value of life. According to the results obtained, Northern European individuals seem to be more informed about the health consequences of obesity and value the future more than their Southern European counterparts (Sanz-de-Galdeano, 2007).

Although lifestyle is becoming healthier, there is overwhelming evidence of the effectiveness of wellness programs in the workplace that improve the health of workers and help employees reach a higher level of productivity. In many cases, improving employee health can lead to a significant reduction in costs for both the worker and the employer. One study identified an average saving of about \$ 5 for every dollar spent on implementing a worker's wellness program. In addition, the same study observed a 14% reduction in days lost due to illness or disability following the implementation of the program (Aldana and Pronk, 2001).

From the aforementioned, it is understood that obesity has significant medical and health costs. Although the relationship between health and productivity is robust, few studies have studied whether the level of obesity and activity affect the absence from work due to illness and if these factors interact with health behaviours. The purpose of this research was to examine whether obesity,

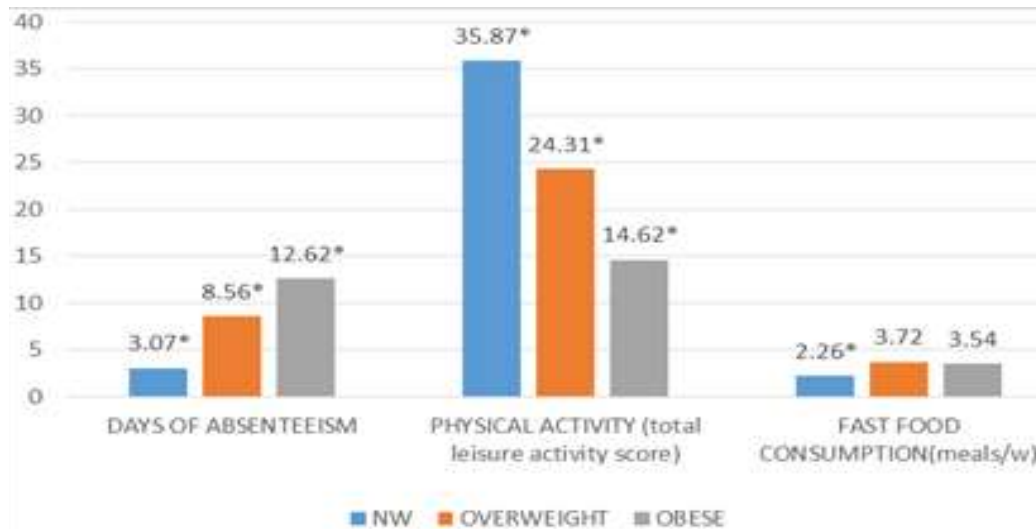


Figure 1. Days of absenteeism, physical activity and fast food consumption for different groups.

and in particular BMI, as well as the level of physical activity, affect days of absence from the workplace due to illness. The second goal was to examine whether overweight and obese people exhibit more musculoskeletal and health problems associated with diseases with high mortality rates. Finally, the aim of the study was to discover if BMI affects health-related behaviours.

METHODOLOGY

In this cross-sectional study, a random sample was taken out of the Sports General Secretariat of Greece employee population. The sample consisted of 103 office workers age (means \pm SD, 46.6 \pm 5.8 years and BMI 25.3 \pm 3.7), working 40 h a week. The study focused on 70 women, age 46.3 \pm 5.4 years and BMI 24.6 \pm 3.5, and 33 men age 46.6 \pm 6.6 years and BMI 26.6 \pm 3.8 (means \pm SD). Preabsenteeism was assessed by a single question, evaluating the frequency of being at work, despite illness, during the preceding year. Illness absence data were registered during 12 months' follow-up. Height and body weight were measured according to a standard protocol by a trained dietician, and an exercise physiologist. BMI was calculated by the type: weight (kg)/height (m)². Weight and height were measured with clothes and shoes removed, using a SECA scale (seca 899). The level of physical activity was calculated through the Godin leisure time exercise questionnaire (Godin, 2011). Also, diseases related to increased mortality rates (type 2 diabetes, heart disease, high blood pressure, high cholesterol and respiratory illness) musculoskeletal pains (neck, lower back, hips, knees) and health-related habits (smoking, fast food and alcohol consumption, physical inactivity) were recorded, by asking the participants with a simple question for each factor. Demographic characteristics were also assessed. Other baseline characteristics were sex and age (years). The sample was divided into normal weight (NW) (BMI 18-24.9), overweight (BMI 25-29.9) and obese (BMI \geq 30) employees. Management was informed about the study and the questionnaire was sent to the employees. The questionnaire included a letter explaining the purpose of the study. In addition, employees were asked to complete the questionnaire without reporting any identifying information. Average,

