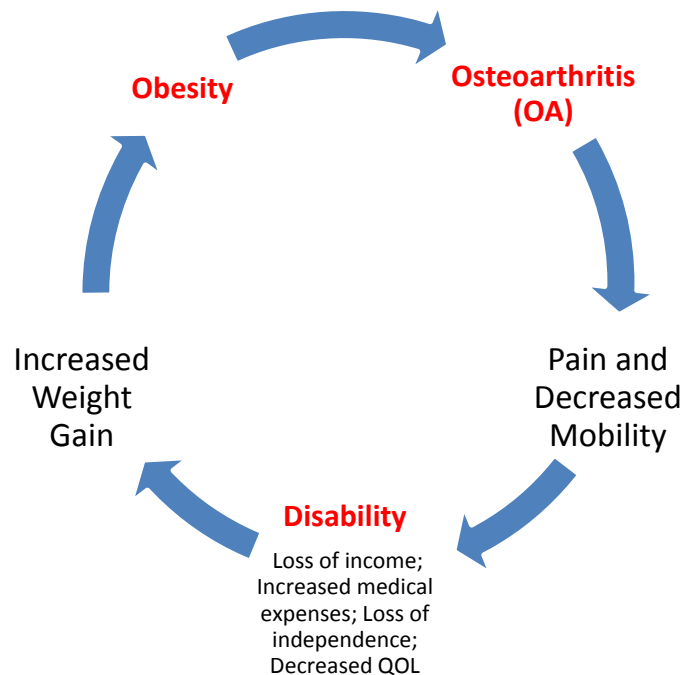


## Background Facts on the Vicious Cycle of Obesity, Osteoarthritis (OA) and Disability

This document serves as a technical backgrounder reflecting the current state of the science that links obesity, osteoarthritis (OA) and disability. As depicted below, these three conditions interact to place the individual in a vicious cycle that erodes health, independence and well-being, diminishes quality of life, and contributes to rapidly escalating health care costs for both the individual and society:



Note: QOL = Quality of Life

1. The prevalence of obesity (BMI 30.0 kg/m<sup>2</sup> or higher) in America is higher than in any other developed country.<sup>1</sup> One out of every three American adults has obesity.<sup>2</sup> This high prevalence of obesity and the growing prevalence of severe obesity is fueling an epidemic of osteoarthritis (OA) that currently affects more than one in every ten adults 25 and older<sup>3</sup> and one out of three adults 65 and older.<sup>3</sup>

<sup>1</sup> United Nations System Standing Committee on Nutrition. Overweight and obesity: a new nutrition emergency? SCN News 29, Late 2004-Early 2005 Available online: [www.unscn.org/layout/modules/resources/files/scnnews29.pdf; accessed 4/3/2012]

<sup>2</sup> Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*. 2010;303(3):235-241

<sup>3</sup> Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part II. *Arthritis Rheum* 2008;58(1):26-35.

2. Excess weight has become one of the most pressing public health threats of the 21<sup>st</sup> century. Today, one third of U.S. adults are classified as overweight (BMI of 25.0-29.9 kg/m<sup>2</sup>), and another third are classified as obese (BMI 30.0 kg/m<sup>2</sup> or higher). Of great concern is the fact that nearly 6 percent of American adults have severe obesity (BMI 40.0 kg/m<sup>2</sup> or higher).<sup>4</sup> The high prevalence of obesity and severe obesity contributes to an estimated \$215 billion spent each year in increased medical expenditures, as well as high rates of disability and preventable death.<sup>5</sup>
  
3. As of 2005, 27 million people in the United States were afflicted with osteoarthritis, which is by far the most common form of arthritis.<sup>3</sup> This condition, characterized by the degeneration of the joint cartilage, can cause severe pain and functional limitations. It is a leading cause of disability and the most common reason for joint replacement surgery in the elderly.<sup>6</sup> Compared with their leaner peers, adults classified as overweight are at increased risk of developing osteoarthritis of the knee<sup>7</sup> and are more than twice as likely to develop osteoarthritis in the hip.<sup>7</sup> In fact, two out of three people who have obesity may develop symptomatic knee OA in their lifetimes.<sup>8</sup> In a study of people ages 55 to 74 years old, high BMI was strongly associated with an increased risk of knee and hip replacement surgery for both men and women.<sup>9</sup>
  
