



Health impacts of the global increase in overweight and obesity— a cause for concern

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In the July 6, 2017 issue of the *New England Journal of Medicine*, members from the Global Burden of Disease 2015 Obesity Collaborators present compelling data about the global prevalence of overweight and obesity in youth and adults and the impact of obesity on health outcomes (1). Using a body mass index (BMI) of 25–29 to reflect overweight status and ≥ 30 to reflect obesity status, in 2015 there were 603.7 million adults and 107.7 children from 195 countries that were classified as obese. This translates into an overall prevalence of 12.0% among adults and 5.0% among youth. The collaborators estimated that obesity contributed globally to nearly 4.0 million deaths annually and nearly 5% of the disability-adjusted life years from any cause. Most of the obesity-related deaths and disability-adjusted life years were from cardiovascular diseases. Diabetes was identified as the second obesity-related cause for deaths and disability-adjusted life years.

Particularly troubling are the health disparities noted in the patterns of obesity prevalence. Women were more obese than men at all levels of the socioeconomic index and obesity was highest in women ages 60–64 and in men ages 50–54. Surprisingly, men had the highest increases in obesity between 1980–2006. Among men ages 25–29, those in the lowest socioeconomic index had the highest increase in obesity compared with peers with a higher socioeconomic index. Across the lifespan, the prevalence of obesity decreased from early childhood until age 14 when it increased more rapidly in girls compared with boys. In

adults, obesity increased most rapidly in early adulthood. Geographically, the prevalence of obesity was among the highest in the USA and in selected middle-eastern countries, although prevalence estimates varied by age and gender.

As noted by the GBD collaborators, many factors may have contributed to increases in global obesity as reported in this article. Globalization also has brought increases in the availability, accessibility, and affordability of energy dense foods that can increase the daily energy intake. Between 1989–1997, Popkin (2) noted energy intake in Chinese adults increased by 10% due to an upward shift in the energy dense food in urban and rural diets. They noticed increases in BMI and changes in the shape of the BMI curve in adults ages 20–45. Further, the proportion of underweight men and women decreased and the proportion of overweight or obese status in men increased from 6.4% to 14.5% and women increased from 11.5% to 16.2% (3).

Consuming highly palatable energy dense foods and drinks in excess of daily calorie expenditure contributes to an increase in overweight and obesity. In a thought-provoking article about the rapid rise of Western-style fast food outlets around the world, Pan *et al.* (4), noted a paralleled increase in obesity and type 2 diabetes during the same period. There is little research, however, showing that expansion of fast food franchises globally is a causal factor in the obesity epidemic (5).

Avoiding overweight and obesity requires a balance

of energy intake and energy expenditure. There is little doubt that reductions in physical activity and increases in sedentary behaviors over the past decades have contributed to the global increases in overweight and obesity. Ng and Popkin (6) analyzed physical activity data from five countries (US, UK, Brazil, China, and India) and labor data from the United Nations International Labour Organization to compare the changes in physical activity over 5 to 34 years. They observed a consistent decrease (-5.6% to 44.9%) in the total energy expended in occupation, transportation, domestic, and active leisure physical activity. Conversely, the hours spent per week in sedentary behaviors increased from 3.1% to 46.6%. In particular, large transitions in physical activity were observed over the 18-year monitoring period in China. Total physical activity energy expenditure decreased by 44% with the greatest decreases observed in domestic (-52.1%) and transportation activities (-50.2%). Time spent in sedentary behaviors increased by 32.3%. Katzmarzyk and Mason (7) refer to these changes in energy expenditure as a physical activity transition, where over time, changes in society have diminished our need to perform manual labor for occupational and domestic tasks. Church *et al.* (8) evaluated U.S. labor statistics data from 1960 to 2008 to compare changes in the types of occupations performed and the metabolic demands of occupations. During the 48-year period, there was a decrease in manufacturing and agricultural jobs with an increase in service jobs. This change was associated with an estimated decrease in a daily energy expenditure of 140 calories in men and 124 calories in women. Without adjustments in energy intake or increases in other types of physical activity, these decreases in occupational energy expenditure can add to a significant weight gain over time.

The burden of disease associated with increased overweight and obesity is high, but it likely would be less if people were physically active at levels associated with reductions in many types of cardiovascular diseases and cancers, diabetes and other metabolic disorders (9). The World Health Organization recommends children and adolescents exercise vigorously for at least 60 minutes per day and adults and seniors should accumulate at least 150 minutes per week of moderate-intensity aerobic activity, 75 minutes per week of vigorous-intensity exercise, or a combination of the two doses. Adults and seniors also should do muscle strengthening activities and seniors should include activities to improve balance. In their highly-cited article published in the 2012 *Lancet* physical activity series, Lee *et al.* (10) report an estimated 9.4% of

all 57 million deaths worldwide in 2008 were attributed to physical inactivity. The estimated burden of disease due to physical inactivity was 6% for coronary heart disease, 7% for type 2 diabetes, and 10% for breast and colon cancer. Steven Blair has long asserted that having higher aerobic fitness is protective against morbidity and mortality across the spectrum of BMI levels (11). In a series of studies arising from the Aerobics Center Longitudinal Study, adults with the highest cardiorespiratory fitness levels had lower relative risks for multiple morbidities, all-cause mortality, and cause-specific mortality across BMI strata from normal to obese classes (12-15). This reflects the importance of increasing physical activity at levels to increase cardiorespiratory fitness, especially for those with higher BMI levels.

Of great concern is the global variability on the proportion of adults who fail to meet the WHO physical activity recommendations. Averaged across all countries, 20% of males and 26% of females are not physically active at WHO recommended levels (16). In the Mediterranean, however, where obesity prevalence is among the highest in the world, nearly a quarter to a third of adults do not meet the WHO physical activity recommendations (men 25.6%, women 37.1%) (17). A coupling of sedentary behaviors and overweight and obese status increase the risk for further weight gain and associated with adverse health outcomes.

The global prevalence of overweight and obesity is a public health problem as it affects the health, function, and well-being of a large number of people, and it has as its major impact, the reduction of the health of individuals or society rather than purely a social, esthetic, economic or other non-health impact. Accordingly, various strategies have been proposed to reduce weight gain (18) including recommendations from the WHO to reduce overweight and obesity (19) and to increase physical activity (20). The U.S. Community Preventive Services Task Force is an independent, nonfederal panel of public health and prevention experts who have identified evidence-based strategies to address health concerns. Selected strategies to reduce overweight and obesity include conducting multicomponent interventions to increase the availability of healthier foods and beverages in schools, applying behavioral interventions that aim to reduce recreational sedentary screen time among children, using technology-supported multicomponent coaching or counseling interventions to reduce and maintain weight loss, and initiating worksite obesity programs (21). Selected strategies to increase physical activity include applying interventions including activity monitors for adults who are overweight

or obese, modifying the built environment to combine transportation system interventions with land use and environmental design and to create or improve place for physical activity, providing family-based interventions to increase physical activity, initiating combined diet and physical activity promotion programs to prevent type 2 diabetes among people at increased risk, and enhancing school-based physical education (22).

The global prevalence of overweight and obesity requires a coordinated, multi-disciplinary team approach to address its multiple dimensions. The best approach is to engage multiple stakeholders interested in reducing the impact of overweight and obesity, including medical practitioners, nutritionists, physical activity experts, school leaders, city planners, community leaders, and others who can provide organized, coordinated, and culturally appropriate efforts on a community-wise, basis. The world is at a crossroads regarding the rise in overweight and obesity and the need for more physical activity. Applying community-based strategies to promote energy balance have the greatest benefit to assure optimal health and quality of life globally.

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