standard deviations and correlations between variables were examined, while one-way ANOVA was used. For the statistical analysis, the Statistical Package for Social Sciences (SPSS 20.0) was used (IBM Corp, 2011).

RESULTS

The purpose of this study was to examine the correlations between BMI, physical activity, health-related habits, disease and musculoskeletal pain and absenteeism. Additionally, it has been examined whether the level of obesity and physical activity affect the absence from work and how the health-related habits are affected.

Figure 1 presents the differences in days of absenteeism, physical activity and fast food consumption among normal weight, overweight and obese employees. There was a statistically significant difference between the 3 groups on days of absence and physical activity. In junk food consumption, there was no significant difference between overweight and obese people, but normal weight people consumed significantly less junk food than the other 2 groups. Figure 2 shows the percentage of employees presenting musculoskeletal pains, developing disease, alcohol consumption and smoking. Overweight and obese people presented more musculoskeletal pains, health problems and unhealthy behaviours than normal weight individuals

There was a significant difference in the absence days between NW individuals (3.07 \pm 1.7), overweight (8.56 \pm 3.08) and obese (12.62 \pm 10.1). There was a significant correlation between BMI and days absent from work ($R= 0.673$). Correlations were observed between BMI and activity level ($R= -0.497$), and between days of absence and physical activity ($R= -0.368$). No significant correlations were observed in days of absence relative to

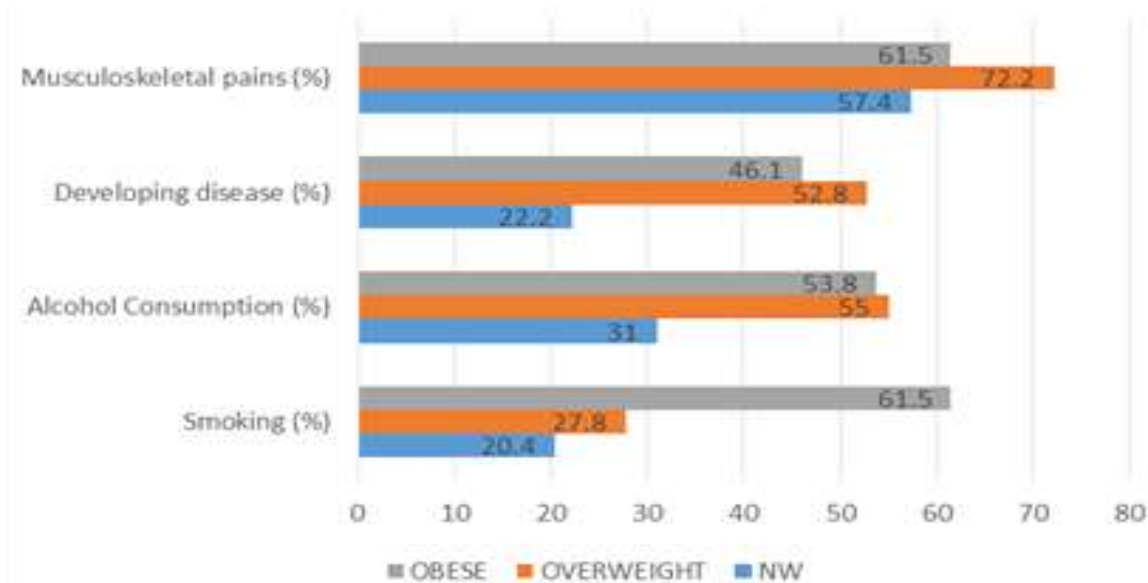


Figure 2. Percentage of musculoskeletal pains, disease, alcohol consumption and smoking for different groups.

sleeping time ($R = -0.006$) and fast food consumption ($R = -0.112$). People with disease and musculoskeletal pain were absent more days (8.38 ± 4.36) than healthy subjects (4.54 ± 3.07). The data on health-related habits showed that people with higher BMI adopted more unhealthy habits.