4. Obesity is increasingly common among children, with 17% of children ages 2 – 19 classified as obese.<sup>10</sup> A similar proportion is classified as overweight.<sup>10</sup> Children who are classified as overweight and obese report more lower extremity musculoskeletal problems as compared to their normal weight age-matched counterparts.<sup>11</sup> In this study, teenaged children were more likely to seek medical treatment for such problems than their normal weight peers.<sup>11</sup> Children classified as overweight or obese are at increased risk for OA when they reach adulthood, especially if musculoskeletal problems interfere with their ability to exercise and control weight as they get older.<sup>12</sup>

<sup>4</sup> Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999-2008. *JAMA*. 2010;303(3):235-241

<sup>5</sup> Behan DF, Cox SH. Obesity and its relation to mortality and morbidity costs. Society of Actuaries, Dec. 2010, p 59. available at: [www.soa.org/files/pdf/research-2011-obesity-relation-mortality.pdf](http://www.soa.org/files/pdf/research-2011-obesity-relation-mortality.pdf)

<sup>6</sup> Guccione AA, Felson DT, Anderson JJ, et al. The effects of specific medical conditions on the functional limitations of elders in the Framingham Study. *Am J Pub Health* 1994; 84(3):351-358.

<sup>7</sup> Cicuttini FM, Baker JR, Spector TD. The association of obesity with osteoarthritis of the hand and knee in women: a twin study. *J Rheumatol* 1996; 23:1221-1226.

<sup>8</sup> CDC Centers for Disease Control and Prevention. Arthritis-related statistics.

[http://www.cdc.gov/arthritis/data\\_statistics/arthritis\\_related\\_stats.htm](http://www.cdc.gov/arthritis/data_statistics/arthritis_related_stats.htm) ; accessed April 3, 2012.

<sup>9</sup> Wendelboe AM, Hegmann KT, Biggs JJ, Cox CM, Portmann AJ, Gildea JH, Gren LH, Lyon JL. Relationships between body mass indices and surgical replacements of knee and hip joints. *Am J Prev Med* 2003; 25:290-295

<sup>10</sup> Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007-2008. *JAMA* 2010; 303(3):242-249.

<sup>11</sup> Krul M, van der Wouden JC, Schellevis FG, van Suijlekom-Smit LWA, Koes BW. Musculoskeletal problems in overweight and obese children. *Ann Fam Med* 2009; 7:352-356.

<sup>12</sup> Stovitz, SD, Pardee, PE, Vazquez, G, et al. Musculoskeletal pain in obese children and adolescents. *Acta Pædiatrica* 2008;97(4):48-93.

5. There is a strong correlation between both overweight and obesity and a wide variety of chronic diseases such as Type 2 diabetes, heart disease, stroke, certain cancers and OA.<sup>13</sup> Consequently, the costs associated with chronic disease management are expected to double every 10 years.<sup>14</sup> As a result, by 2030, health-care costs attributable to overweight and obesity are predicted to account for 16-18 percent of total U.S. health-care costs.<sup>14</sup>
6. In one analysis of national survey data, adults with obesity and extreme obesity were the most likely to report joint pain (58 percent and 69 percent, respectively) as compared to those who were normal weight and overweight (40 percent and 49 percent, respectively).<sup>15</sup> In addition, adults with obesity and extreme obesity were less likely to report regular exercise (50.0 percent and 30.9 percent, respectively) compared to healthy weight adults and adults classified as overweight (66.8 percent and 61.7 percent, respectively).<sup>15</sup> This is significant because inability to exercise makes weight gain more likely.
7. As overweight and obesity rates have climbed, so has the prevalence of OA.<sup>16</sup> Affecting 27 million adults,<sup>3</sup> OA is now the third leading cause of years lived with a disability in the U.S.<sup>17</sup> When compared to the rest of the adult population, people with self-reported arthritis are more likely to require the use of special equipment (16% among those with arthritis versus 4% among those without), to be limited in their activities (37% versus 10%), and to be disabled (41% versus 12%).<sup>18</sup>
8. The risk of disability in people with OA increases with the degree of obesity. According to a 2004 study, persons with self-reported OA with obesity (BMI 30.0-39.9 kg/m<sup>2</sup>) are 1.72 times more likely to be disabled than normal weight counterparts.<sup>18</sup> Among people with severe obesity (more than 100 pounds overweight), the risk of OA-related disability increases to 2.75 times higher than normal weight persons.<sup>18</sup>
9. Compounding the problem, many people with OA also have other chronic diseases, like heart disease and diabetes, for which excess weight is a major risk factor. Nearly one in four adults with arthritis (24% or 11.2 million) have

