

Demand for food diversity in the case of Kosovo

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Abstract

Food nutrition security (FNS) is a multidisciplinary term that encompasses a set of the complex economic and social determinants. Recent food spikes were raising concerns on the food and nutrition security at all its levels (global, national, household and individual). In this paper we estimate demand for food diversity in Kosovo. Theoretical framework suggests that food diversity serves as a proxy for food and nutritional status at the household level. Here we employ standard OLS in order to estimate the impact of income (and other determinants) on the demand for the food diversity. Further, we compute relevant anthropometric indicator (Body Mass Index) in order to access the state of the FNS at the individual level. For the purpose of empirical estimation we use the HBS data on Kosovo covering the period 2005-2012. The main findings suggest that food diversity in Kosovo marked important improvement over the time period observed, reflecting the impact of rising income as a key determinant of the food diet. The pattern of the household food consumption remained diversified over the time period observed, but restricted by the low level of income. Food diversity in the urban households is significantly higher than in rural areas. Individual variables in the most of the cases were determined as significant. Anthropometric estimates were evidencing that prevalence of undernourishment is particularly critical in the case of school-age children, while the main nutritional problem among the adults is overweight.

Key words: Food security, food diversity, BMI, Kosovo

JEL Classification: C12, D12, I15, Q18

1. Introduction

The early 1970s instigated a period of the global food price instability. That time crisis altered rapidly bringing the humanity into the edge of food insecurity (Friedmann, 1993). From food crisis of the early 1970s until now, the absolute number of food insecure people was consistently around 850 million. Since 2008, more than one billion people were counted as food insecure (McDonald, 2010; McMichael and Schneider, 2011; Rosset, 2008). The recent food crisis has been associated with rising food prices and rising hunger rates across the world (McMichael and Schneider, 2011). Food price spikes are particularly harming poor people in developing countries. In such nations, food price volatility is leading to great hardship for consumers, reflecting the fact that food expenditure constitutes a significant proportion (60-80%) of the total income (Clapp and Cohen, 2009; Gilbert and Morgan, 2011).

Food security is a necessary but not sufficient condition for nutrition security (IBRD, 2012). Food security goes beyond the food production and distribution, therefore nutrition security is not necessary outcome of successfully achieving food security (Benson, 2004; Pinstrip-Andersen,

2009). The extent to which food security results in good nutrition depends on a set of non-food factors such as sanitary conditions, water quality, infectious diseases and access to primary health care.

Darmon and Drewnowski (2008) show that socioeconomic conditions are important predictors of diet quality. Diets in the transition region of Europe (like Kosovo) are particularly monotonous, with the majority of energy coming from the consumption of starch and cereals (Swinnen and Van Herck, 2011). The situation has been improving but the share of starchy foods in total dietary energy consumption on average remains larger in the transition countries. The poorest face difficulties in obtaining access to food of sufficient quantity and quality to ensure a safe and nutritious diet. Darmon and Drewnowski (2008) also note that energy-dense and nutrient-poor diets are cheap and more consumed by those with limited means.

Despite the fact that food security became recently widely debated issue around the globe, research on the topic of food security remains scarce in the case of Kosovo. Most of the studies are devoted narrowly to the poverty constraints. Official reports (World Bank/KAS, 2013) stress their deep concerns on the high prevalence of poverty. It is estimated that 29.7% of its population in Kosovo lives below the poverty line, with 10.2% of the population living in the extreme poverty.

Kosovo as a small European economy is undergoing complex economic, political and structural adjustments of the transition process. It is considered to be self-insufficient in meeting domestic demand for the key food commodities. For example, referring to the latest data (2012), Kosovo satisfies 76% of domestic demand for wheat, while 24% is imported from the global market (MAFRD, 2012). Such an outcome is relevant, particularly taking into account that Kosovo is characterized as a “bread-eating country“ (Lingard, 2003), where cereals constitute relevant share of the food diet.

