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# Association between obesity and prescribed medication use in England

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## ABSTRACT

We investigate the association between obesity and use of prescribed medications in England. Data were taken from fourteen rounds of the *Health Survey for England* (1999–2012), which has measures of current prescribed medication use based on therapeutic classifications in the British National Formulary, and nurse-measured height and weight. We find that obesity has a statistically significant and positive association with use of a range of medicines for managing diseases associated with obesity. The mean probability of using any type of medication is 0.40 in those of normal weight, 0.44 in the overweight, 0.52 in obesity class I and 0.60 in obesity class II/III. Significant positive associations were found between obesity and the use of medication for diseases of the cardiovascular system, gastrointestinal system, respiratory system, and central nervous system, as well as for infections, endocrine system disorders, gynaecological/urinary disorders and musculo-skeletal and joint disorders. Use of anti-obesity medication is low, even among those with class II/III obesity.

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## 1. Introduction

Many studies have estimated the cost of obesity, using a variety of approaches, and found that obesity accounts for a substantial proportion of health care costs (Bierl et al., 2013). An important component of these costs is associated with medication use, although these costs are often not accounted for, leading to inaccurate calculations of the costs of obesity (Bierl et al., 2013). The cost of medications to the National Health Service (NHS) in England for all health problems is increasing and in 2011 almost 962 million prescription items were dispensed at a cost of £8.8

billion (The NHS Information Centre, Prescribing Support Unit, 2012). Prescriptions for drugs to combat obesity, diabetes, alcoholism and smoking have all increased and in 2011 medications for the cardiovascular system and the central nervous system were the categories with the highest net ingredient costs (£1.4 and £2 billion, respectively). Nine hundred thousand prescription items for anti-obesity medications were prescribed at a net ingredient cost of £30 million (The NHS Information Centre, Prescribing Support Unit, 2012).

The high costs paired with increasing obesity prevalence in most Western countries have led to a number of studies investigating the association between obesity and health service use. The literature covers a variety of health services including General Practitioner (GP) visits, specialist visits, emergency services, preventive services (e.g., vaccination and screening), medication use and inpatient stays. Although country of analysis, population, age range,

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and other demographic characteristics vary all the studies generally found that obesity is associated with increased medical use and expenditures in adults.<sup>1</sup> Of ten studies looking at obesity and GP visits, nine found that obesity was positively correlated with the number of visits. Among eight studies analysing the relationship between obesity and outpatient visits all eight found a positive association. For inpatient stays 13 of 20 studies found a positive association and seven found no significant association. Positive associations have also been found between obesity and inpatient length of stay, practice nurse visits, hospital emergency services, uptake of influenza vaccination and medical expenditures (Bierl et al., 2013). Similar findings have been obtained in children (Batscheider et al., 2013; Breitfelder et al., 2011).

Three studies have looked at the association between obesity and medication use (Dzien et al., 2003; van Dijk et al., 2006; The Counterweight Project Team, 2005b). All three showed that obesity was associated with greater medication use. Dzien et al. (2003) found significant positive associations between obesity and medications for cardiovascular, rheumatological and metabolic disorders using Austrian data. van Dijk et al. (2006) found significant positive associations in the Netherlands between obesity and use of medications for disorders of the cardiovascular, respiratory and musculoskeletal systems, alimentary tract and metabolic disorders, skin disorders, and infections. In the UK The Counterweight Project Team (2005b) found a significant and positive association between obesity and being prescribed drugs for disease of the cardiovascular system, the central nervous system, the endocrine system, the musculoskeletal system, the gastrointestinal system, the respiratory system, skin problems and infections. They also found a weakly significant and positive association between obesity and the use of medication for ear, nose and oropharynx problems and for obstetric and gynaecological problems. They found no association between obesity and the use of anaesthesia and vaccines, and medications for malignant disease, immunosuppression, nutrition and blood disorders and eye problems. These studies mainly use regression-based approaches, regressing medication use against an obesity measure controlling for other factors potentially correlated with medication use. There were relatively few participants in each study. For example, The Counterweight Project Team (2005b) included 2300 individuals. This may preclude the use of multiple BMI groups, especially in analyses of relatively rare medication categories, e.g., The Counterweight Project Team (2005b) used two BMI groups (BMI 18.5–24.9 kg/m<sup>2</sup>;