<sup>13</sup> Guh DP, Zhang W, Bansback N, Amarsi Z, Birmingham CL, Anis AH. The incidence of co-morbidities related to obesity and overweight: A systematic review and meta-analysis. *BMC Public Health* 2009; 9:88

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<sup>14</sup> Wang Y, Beydoun MA, Liang L, Caballero B, Kumanyika SK. Will all Americans become overweight or obese? Estimating the progression and cost of the US obesity epidemic. *Obesity* 2008; 16(10):2323-2330

<sup>15</sup> Carroll W, Rhoades J. Obesity in America: Estimates for the U.S. Civilian Noninstitutionalized Population Age 20 and Older, 2009. Statistical Brief #364. March 2012. Agency for Healthcare Research and Quality, Rockville, MD.

[http://www.meps.ahrq.gov/mepsweb/data\\_files/publications/st364/stat364.pdf](http://www.meps.ahrq.gov/mepsweb/data_files/publications/st364/stat364.pdf)

<sup>16</sup> CDC Centers for Disease Control and Prevention. Arthritis-related statistics.

[http://www.cdc.gov/arthritis/data\\_statistics/arthritis\\_related\\_stats.htm](http://www.cdc.gov/arthritis/data_statistics/arthritis_related_stats.htm) ; accessed April 3, 2012.

<sup>17</sup> Michaud CM, McKenna MT, Begg S, Tomijima N, Majmudar M, Bulzacchelli MT et al. The burden of disease and injury in the United States 1996. *Pop Health Metrics* 2006; 18:4-11.

<sup>18</sup> Okoro CA, Hootman JM, Strine TW et al. Disability, arthritis, and body weight among adults 45 years and older. *Obesity Res* 2004; 12(5):854-861

heart disease and 16% (7.3 million) have diabetes.<sup>19</sup> According to one estimate, arthritis affects 57% of adults with heart disease and 52% of adults with diabetes.<sup>19</sup> Arthritis is a known barrier to physical activity among people with heart disease<sup>20</sup> and those with diabetes,<sup>21</sup> increasing the risk of further weight gain and worsening these conditions.

10. The intersection of OA with obesity and disability translates into higher healthcare costs for the nation. In terms of hospital costs alone, OA costs the healthcare system more than \$22.6 billion annually.<sup>22</sup> OA is associated with over 11 million physician and outpatient visits, 662,000 hospitalizations and more than 632,000 total joint replacements.<sup>3</sup> Importantly, these costs are only expected to rise as baby boomers age and the effects of the obesity epidemic on OA incidence and prevalence are realized.
11. Despite these disturbing projections, OA remains a relatively unaddressed public health problem compared to other obesity-related chronic diseases, such as cancer and heart disease. The link between overweight, obesity, and OA is too often overlooked. Yet there is evidence that the presence of pain associated with OA leads to reduced mobility and to subsequent weight gain.<sup>23</sup> The presence of obesity, in addition to increasing the risk of OA, compromises outcomes of joint replacement surgery should it become necessary.<sup>24,25</sup>
12. Studies show that even modest weight loss (especially when combined with exercise) in people who are classified as overweight or obese and have OA produces meaningful improvements in physical function, reductions in pain, improved mobility and independence, and increased quality of life.<sup>26,27,28,29</sup> In fact, a 2005 study in older adults with knee OA demonstrated that each pound

<sup>19</sup> Murphy L, Bolen J, Helmick CG, Brady TJ. Comorbidities Are Very Common Among People With Arthritis. Poster 43. 20th National Conference on Chronic Disease Prevention and Control, CDC February 2009.

<sup>20</sup> Bolen J, Murphy L, Greenlund K, Helmick CG, Hootman J, Brady TJ, Langmaid G, Keenan N. Arthritis as a potential barrier to physical activity among adults with heart disease — United States, 2005 and 2007. *MMWR* 2009;58(7):165-169.

<sup>21</sup> Bolen J, Hootman J, Helmick CG, Murphy L, Langmaid G, Caspersen CJ. Arthritis as a Potential Barrier to Physical Activity Among Adults with Diabetes — United States, 2005 and 2007. *MMWR* 2008;57(18):486-489.