Specifically, NW employees, through the total leisure activity score, showed significantly higher physical activity (35.87 ± 15.79) than overweight (24.3 ± 12.8) and obese (14.62 ± 5.9377). Additionally, from those obese employees, 61.5% were smokers, compared to 20.4% of NW employees. In addition, NW employees consumed significantly less fast food meals per week (2.26 ± 1.76) compared to overweight (3.72 ± 1.91) and obese (3.54 ± 1.61). Regarding alcohol consumption, 55% of overweight employees drunk more than 7 glasses per week in contrast with NW employees where the percentage was 31%. Also, 52.8% of overweight employees had developed a disease, compared to 22.2% of those with normal weight. 57.4% of NW employees presented musculoskeletal pains, while the proportion of overweight and obese subjects was 72.2 and 61.5%, respectively.

DISCUSSION

The present study shows that BMI correlates with days of absence from work due to illness. A small correlation also occurs between physical activity and absence days. As expected, physical activity affects the body mass index, with the most trained individuals having a lower BMI. It also appears that eating junk food and sleeping hours, as isolated factors, do not affect days of absence. A finding

of the research is that obese people also adopt more unhealthy behaviours. In particular, obese and overweight people exercise less, consume more junk food and alcohol and smoke more. They also suffer from musculoskeletal problems and health problems in general. Although overweight and obese individuals presented more musculoskeletal pain, the rate is also quite high in NW employees too, as about one in two people suffers from musculoskeletal pains. This is probably due to the type of work and other ergonomic factors.

The results of the present paper agree with other studies showing that obese employees and workers with higher self-reported BMI values, experienced higher absenteeism rates than overweight or normal weight employees (Quesenberry et al., 1998). Gates et al. (2008) found that extremely or moderately obese workers have higher absenteeism rates and showed significantly fewer productivity levels than mildly obese workers. The aforementioned results are consistent with the current survey, where obese and overweight people were absent more days than normal people from their work. In contrast, the results of the present study do not agree with Gifford (2015) study, where the results indicate that obese employees who reduced their weight, also experience reduced pre-absenteeism. Obesity is also associated with a lower health-related quality of life, and it is shown that moderately or extremely obese people often have difficulty moving because of their body size and weight (Sach et al., 2007).

In addition, pain has been found to be prevalent in obese persons (Kostka and Bogus, 2007) and is often associated with musculoskeletal or joint-related pain in the feet, knees, ankles, and back (Anderson et al., 2003).

The prevalence of significant knee, hip, and back pain increases with increased levels of BMI. In the present study, the 72.2% of overweight and 61.5% of obese subjects presented musculoskeletal pains. Higher levels of cognitive demands and influence at work are associated with the higher self-reported physical activity, but not with health behaviours (McCarthy et al., 2015).

Another study analyzed the relationship between body mass and hours worked where BMI was used as an explanatory variable. It was found that among women aged 18 to 54 the effect of a one-unit increase in BMI was to lower the number of hours worked by 1.6%. The sample was composed of single mothers receiving cash-welfare benefits in one urban county in Michigan (Cawley and Danziger, 2004). The results of the present paper also agree with the outcome of a cross-sectional study where the results showed that obese employees were more than twice as likely to experience high-level absenteeism, and 1.49 times more likely to suffer from moderate absenteeism than slim employees. With all of the potential confounders controlled simultaneously, obese employees were 1.74 and 1.61 times more likely to experience high and moderate levels of absenteeism, respectively, than slim individuals (Tucker and Friedman, 1998).

Regarding participation in training programs, the results of the present research are in agreement with a study from Netherlands. Jans et al. (2007) found that obese employees were absent 14 days a year more than normal-weight employees. Also, the frequency of absenteeism of more than 7 days was significantly higher. The differences in absenteeism between obese and normal-weight employees were larger for employees who did not exercise regularly. Obese employees are more often absent and are absent longer, especially when they do not practice sport regularly.