Kosovo is a consumption driven economy. Aggregated data (Figure 1) provides clear suggestion that consumption marks the highest contribution on GDP. Over the last decade, country achieved a significant improvement on its economic accounts. However, economic growth has been well below the rate achieved in neighbouring economies and the level of per capita income is among the lowest in Europe. Many households depend on remittances from abroad to meet their consumption needs (Sen and Kirkpatric, 2011). Several constraints were shaping the weak development pattern during the last decade. Most important constraints driving country’s weak growth pattern involves inherited political profile, low investment profile economy, underutilization of resources due to the corruption practices, high level of unemployment, dependency on migrant remittances etc.

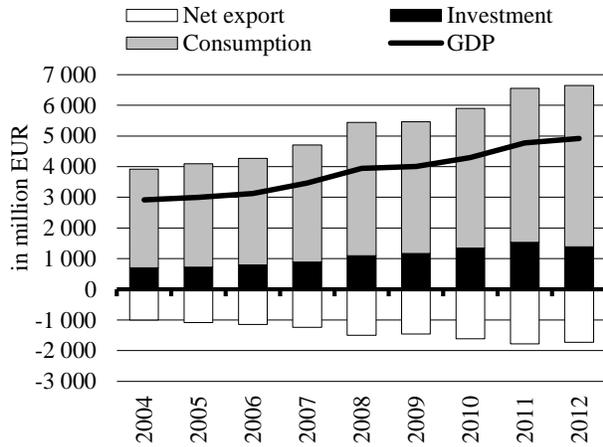


Figure 1: Main components of GDP in Kosovo
Source: Own elaboration based on the data of KAS

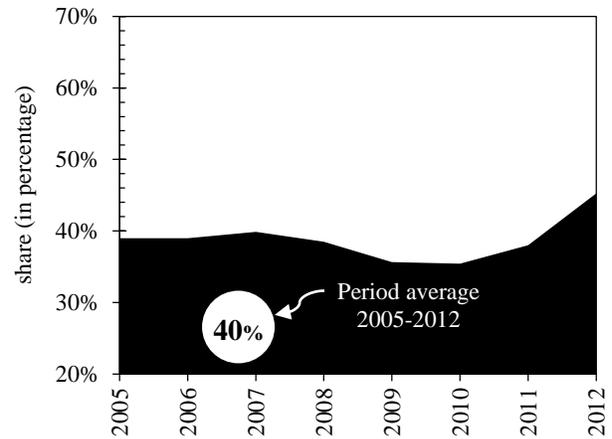


Figure 2: Share of food in consumption in Kosovo

Food consumption marks the highest proportion on the total share of expenditures in Kosovo. The share of food expenditures in total consumption during the period 2005-2012 exceeds 40% (Figure 2).

2. Data and Methods

2.1 Theoretical framework on the demand for food diversity

Literature suggests that appropriate alternative in measuring food diversity is to employ the Berry Index (Berry, 1971). Berry Index has been applied in empirical economic studies to investigate food diversity (Thiele and Weiss, 2003; Stewart and Harris, 2005). Empirical studies based on individual household data so far have been devoted to studying actual consumption behaviour in different countries. For example, Moon *et al* (2002) addressed the demand for a varied diet in an economy in transition. They found out that the length of the time allowed for consumption is an important element in measuring the demand for food diversity.

Theoretical foundation of food diversity estimations of this paper is based on theoretical framework introduced by Jackson's (1984). Jackson's hierarchic model for food diversity suppose separability of food with non-food commodities, therefore we consider the utility maximization problem for q_j where $j = 1, \dots, n$ as follows,

$$u(q_j) = u(q_1, q_2, q_3, \dots, q_n); \text{ s.t. } \sum_{j=1}^n P_j q_j = E \text{ and } q_j \geq 0 \quad (1)$$

where P_j shows the price for commodity j and E represents total food expenditure. Kuhn-Tucker conditions are satisfied by the maximization of $u(q)$ such that,