<sup>22</sup> United States Bone and Joint Decade. The burden of musculoskeletal diseases in the United States. Rosemont, IL: American Academy of Orthopaedic Surgeons 2008; available at <http://www.boneandjointburden.org/> accessed April 2, 2012.

<sup>23</sup> Lake JK, Power C, Cole TJ. Back pain and obesity in the 1958 British birth cohort. cause or effect? *J. Clin Epidemiol* 2000; 53:245-250

<sup>24</sup> Miric A, Lim M, Kahn B, Rozenthal T, Bombick D, Sculco TP. Perioperative morbidity following total knee arthroplasty among obese patients. *J. Knee Surg* 2002; 15:77-83.

<sup>25</sup> Baumgarten KM, Carlson WO, Watson ES. The effect of obesity on orthopaedic conditions. *S D Med*. 2011;Spec No:41-4.

<sup>26</sup> Messier SP, Loeser RF, Miller GD, Morgan TM, Rejeski WJ, Sevick MA, et al. Exercise and dietary weight loss in overweight and obese older adults with knee osteoarthritis: The arthritis, diet, and activity promotion trial. *Arthritis & Rheumatism* 2004; 50(5):1501-1510.

<sup>27</sup> Felson DT, Zhang Y, Hannan MT, et al: Risk factors for incident radiographic knee osteoarthritis in the elderly: the Framingham Study. *Arthritis Rheum.* 1997;40:728-733.

<sup>28</sup> Christensen R, Astrup A, Blida H. Weight loss: the treatment of choice for knee osteoarthritis? A randomized trial. *Osteoarthritis Cartilage*. 2005 Jan;13(1):20-7.

<sup>29</sup> Felson DT, Chaisson CE. Understanding the relationship between body weight and osteoarthritis. *Baillieres Clin Rheumat* 1997; 11:671-681.

of weight loss resulted in a four-pound reduction in knee joint forces.<sup>30</sup> Other research finds that a weight loss of only about 15 pounds can cut knee pain in half for individuals who are classified as overweight and have OA.<sup>31</sup>

13. Even in people with severe obesity, a scant but growing body of clinical evidence shows that treatment produces significant lasting weight loss accompanied by improvements in comorbidities, such as OA, that can be maintained over time.<sup>32</sup> For the growing number of people with severe obesity, lasting weight loss after surgery dramatically reduces the need for costly hip and knee replacements.<sup>25,33</sup>
14. In light of available evidence, in 2006, the Centers for Medicare and Medicaid Services (CMS) established a national coverage policy for weight-loss surgery to help reduce the significant health risks associated with obesity, including death and disability.<sup>34</sup> In 2011, CMS issued a coverage decision to reimburse the costs of providing obesity screenings and intensive behavioral counseling to obese Medicare beneficiaries (BMI  $\geq$  30.0 kg/m<sup>2</sup>).<sup>35</sup> The benefits of these CMS decisions for preventing and treating OA remain to be clarified.

Additional Readings:

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Damush TM, Stump TE, Clark DO. Body-mass index and 4-year change in health-related quality of life. *J Aging & Health* 2002; 14:195-210.

<sup>30</sup> Messier S, Gutekunst DJ, David C, DeVita P. Weight loss reduces knee joint loads in overweight and obese adults with knee osteoarthritis. *Arthritis & Rheumatism* 2005;52(7):2026-32.

<sup>31</sup> Bartlett SJ, Haaz S, Wroblewski P et al. Small weight losses can yield significant improvements in knee OA symptoms. *Arthritis & Rheumatism* 2004;50[9 (S)]: S658.

<sup>32</sup> Dixon JB, Dixon ME, O'Brien PE. Quality of life after lap-band placement: influence of time, weight loss, and comorbidities. *Obes Res* 2001; 9:713-721.

<sup>33</sup> Kral JG, Otterbeck P, Touza MG. Preventing and treating the accelerated ageing of obesity. *Maturitas* 2010; 66(3):223-230.

<sup>34</sup> Centers for Medicare & Medicaid Services. Decision Memo for Bariatric Surgery for the Treatment of Morbid Obesity (CAG-00250R)

<sup>35</sup> Centers for Medicare & Medicaid Services. Decision Memo for Intensive Behavioral Therapy for Obesity (CAG-00423N).

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