The data of the present study showed that people with higher BMI adopt more unhealthy habits. Specifically, NW employees, through the total leisure activity score, showed significantly higher physical activity than overweight and obese. Additionally, in obese employees, 61.5% were smokers, compared to 20.4% of NW employees. Also, NW employees consumed significantly less fast food meals per week compared to overweight and obese. Regarding alcohol consumption, 55% of overweight employees drank more than 7 glasses a week in contrast with NW employees, where the percentage was 31%.

An important factor that might influence the results and is worth studying is the psychological work stress and job strain effects on BMI and weight loss or gain. In a survey conducted in England, it seemed that job strain (combination of high job demands and low control) created bidirectional effects on BMI. On one hand, job stress seems to drive in weight gain among obese and overweight men employees, while on the other hand, it seems that slim employees lose weight (Kivimaki et al.,

2006).

Conclusions

Although absenteeism is a multifactorial phenomenon, this study provides evidence that obesity and the lack of physical activity affect the days one is absent from work. Higher BMI is also associated with unhealthy attitudes and health problems. In particular, the results of this research showed that there is a significant correlation between high body mass index and days of absence from the workplace. Also, overweight and obese individuals have experienced more musculoskeletal pains and more health problems associated with high mortality rates. Finally, an important finding is that people with high BMI exhibit more unhealthy attitudes, which affects public health. Overweight and obese people tend to exercise less, smoke more, eat more junk food, and consume more alcohol. This shows that obesity has direct and indirect costs not only for employers but also for health in general.

Planning interventions to tackle this complex health problem requires a coordinated effort between the private and the public sector. A key area of intervention is the workplace, as people spend most of their time there. Employers also have an economic interest in promoting the health and well-being of their employees. Employers should be encouraged to implement management programs for obesity and change health-related behaviours. The implementation of wellness programs at workplaces should not only be limited to the provision of exercise programs but should aim at adopting behaviours that contribute to improving the quality of life. Companies with a healthy workforce increase their potential growth, and, by extension, the economic conditions of society are improving.

Further research-based information must be obtained using a larger sample. Also, it is important to study the effect of obesity on absenteeism and health behaviours within different occupations and hour shifts. This might show more statistically significant associations. It is also important that obesity is expressed with other markers such as body fat percentage and waist and hip circumferences. Vo₂ max is also an important factor and must be examined if it affects the absenteeism. It is particularly important to examine whether obese and overweight employees are absent due to obesity or unhealthy behaviours.

More research is needed on the cause and effect of obesity, and how this interferes with job stress and job satisfaction. About musculoskeletal pain, it is necessary to study whether the body's posture during work, ergonomic position and type of work, are important factors. Such extensions may lead to discovering the relationship between obesity, psychology, health behaviours and occupational health in order to create

appropriate intervention programs.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