$$\frac{\partial u}{\partial u_j} - \lambda P_j = 0 \text{ if } j \in S \text{ and } q_j > 0, \quad (2)$$

$$\frac{\partial u}{\partial u_j} - \lambda P_j = 0 \text{ if } j \in \bar{S} \text{ and } q_j = 0, \tag{3}$$

where the Lagrangian multiplier is denoted by λ , S is set of goods actually purchased, and \bar{S} is set of goods not purchased. Solving through (1), (2) and (3), we obtain the Marshallian demand functions $q_j = g_j(P, E)$. If the condition (20) is fulfilled, then $g_j(P, E)$ is equal to zero meaning that in the optimum there should be zero consumption of the good j given the price vector and total expenditure. If we define $M(E) = \{i | g_i(P, E) > 0\}$ to represent set of goods in a purchased set given the prices, then the number of distinct food items purchased is determined by the cardinality of M as a function of the price vector and total expenditure.

Further, in assessing food diversity we use the Berry Index estimates (Berry, 1971). Berry-Index quantifies caloric share of food i on total calories:

$$BI = 1 - \sum_{i=1}^n s_i^2 \tag{4}$$

BI is bound between 0 and $1-1/n$. BI is 0 in the case of no diversity, where there is total concentration in one item. BI is $1-1/n$ if the items are equally distributed. BI measures diversity proportionally; therefore high values of BI indicate high diversity within the sum of all items.

Since Berry Index lies in the interval between 0 and 1, the assumption of the normality may not be fulfilled. Therefore to overcome this problem, here is applied usual logistic transformation (Greene, 1997), as we could run the standard OLS estimates. The modified index is called Transformed Berry Index (TBI) and is computed as,

$$TBI = \ln \left[\frac{BI}{(1 - BI)} \right] \tag{5}$$

2.2 Empirical assessment of food diversity

We apply our methodology to the Household Budget Survey (HBS) data. Our dataset consists of eight annual rounds, from 2005 to 2012. The survey provides detailed information on household incomes and expenditures on food and non-food goods and services. The data also contain detailed information on quantities consumed by each household, its location and size as well as individual head of household characteristics such as age, education, and working status.

In order to empirically estimate relationship between income and food diversity, we assess the standard OLS regression model as follows,

$$FD_i = \beta_0 + \beta_1 Y_i + \beta_2 H'_i + \beta_3 HH'_i + \beta_4 REG'_i + \varepsilon_i \tag{6}$$

where FD_i represents Berry Index; Y_i is the logarithm of household's net monthly income; H'_i represents a vector of household's characteristics, such as size of household, urban; HH'_i represents a vector of characteristics of the head of household's including age, educational level, and working status; REG'_i are covariates of regional differences; and ε_i is error term. The income

elasticity of the food diversity is measured directly by β_i when diversity is measured by the Berry Index. All estimations are carried out with correction for heteroschedasticity and robust standard errors are reported.

2.3 Assessment of the anthropometric indicators

Anthropometric literature defines nutritional anthropometry as measurement of the physical dimensions and gross composition of the human body as a means of assessing nutritional situation (WHO, 1986; Shetty, 2003; Gibson, 2005; Neufeld and Osendarp, 2014). In terms of practical application there is general agreement that anthropometric indicators serve as the most powerful tools to determine nutritional status of individuals and populations (WHO, 1986; Victora, 1992). An added value of these indicators lays on their ability to discriminate between different physiological and biological factors (Gorstein *et al*, 1994). As explained by Cook and Frank (2007) poor nutrition influences health and wellbeing through the life cycle, from the prenatal period on into elder years. The anthropometric indicators were determined by Reinhard and Wijayaratne (2002) as food and nutrition security impact indicators that assign the level to which the food is utilized and converted into satisfactory nutrition status. The most frequently anthropometric indicators used for such a purpose are Body Mass Index (BMI) or weight-for-height, height-for-age, and weight-for-age.

