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Relative weight-related costs of healthcare use by children—Results from the two German birth cohorts, GINI-plus and LISA-plus

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ABSTRACT

Obesity among children and adolescents is a growing public health burden. According to a national reference among German children and adolescents aged 3–17 years, 15% are overweight (including obese) and 6.3% are obese. This study aims to assess the economic burden associated with overweight and obesity in children based on a cross-sectional survey from two birth cohort studies: the GINI-plus – German Infant Nutritional Intervention plus Non-Intervention study (3287 respondents aged 9 to <12 years) and the LISA-plus study – Influence of life-style factors on the development of the immune system and allergies in East and West Germany (1762 respondents aged 9 to <12 years). Using a bottom-up approach, we analyse direct costs induced by the utilisation of healthcare services and indirect costs emerging from parents' productivity losses. To investigate the impact of Body Mass Index (BMI) on costs, we perform various descriptive analyses and estimate a two-part regression model. Average annual total direct medical costs of healthcare use are estimated to be €418 (95% CI [346–511]) per child, split between physician (22%), therapist (29%), hospital (41%) and inpatient rehabilitation costs (8%). Bivariate analysis shows considerable differences between BMI groups: €469 (severely underweight), €468 (underweight), €402 (normal weight), €468 (overweight) and €680 (obese). Indirect costs make up €101 per year on average and tend to be higher for obese

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children, although this was not statistically significant. Drawing on these results, differences in healthcare costs between BMI groups are already apparent in children.

1. Introduction

During the last two decades, the prevalence of overweight and obesity in children has increased rapidly worldwide (Lobstein et al., 2004; Ogden et al., 2010). This phenomenon can also be seen to be developing into a major public health problem in Germany (Kalies et al., 2002; Lissau et al., 2004; Spurgeon, 2002; Wang and Dietz, 2002). The German Interview and Examination Survey for Children and Adolescents (KiGGS) shows that – according to a national growth chart reference – among German children and adolescents aged 3–17 years, 15% are overweight (including obese) and 6.3% are obese (Kurth and Schaffrath Rosario, 2007).

A comprehensive review shows that childhood obesity is associated with numerous medical and psychosocial consequences that have an immediate impact on the health of obese children (Lee, 2009). They might thus cause greater healthcare utilisation and higher costs for the healthcare system. Additionally, childhood obesity significantly increases the risk of obesity in adulthood (Magarey et al., 2003).

Lengerke et al. found that a high economic burden is associated with obesity in adulthood (von Lengerke et al., 2005, 2006). In Germany, little research has been performed concerning the economic consequences of overweight and obesity among children (Huang and Horlick, 2007; Stratmann et al., 2000). One study examines the hospital and rehabilitation costs related to diagnosed obesity among young Germans based on a top-down approach (Wolfenstetter, 2006), and thus provides a first insight into this problem. This study found high incremental costs including future costs for obese children compared with all children in Germany in 2003. However, because of data limitations, this study provides a rather partial insight into this issue. The international evidence for the impact of childhood obesity on healthcare costs is ambiguous (for a review, see John et al., 2010). Several recent studies found a positive correlation between costs and body mass index (BMI), at least for subgroups (Buescher et al., 2008; Estabrooks and Shetterly, 2007; Finkelstein and Trogdon, 2008; Hampl et al., 2007; Monheit et al., 2009; Trasande and Chatterjee, 2009). However, two studies could not confirm these results (Johnson et al., 2006; Skinner et al., 2008). These international results cannot be generalised beyond the populations under study, as transferring the results of a cost study to another setting is not usually feasible without major adjustments (Welte et al., 2004). Moreover, one factor particularly impeding the transferability of study results on the economic burden of obesity is the significant variation, as well as changes over time, in the coverage of obesity-related healthcare services offered by third-party payers in different countries and jurisdictions (Simpson and Cooper, 2009). Unfortunately, there are no studies examining the role of underweight in Western countries with the exception of low birth weight. In Germany, there is still only a little evidence of the economic burden of overweight and obesity in young people.

The objective of this paper is to assess aspects of the economic burden associated with bodyweight in children aged 9 to <12 years including analyses of healthcare utilisation and healthcare costs.

2. Methods

2.1. Data

We base our analysis on data from the GINI-plus (German Infant Nutritional Intervention study) and LISA-plus (Influence of life-style factors on the development of the immune system and allergies in East and West Germany) studies, two German birth cohorts of healthy full-term neonates born between 1995 and 1999 in Munich, Wesel, Bad Honnef and Leipzig.

2.1.1. Study design and population

For the GINI-plus study, 5991 healthy full-term newborns were recruited from obstetric clinics in Munich and Wesel between September 1995 and July 1998 (Rzehak et al., 2009). Details of the intervention and control groups can be found elsewhere (Berg et al., 2010). In the 10-year follow-up, parents of 3287 children completed questionnaires. Compared with the baseline survey, this is a follow-up rate of about 55%. The LISA-plus study is an ongoing population-based birth cohort study of unselected newborns. A total of 3097 healthy full-term newborns were recruited from 14 obstetric clinics in Munich, Leipzig, Wesel and Bad Honnef between November 1997 and January 1999 (Rückinger et al., 2009). In the 10-year follow-up, 1762 children participated in the study (follow-up rate compared with the baseline survey was about 57%). Overall, we find for both studies that children staying in the cohort up to the 10-year follow-up have a higher socio-economic status (SES) at baseline compared with those dropping out at some stage.

Since the 6-year follow-up both birth cohort studies share identical standard operating procedures and before the 6-year follow-up, there were very similar study protocols (Rückinger et al., 2009; Rzehak et al., 2009).

Combined, the GINI-plus and LISA-plus cohorts offered 10-year follow-up data on 5049[2] children. The present analyses are restricted to children for whom information on the use of the healthcare system ($n = 3647$) was available. We excluded 139 participants from the analyses with missing information on age at measurement or BMI (measured or questionnaire information). Finally, this

[2] A main questionnaire of the 10-year follow-up was available for only 5046 of these children. For two children, we have information on the body examination only and for one child on body examination and healthcare use.