- Aldana SG, Pronk NP (2001). Health promotion programs, modifiable health risks, and employee absenteeism. *Journal of Occupational and Environmental Medicine* 43(1):36-46.
- Anderson RE, Crespo CJ, Bartlett SJ, Bathon JM, Fontaine KR (2003). Relationship between body weight gain and significant knee, hip, and back pain in older Americans. *Obesity Research* 11:1159-1162.
- Cawley J, Danziger S (2004). Obesity as a barrier to the transition from welfare to work. Working Paper 10508, NBER Working Paper Series.
- Centers for Disease Control and Prevention (2008). Contributing factors. *Overweight and Obesity: An overview*.
- Dua S, Bhuker M, Sharma P, Dhall M, Kapoor S (2014). Body mass index relates to blood pressure among adults. *North American Journal of Medical Sciences* 6(2):89-95.
- Finkelstein E, Fiebelkorn IC, Wang G (2005). The Costs of Obesity among Full-Time Employees. *American Journal of Health Promotion* 20(1):45-51.
- Gates DM, Succop P, Brehm BJ, Gillespie GL, Sommers BD (2008). Obesity and presenteeism: the impact of body mass index on workplace productivity. *Journal of Occupational and Environmental Medicine* 50:39-45.
- Gifford B (2015). Unhealthy Body Weight, Illness Absence, Presenteeism, Medical Payments, and Disability Leave: A Longitudinal View. *Population Health Management* 18(4):272-282.
- Godin G (2011). The Godin-Shephard leisure-time physical activity questionnaire. *Health and Fitness Journal of Canada* 4(1):18-22.
- Goetzel RZ, Gibson TB, Short ME, Chu BC, Wadell J, Boewn J, Lemon SC, Fernandez ID, Ozminkowski RJ, Wilson MG, Deloy DM (2010). A multi-worksites analysis of the relationships among body mass index, medical utilization and worker productivity. *Journal of Occupational Medicine* 52 Suppl 1:S52-58.
- Gregg EW, Cheng YJ, Cadwell BL (2005). Secular trends in cardiovascular disease risk factors according to body mass index in US adults. *Journal of American Medical Association* 293:1868-1874.
- IBM Corp (2011). Released. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY.
- Jans MP, Van Den Heuvel SG, Hildebrandt VH, Bongers PM (2007). Overweight and Obesity as Predictors of Absenteeism in the Working Population of the Netherlands. *Journal of Occupational and Environmental Medicine* 49(9):975-980.
- Kivimaki M, Head J, Ferrie JE, Shipley MJ, Brunner E, Vahtera J, Marmot MG (2006). Work stress, weight gain and weight loss: evidence for bidirectional effects of job strain on body mass index in the Whitehall II study. *International Journal of Obesity* 30(6):982-987.
- Kostka T, Bogus K (2007). Independent contribution of overweight/obesity and physical inactivity to lower health-related quality of life in community-dwelling older subjects. *Zeitschrift fur Gerontologie und Geriatrie* 40:43-51.
- Lallukka T, Sarlio-Lähteenkorva S, Roos E, Laaksonen M, Rahkonen O, Lahelma E (2004). Working conditions and health behaviours among employed women and men: the Helsinki Health Study. *Preventive Medicine* 38:48-56.
- McCarthy VJC, Perry IJ, Harrington JM, Greiner BA (2015). Co-occurrence of protective health behaviours and perceived psychosocial job characteristics. *Preventive Medicine Report* 2:812-817.
- Mummery WK, Schofield GM, Steele R, Eakin EG, Brown WJ (2005). Occupational sitting time and overweight and obesity in Australian workers. *American Journal of Preventive Medicine* 29:91-97.
- Quesenberry CP Jr, Caan B, Jacobson A (1998). Obesity, health services use, and health care costs among members of a health maintenance organization. *Archives of Internal Medicine* 158:466-472.
- Sach TH, Barton GR, Doherty M, Muir KR, Jenkinson C, Avery AJ (2007). The relationship between body mass index and health-related quality of life: comparing the EQ-5D, EuroQol VAS and SF-6D. *International Journal of Obesity* 31:189-196.
- Sanz-de-Galdeano A (2007). An Economic Analysis of Obesity in Europe: Health, Medical Care and Absenteeism Costs. Universitat de Girona, FEDEA and IZA. December 2007.
- Schmier JK, Jones ML, Halpern MT (2006). Cost of obesity in the workplace. *Scandinavian Journal of Work, Environment and Health* 32(1):5-11.
- Troiano RP, Berrigan D, Dodd KW (2008). Physical activity in the United States measured by accelerometer. *Medicine and Science in Sports and Exercise* 40(1):181-188.
- Tucker LA, Friedman GM (1998). Obesity and Absenteeism: An Epidemiologic Study of 10,825 Employed Adults. *American Journal of Health Promotion* 12:202-207.
- World Health Organization (WHO) (2002). The world health report 2002 - Reducing Risks, Promoting Healthy Life. Available at <http://www.who.int/whr/2002/en/>
- World Health Organization (WHO) (2003). Diet, Nutrition, and the Prevention of Chronic Diseases. WHO Technical Report 916. Available at <http://www.who.int/dietphysicalactivity/publications/trs916/en/>
- World Health Organization (WHO) (2010). Environment and health risks: a review of the influence and effects of social inequalities. Available at http://www.euro.who.int/__data/assets/pdf_file/0003/78069/E93670.pdf