2.4 Computation of the Body Mass Index (BMI)

Due to the data limitations, research objective of this section is to compute Body Mass Index (BMI), based on the differentiation of the population sample between adults (+16 years) and pre-school children (6-16 years old). Body Mass Index (BMI) depends on the net energy intake and varies through the human life cycle. It captures both long and short term dimensions of nutrition. Relationship between BMI and food security was observed in several studies (Dubois *et al*, 2011; Thomas and Frakenberg, 2002) assuming that in developing countries food insecurity is related with higher odds of being undernourished, while in developed countries food-insecure households have higher odds of being overweight or obese.

BMI is calculated by dividing individual weight by the square of individual height:

$$BMI = \frac{\text{Body weight (kg)}}{\text{Body height (m)}^2} \quad (7)$$

According to the World Health Organisation (WHO, 2014), the BMI is an indicator for food intake, which is commonly used to classify underweight, overweight and obesity. It ranges from 18.5 to 25, where BMI lower than 18.5 indicates underweight, while BMI higher than 25 indicates overweight. Variation of the BMI between 30 and 39.99 differentiates the levels of obesity.

2.5 Data availability

Concerning the data management of the HBS dataset we decided to aggregate the HBS data of the food expenditure into five main categories: cereals, meat and fish, dairy products, fruits and vegetables and other food products. Similar approach was applied in several studies in different countries such as Smith and Subandoro (2007). One of the data restrictions in estimating anthropometric indicators were the data availability in the individual level (body weight, body height and age) only for the year 2012. The main research limitation in this case is inability to

explain potential changes between two (or more) time periods. The 2012 HBS sample includes 18,556 individuals living in 2,347 households, with an average household size of the 5.5 members.

3. Results and Discussion

3.1 Preliminary assessment of the food diversity

Large number of empirical studies has been devoted on consumer demand analysis. However, according to Thiele and Weis (2003) much less attention has been paid to the household’s demand for food diet variety (the number of different products consumed in a specific time period). Estimates of the Berry Index (BI) made in this section give a straightforward outcome in the explaining the main drivers of food diversity in Kosovo.

Results suggest that Kosovo households consume diversified food pattern and since 2005 food diversity marked an upward trend (Figure 3). The main contributor on increasing food variety is devoted to the increase in income. Moreover, distinction between the urban and rural areas provides information on the differences of food diversity in the case of Kosovo. Berry Index (BI) estimation explains that urban households tend to enjoy more diversified food diet than those in the rural settlements. Such an outcome is complementary with the theoretical framework and empirical findings on food diversity (Drescher, 2007). Accordingly, aggregated HBS data (Figure 4) indicates relatively proportional distribution of the food categories consumed in Kosovo households. Food consumption of the Kosovo households is diverse in terms of variety, but remains poor in terms of income. This is particularly true in the case of rural areas and marginalized social groups.

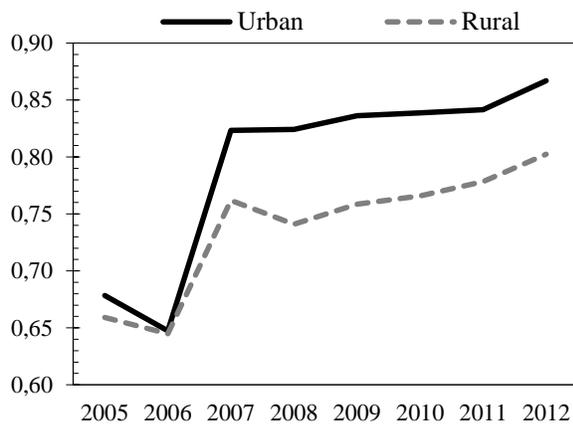


Figure 3: Berry Index in Kosovo
Source: Own elaboration based on the HBS data of KAS

