



Economic analysis of the link between diet quality and health: Evidence from Kosovo



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ABSTRACT

We analyse the link between diet diversity, (which is a proxy of diet quality) and health outcomes measured by body-mass index (BMI) in a representative sample of Kosovar adults using household expenditure micro-data. Building on a household model of health production we devise a two-stage empirical strategy to estimate the determinants of diet diversity and its effect on BMI. Economic factors and demographic characteristics play an important role in the choice of balanced diets. Results from the BMI analysis support the hypothesis that diet diversity is associated with optimal BMI. One standard deviation increase in diet diversity leads to 2.3% increase in BMI of the underweight individuals and to 1.5% reduction in BMI of the obese individuals. The findings have important implications for food security policies aiming at enhancing the public health in Kosovo.

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1. Introduction

Despite progress made in recent years towards poverty alleviation and inclusive growth a significant number of people suffer from food insecurity and undernourishment globally (FAO, 2015). In Kosovo – one of the poorest European transition countries – despite relatively high economic growth since the post-conflict reconstruction, the socio-economic environment can be characterised as a mix of poverty, food insecurity, and galloping unemployment. Kosovar households in urban areas spent more than 40 percent of their income on food whereas rural households depend heavily on their own food production (Sen and Kirkpatrick, 2011; Duval and Wolff, 2013). Countries where

food expenditures constitute significant share of households' incomes are the most vulnerable and food insecure (e.g., Clapp and Cohen, 2009; McMichael and Schneider, 2011).¹

Food insecurity is closely associated with poor diets, suboptimal nutrition, and consequently worsening health status (Hatloy et al., 1998; Thomas and Frankenberg, 2002; Sirotin et al., 2012). Darmon and Drewnowski (2008) note that monotonous, energy-

¹ The food security concept was formulated in 1996 at the World Food Summit (WFS) in Rome where the Declaration on World Food Security was adopted. The concept comprises supply and demand factors and has four major aspects: availability (adequate food supplies), access (people's ability to access the available food supplies), utilisation (calorie and micronutrient intake and absorption), and stability (environmental, economic and political stability in access to food). Commonly, the access to food is reflected in the share of income spent on food while the utilisation of food is captured by the quality of diet for which access is a necessary condition (Carletto et al., 2013; FAO, 2015). Smith et al. (2000) offer a conceptual framework capturing the various dimensions of food security and their interactions.

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dense and nutrient-poor diets are cheap and more common for those with limited means; socio-economic conditions are therefore important predictors of diet quality. Diets of many households in transition countries are particularly monotonous, mainly based on cheap cereal products (Swinnen and Van Herck, 2011). Quality of diets in transition countries depends heavily on real incomes, prices, and household socio-economic characteristics as a large proportion of households have nutrition-poor diets (e.g., Moon et al., 2002; Herzfeld et al., 2014; Cupák et al., 2016). Poor diets lead to the extremes of either undernourishment or overweight and obesity and ultimately to poor health both in adult and infant populations (e.g., Kant et al., 1995; Kennedy, 2004; Azadbakht et al., 2006; Rosinger et al., 2013).²

Comparing countries in Europe, overweight and obesity are more widespread in the low to middle-income Central and East European (CEE) transition countries relative to the high-income, developed European countries. The rising trend in overweight and obesity in many of the CEE countries have also been documented in a descriptive study by Knai et al. (2007) who show that up to 6% of the total healthcare costs can be attributed directly to obesity and consequent illnesses which may have important implications for the population's economic productivity.

Overweight and obesity, measured by the Body-Mass Index (BMI),³ and its determinants have been studied with detailed micro-data in a number of developed European countries (e.g., Gutiérrez-Fisac et al., 1999 for Spain; Ali and Lindström, 2006 for Sweden; Kleiser et al., 2009 for Germany). However, studies on the transition CEE countries are limited which presents a significant gap in the literature.⁴ Furthermore, considering that economic development of transition countries has not reached the West European levels yet, there are important challenges remaining for the food security status and health of the population which makes our study very relevant.

Kosovo offers an important case study of the link between food security, diet, obesity and health from both scientific and policy intervention viewpoints. Kosovo is one of the poorest transition CEE countries, with per capita annual GDP at about 3000 Euro; 29.7% of its population lives below the poverty line and 10.2% of the population lives in extreme poverty (World Bank/KAS, 2011). Although a significant annual GDP growth of 4.5% is marked since the early 2000s, economic growth has had limited impact on poverty reduction and public health improvement (UNDP 2014; World Bank, 2015). Thus, the food security situation in Kosovo and its impact on health remains an important development issue. So

far the focus in Kosovo has mostly been on supply side policies promoting the contribution of agriculture to food availability as a part of the food security agenda (Osmani et al., 2013; MAFRD, 2014; Braha et al., 2015).