BMI  $\geq 30$  kg/m<sup>2</sup>), Dzien et al. (2003) used three groups (BMI <18.5 kg/m<sup>2</sup>; BMI 18.5–24.9 kg/m<sup>2</sup>; BMI  $\geq 25$  kg/m<sup>2</sup>) and van Dijk et al. (2006) used three groups (BMI <25 kg/m<sup>2</sup>; BMI 25–29.9 kg/m<sup>2</sup>; BMI  $\geq 30$  kg/m<sup>2</sup>). Our large, rich dataset permits analyses for all medication categories using disaggregated BMI groups.

We expect obesity to be positively associated with medication use for two reasons. First, obesity will affect medication use directly through prescribed appetite-suppressing and other drugs for weight reduction. For example, in England guidelines produced by the National Institute for Health and Care Excellence (NICE) state that drugs aimed at weight reduction (Orlistat or Sibutramine) should be considered for treatment in overweight and obese individuals, aged 12 and over (NICE, 2006).<sup>2</sup> Anti-obesity medications are generally found to be cost-effective (Neovius and Narbro, 2008). However, some have side effects that have limited their use. For example, use of the Fenfluramine–Phentermine (fen-phen) combination came to an abrupt halt in 1997 when they were withdrawn from the market when a study revealed significant valvular heart disease in 24 women who had taken them (Wadden et al., 1998). Until 2010 Sibutramine was used in many countries but was withdrawn from the market after it was shown to be associated with increased cardiovascular disease (NICE, 2014). Scars surrounding the use of anti-obesity medications such as these, coupled with strict guidelines for their use, might have caused both physicians and the public to reduce the use of anti-obesity medications (Glazer, 2001; Kang and Park, 2012). Little is known about the association between obesity and the use of anti-obesity medication in England.

Obesity will also increase use of medication because it is an important risk factor for a number of diseases across a range of therapeutic classifications. These includes type II diabetes, hypertension, gallbladder disease, dyslipidemia, insulin resistance, breathlessness, sleep apnea, osteoarthritis, hyperuricemia and gout, specific cancers, reproductive hormone abnormalities, polycystic ovary syndrome, impaired fertility, low back pain, asthma, coronary heart disease, and stroke (NHLBI, 1998; WHO, 1997; Stein and Colditz, 2004; Reeves et al., 2007; Anandacoomarasamy et al., 2007; Keller et al., 2011). Hence, obese people are more likely to take medications for managing these conditions, which arise as a result of their obesity.

There are a number of therapeutic classifications that should not be associated with obesity, or may be negatively associated. Medications aimed at conditions that are more prevalent in the underweight might be less prevalent in the obese. An example is medications for anaemia; the overweight and obese have been found to be less likely to suffer from anaemia, while the opposite is found in the underweight (Qin et al., 2013).

<sup>1</sup> See Batscheider et al. (2013), Cawley and Meyerhoefer (2012), Wolfenstetter (2012), Breitfelder et al. (2011), Gupta and Greve (2011), Wildenschild et al. (2011), Hauck and Hollingsworth (2010), Han et al. (2009), Pearson et al. (2009), Veiga (2008), Bertakis and Azari (2005), Chen et al. (2007), Chu et al. (2010), The Counterweight Project Team (2005a,b), Folmann et al. (2006), Guallar-Castillon et al. (2002), Luchsinger et al. (2003), Peytremann-Bridevaux and Santos-Eggimann (2007a,b), Quesenberry et al. (1998), Reidpath et al. (2002), Saez et al. (2006), Sansone et al. (1998), Schafer and Ferraro (2007), van Dijk et al. (2006), Trakas et al. (1999), Von Lengerke et al. (2005), Yan et al. (2006), Zizza et al. (2004), Dzien et al. (2003).

<sup>2</sup> “Drug treatment should be considered for patients who have not reached their target weight loss or have reached a plateau on dietary, activity and behavioural changes alone” (NICE, 2006: p. 60).

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