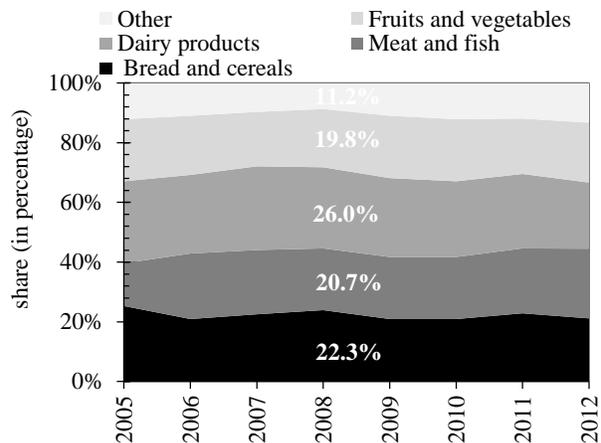


Figure 4: Diversity of food consumption

In order to confirm such preliminary indication provided here, in the next section we estimate the Berry Index (BI) of food diversity by using the microdata from the HBS and applying for food diet assessment.

3.2 OLS estimates on the food diversity

Our results (Table 1) show that food consumption in Kosovo became more diverse over the observed time period. Moreover, estimates suggest that food consumption tends to be more diverse

in the urban areas, and varies across Kosovo regions. These findings are consistent with the study done by Thiele and Weiss (2003) confirming that households living in larger cities tend to enjoy higher food diversity than people living in rural areas. Previous literature suggests that income is the most important variable that is positively correlated with the demand for food diversity (Drescher, 2007; Ogundari, 2013). This is confirmed by our results from Kosovo. Interestingly, based on the findings of our empirical analysis, size of household has significantly negative impact on the demand for food diversity. The larger the size of household, the lower food diversity is observed, *ceteris paribus*. This outcome is in accordance with the findings of several previous studies (Stewart and Harris, 2005), but at the same time our results is in contradiction with the findings presented by Drescher (2007) who suggests that different household members have different needs and it is likely that food diversity increases with increasing the size of the household. Individual control variables of the head of household (age, education and working status) were determined to have significant impact in our model. There is a positive impact of employment status of the head of household on demand for food diversity in Kosovo. Demand for food diversity also increases with the level of education of the head of the household. Education is considered as a proxy variable for dietary knowledge (Variyam *et al.*, 2002), therefore better-educated consumers are more aware of the importance of a diversified diet (Drescher, 2007). Finally, the age of the head of household has relevant but significantly lower impact on the demand for food diversity.

Table 1: Food diversity OLS estimates (pooled sample, 2005-2012)

TBI	Coef.	Std. Err.
<i>ln_Income</i>	0.081***	0.005
<i>ln_pcereals</i>	2.694***	0.054
<i>ln_pmeat</i>	0.059	0.036
<i>ln_pdairy</i>	-0.259***	0.042
<i>ln_pfruits</i>	-0.682***	0.048
<i>ln_pother</i>	0.074***	0.021
<i>Household size</i>	-0.014***	0.002
<i>Education</i>	0.118***	0.010
<i>Age</i>	0.005***	0.001
<i>Working status of the head of household</i>	0.090***	0.017
<i>Urban</i>	0.330***	0.013
<i>Year_{trend}</i>	0.050***	0.004
<i>Gjakova</i>	0.327***	0.020
<i>Gjilani</i>	0.381***	0.022
<i>Mitorvica</i>	0.344***	0.026
<i>Peja</i>	0	(omitted)
<i>Prizreni</i>	0.312***	0.019
<i>Prishtina</i>	0.408***	0.020
<i>Ferizaj</i>	-0.035	0.028

<i>Constant</i>	-101.842***	8.087
<i>Prob > F</i>	0,000	-
<i>R-squared</i>	0.358	-
<i>Number of observations</i>	18,556	-

Note: *P<0.1, **P<0.05, ***P<0.01. Variable of Peja is omitted from regressions because of the colinearity problem.
Source: Own elaboration based on the HBS data of KAS

3.3 Results on Body Mass Index (BMI) computation

BMI (Body Mass Index) is considered as one of the most commonly used indexes in determining the level of undernourishment, overweight and obesity. In the case of Kosovo, the total sample size used for BMI estimations consisted from 18,556 individuals. The main outcome of estimation indicates that around 12% of the individuals in Kosovo are classified as undernourished, and a half of the individuals (50.5%) are categorized at the level of the normal weight. Individuals that cope with overweight are present at 28.5% of the sample. While around 9% of the individuals are categorized as obese (from 1st to 3rd class).