The focus of this paper is on the demand side factors affecting food utilisation such as diet quality, proxied by different diet diversity measures.⁵ Furthermore, we analyse the link between diet diversity and BMI, which is an important indicator of health status. Our analysis is based on individual Kosovar micro-data from 2012. The nutrition literature (e.g., Hatloy et al., 1998; Azadbakht et al., 2006; Darmon and Drewnowski, 2008; Rosinger et al., 2013) shows that consumption of diverse diets has a positive impact on achieving optimal BMI and better health-related outcomes.⁶ First, we estimate demand for diet diversity, using several different measures. Our *first hypothesis* is that household socio-economic status affects diet diversity – a more diverse diet indicates better food utilisation and thus, improved food security status. Second, we study the impact of diet diversity on individual BMI while controlling for a range of individual, household, and environmental factors.⁷ Our *second hypothesis* is that more diverse diet would help achieve optimal individual BMI which in turn is associated with better health-related outcomes. Thus, our second hypothesis implies an inverted-U shaped relationship between diet diversity measures and BMI.

This study is, to the best of our knowledge, the first attempt to evaluate diet quality and test the link between diet and BMI in a CEE country context using representative micro-data.⁸ We use an innovative empirical framework based on a sound theoretical model of household health production following Huffman and Rizov (2010). We find that diverse diet positively affects an individual's BMI in the lower quantiles of the BMI's distribution, it has no effect in the median of the distribution, and has a significant negative effect on BMI in the upper quantiles of the distribution. Other control variables like gender, age, education, and lifestyle also significantly influence the individual BMI. The finding of an inverted-U shaped relationship between the diet diversity and BMI can have important implications for policies designed to prevent food insecurity and enhance healthy nutrition of the population.

The paper is organised as follows. In Section 2 we present the theoretical framework underlying the empirical analysis outlined in Section 3. Section 4 reports and discusses estimation results while Section 5 concludes the paper.

² The association between obesity and poor health-related quality of life (HRQL) has been explored from various angles. Kortt and Dollery (2011) investigated the correlation between HRQL and measures of obesity in a representative sample of the Australian general population and found a negative association. McDonough et al. (2013) provided further evidence for the association between increasing obesity and poorer HRQL in a mixed population of white European and South Asian ethnicities. Even though results on the link between obesity and health in some contexts are somewhat mixed the overall message is that obesity (fatness) and health are negatively associated (Nuttall, 2015).

³ The Body-Mass Index (BMI), originally known as Quetelet Index, is equal to body weight (kilograms) divided by height (meters) squared. By squaring the height, it reduces the contribution of leg length in the equation and tends to normalise the body mass distribution at each level of height; that is, it reduces the effect of a variance in height in the relationship of weight to height. Even though BMI has shortcomings as it rather poorly represents a person's percentage of body fat the index has been adopted by the World Health Organization (WHO) since the 1990s as the main criteria for defining obesity (Nuttall, 2015).

⁴ Some exceptions are studies based on Russian individual data evaluating food demand patterns and rise of obesity in Russia (e.g., Huffman and Rizov, 2007, 2010; Herzfeld et al., 2014). There are also a few relevant studies on the link between food expenditure, consumption, BMI and health in developing country context. Campbell et al. (2010) and Thorne-Lyman et al. (2010) provide insights from Bangladesh, Sirotnin et al. (2012) – from Rwanda, Rosinger et al. (2013) – from Bolivia, and Humphries et al. (2017) – from four other developing countries.

⁵ Diet diversity is an important characteristic of the quality of diet. However, other factors such as the composition of macro and micro nutrients in the diet and the quantity and quality of the calorie intake all have important impact on diet quality. For example, Kennedy (2004) demonstrates that variety in certain selected energy-dense foods may contribute to overweight and obesity. The issue for overweight and obesity is achieving energy balance which is harder to achieve with diets high in total fat and energy.

⁶ However, some studies examining the association between diet diversity and obesity have led to inconsistent findings. Salehi-Abargouei et al. (2016) reviewed several studies using explicitly Dietary Diversity Score (DDS). Their meta-analysis showed that there was no significant association between DDS and BMI status, which may be due to use of different methods for assessing dietary intake and DDS. The authors recommend conducting well-designed prospective studies with similar approaches to assess DDS.

⁷ Nuttall (2015) shows that BMI's use to estimate percentage of body fat and ultimately predict health-related outcomes is a rather crude approach. Even when some comorbidities are considered, the correlation of mortality rates with BMI should also take into consideration such factors as individual age, lifestyle and occupation, family history of diabetes, hypertension, and coronary heart disease, familial longevity, etc.

⁸ Our analysis relates to studies on the socio-economic antecedents of diet diversity and food security conducted in a developing country context (e.g., Campbell, et al., 2010; Thorne-Lyman et al., 2010; Rosinger et al., 2013; Sturm et al., 2016).

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