Table 2: BMI estimations in Kosovo (2012)

BMI categories	Total sample		Children (6-16 years)		Adult (+16 years)	
	Frequency	% share	Frequency	% share	Frequency	% share
Undernourishment	1,532	11.75	882	32.31	225	2.38
Normal weight	6,663	51.11	1,420	52.01	5,160	54.55
Overweight	3,674	28.18	214	7.84	3,366	35.58
Obesity of 1st degree	777	5.96	87	3.19	608	6.43
Obesity of 2nd degree	163	1.25	56	2.05	67	0.71
Obesity of 3rd degree	227	1.74	71	2.6	34	0.36

Source: Own elaboration based on the HBS data of KAS

BMI estimations vary when discriminating for the age population between the school-age children (6-16 years) and adults (+16 years) (Table 2). Common denominator of BMI estimations in this case evidences the acute undernourishment in the case of school-age children (0-16 years). More than a third (32.3%) of the school-age child sample suffers from undernourishment. On the other hand, in the case of the adult population (+16 years) more than 35% of population experience overweight. Differentiated estimates of BMI between urban and rural residence of individuals sample brings similar findings we presented above (Figure 5).

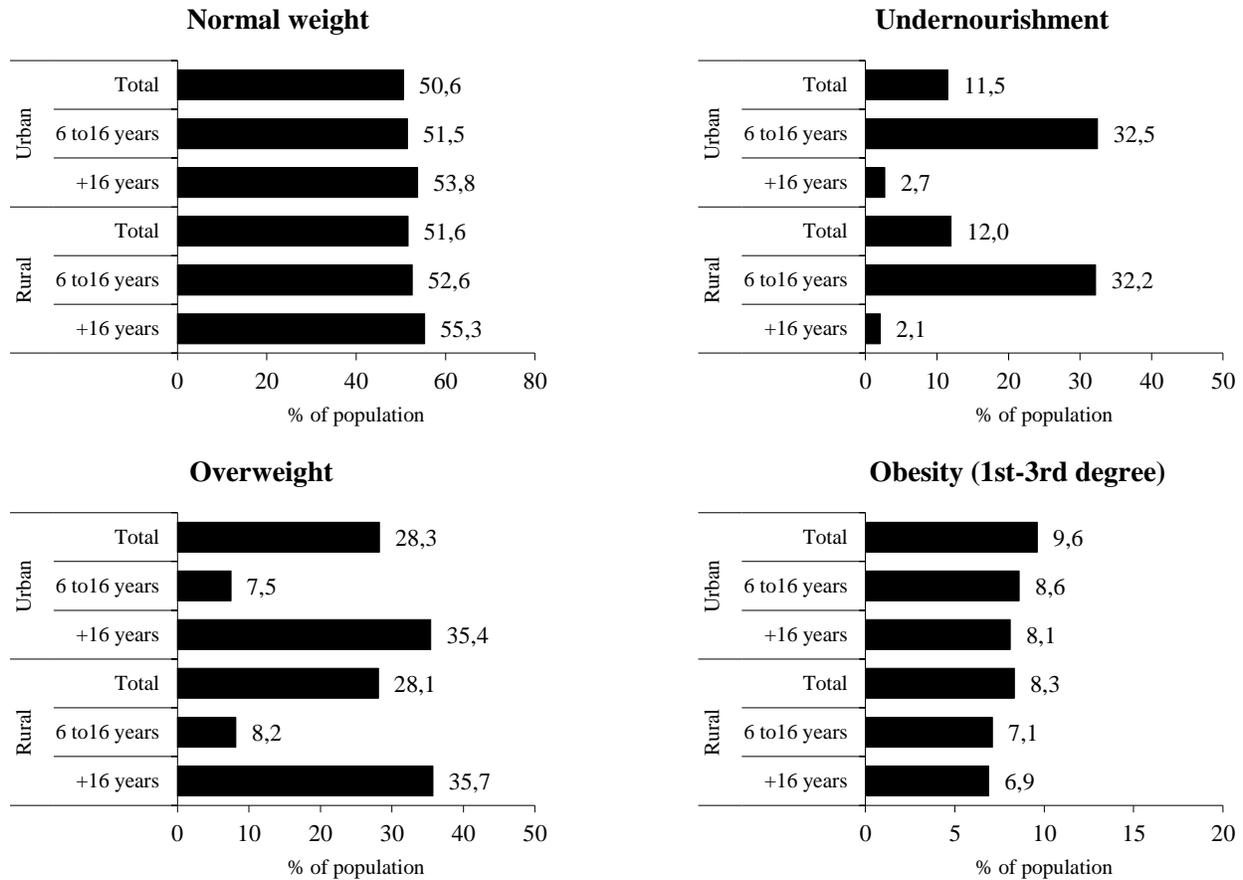


Figure 5: BMI estimations for the school-age children and adults in Kosovo (2012)

Source: Own elaboration based on the HBS data of KAS

One of the limitations on the empirical estimations at this section is unavailability the monthly birth data for measurement stunting and wasting among the pre-school children (0-5 years). Previous studies in the case of Kosovo for the related field are scarce, and most of the research is done on the medical field (Hoxha *et al*, 2014; Lokaj-Berisha *et al*, 2014; Rysha, 2013). However, some interesting findings of early research studies is worthy to mention here. For example, early study report on anthropometrics was conducted by international organizations (AAH, 1999) aiming to capture the state of malnutrition among the children (0-5 year) immediately after the period of war (1999). Another anthropometric study conducted by Volken and Ruesch (2012) integrates Kosovo migrants living in Switzerland. And most recently, UNDP in Kosovo (2014) reports that children fall under the most vulnerable demographic groups in Kosovo, where around 15.5% of them face stunting and inadequate nutrition.

4. Conclusion

The main findings of this paper reveal that Kosovo at the national level is significantly exposed to the food security risks, mainly driven by the high level of poverty, high unemployment, low income level, food self-insufficiency and sharp food trade deficit.

Food diversity analysis reveals that distribution of the food categories remained significantly diversified over the time period observed, but poor an restricted in terms of income. Berry Index (BI) estimations explained that despite the significant improvement of the food diversity since 2005, major constraints of the food diversity are evident in the rural areas and marginalized social groups. Further, OLS estimates affirmed that food pattern became more diversified over the investigated time period. Food diversity is negatively related to the size of household, and varies across the Kosovo regions. Relevant variable in determining food diversity is level of education of the head of households and his employment status, while the age variable has a lower explanatory power on food diversity. Most importantly, OLS estimates indicate existence of strong positive relationship between the income and food diversity. Therefore, income driven policies should be prioritized in order to improve nutrition aspects of food diversity. We should expect that Kosovo will improve its nutrition diet by passing through the so called “nutrition transition” (Doan, 2014). This should take place as the result of the improved income status of the Kosovo households.

Anthropometric assessment of the two age cohorts, school-age children (6-16 years) and adults (+16 years) conveys worrisome message on the state of nutrition security at the individual level. Computed anthropometric variables also show that food security is a major problem in Kosovo, especially among school children and in rural areas. Results were indicating that 12% of total sample suffer undernourishment. Particular concern on individual nutrition status is evident among the children, where about a third (32.3%) of this age group is coping with low food intake. BMI on adults were signalling occurrence of overweight problem, such an outcome is found in more than 35% of adult sample. Overweight and obesity however is not a food intake indicator occurring only in developed countries.

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