



Nutrition transition and dietary energy availability in Eastern Europe after the collapse of communism

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Abstract

After the economic transition of the late 1980s and early 1990s there was a rapid increase in overweight and obesity in many countries of Eastern Europe. This article describes changing availability of dietary energy from major dietary components since the transition to free-market economic systems among Eastern European nations, using food balance data obtained at national level for the years 1990–92 and 2005 from the FAOSTAT-Nutrition database. Dietary energy available to the East European nations satellite to the former Soviet Union (henceforth, Eastern Europe) was greater than in the nations of the former Soviet Union. Among the latter, the Western nations of the former Soviet Union had greater dietary energy availability than the Eastern and Southern nations of the former Soviet Union. The higher energy availability in Eastern Europe relative to the nations of the former Soviet Union consists mostly of high-protein foods. There has been no significant change in overall dietary energy availability to any category of East European nation between 1990–1992 and 2005, indicating that, at the macro-level, increasing rates of obesity in Eastern European countries cannot be attributed to increased dietary energy availability. The most plausible macro-level explanations for the obesity patterns observed in East European nations are declines in physical activity, increased real income, and increased consumption of goods that contribute to physical activity decline: cars, televisions and computers.

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1. Introduction

The sudden collapse of the Soviet Union at the end of the 20th century initiated dramatic economic, political and social changes across Eastern Europe which heightened uncertainties in all facets of life. However, the breakup of communist regimes and the adoption of free-market economic and democratic systems took place in heterogeneous ways, although it generally included three simultaneous processes: liberalization and stabilization; institutional reform; and microeconomic restructuring of existing productive capacity (Zienkowski, 1998). In Poland and Hungary, transformation was negotiated and treaty-based, while in Czechoslovakia and the German Democratic Republic, popular pressure brought to bear on communist elites led to their capitulation. In Bulgaria, transformation was steered by edict from dominant political authorities. In the former Soviet Union, new nations emerged and developed in different ways. On the one hand, the Baltic countries were efficient reformers; on the other, the new countries of Middle Asia became immersed in local, ethnic and/or boundary conflicts, and catastrophic economic situations persisted (Ekiert, 2000). According to Ekiert (2000), four factors were decisive in determining the character and dynamics of transformation: the legacy of the past and the economic conditions persisting at the time of change; the institutional choices taken; the degree of external assistance available; and the policies of the new governments.

The most economically successful of the different Eastern European nations since the collapse of communism have been four countries in the Eastern European Communist Bloc: the Czech Republic, Slovakia, Hungary and Poland; and three satellite nations of the former Soviet Union: Estonia, Latvia and Lithuania. These nations were the first to enter the European Union. The two nations that entered most recently, Romania and Bulgaria, have been less successful. Three satellite nations of the former Soviet Union, the Ukraine, Belarus and Moldova, remain economically and politically tied to Russia, while the three Caucasian countries Azerbaijan, Georgia and Armenia remain mainly rural and economically less-developed relative to Russia and Eastern Europe. The five Central Asian countries, Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan remain the least developed economically, with much lower population sizes and densities (Stillman, 2006). Detailed comparisons of, and changes that have taken place in these countries are described elsewhere (see Stillman, 2006; Keane and Prasad, 1999; Ekiert, 2000; World Bank, 1999).

Despite variation in economic and political strategies, and social and cultural differences among these nations, economic, political and social change have contributed, with varying intensity and duration, to major changes in lifestyle, diet, dietary habits and knowledge of health promoting behaviour. These changes have contributed to significant effects on human biology, including increasing levels of: chronic disease (Stillman, 2006; Wróblewska, 2002; Lipowicz, 2007); overweight and obesity (Koziel et al., 2004, 2006; Zellner et al., 2004); and mortality (Kalediene and Petrauskiene, 2004; Kolodziej et al., in press). With respect to overweight and obesity rates, both increased rapidly after the economic transition of the late 1980s and early 1990s. Increased rates of both have been documented for children and adults in East Germany (Frye and Heinrich, 2003; Zellner et al., 2004; Zeller et al., 2007), the Czech Republic (Vignerova et al., 2004, 2007) and Poland (Bielicki et al., 2001, 2005; Koziel et al., 2004). However, it is not clear to what extent dietary changes, especially increased intakes of dietary energy, may have contributed to these patterns of overweight and obesity. In this article, changing availability of dietary energy from major dietary components since the transition to free-market economic systems among Eastern European nations is described, using food balance data obtained at national level for the years 1990–92 and 2005 (Food and Agriculture Organisation, 2007).

2. Food balance data

For the purposes of this analysis, Eastern European nations are divided into the nations of the former Soviet Union, and those that were satellite to it. The satellite nations are referred to henceforth as Eastern Europe. The nations of the former Soviet Union are further divided into those of the East and South, and those of the West. The comparison of per capita energy availability in total energy, and energy from particular foods and food groups between these categories of nation was carried out using analyses of data from the [Food and Agriculture Organisation \(2007\)](#) FAOSTAT food balance data set. This database is one of several statistical on-line multilingual databases currently containing over 3 million time-series records from over 300 countries and territories, and including statistics on agriculture, nutrition, fisheries, forestry, food aid, land use and population. The sub-database FAOSTAT-Nutrition contains statistics on commodities, food supply, food balance sheets, food aid and population size across the years 1961–2005, and uses food balance data collected at national level for its information. The database is as good as the data collection and reporting system for any given country, and reflects the commoditized food sector more precisely than production for local use. Since the data in question varies in its reliability, interpretations from this analysis are of necessity cautious ones.

Data for the years 1990–1992 and 2005 were available for the following nations of the former Soviet Union: Armenia; Azerbaijan; Belarus; Estonia; Georgia; Kazakhstan; Kyrgyzstan; Latvia; Lithuania; Moldova; Russia; Turkmenistan; Ukraine and Uzbekistan. They were available for the following nations of Eastern Europe: Bulgaria; the Czech Republic; Hungary; Poland; Romania and Slovakia. The Eastern and Southern nations of the former Soviet Union for which food balance data were available for the years in question were: Azerbaijan; Georgia; Kazakhstan; Kyrgyzstan; Moldova; Turkmenistan and Uzbekistan. Data were available for the following Western nations of the former Soviet Union: Belarus; Estonia; Latvia; Lithuania and the Ukraine.

A dataset of total dietary energy availability and dietary energy availability from major food categories according to nation and year (1990–1992 and 2005) was constructed. Data was taken directly from the FAOSTAT-Nutrition database for the following food categories: animal fat; eggs; sugar and milk. The following food categories were constructed by aggregating data for availability of dietary energy from foods which fall into one of them: nuts; fruit; staple foods; meat; vegetables; fish; sugar; and beans and pulses. The category ‘other’ was constructed to include all foods that fell into none of the previous categories.

Mean dietary energy availability was calculated for all categories of nations, two-way analysis of variance being used to identify differences in energy availability between the national categories and between the years 1990–1992 and 2005. The database was constructed and analysed using SPSS-PC for Windows ([Green et al., 1999](#)).

3. Results

[Table 1](#) shows daily per capita energy availability to the Soviet Union and its nations compared with Eastern Europe, from the establishment of post-communist statehood (1990–1992) to 2005. Two-way analysis of variance shows Eastern Europe to have had greater total energy availability in both 1990–1992 and 2005. This difference is largely due to greater availability of animal fat, meat, eggs, sugar, beans and pulses, and fish. There is no significant difference in overall dietary energy availability in either category of nation between 1990–1992 and 2005.

Table 1

Daily per capita energy availability (kilocalories) to nations of the former Soviet Union and Eastern Europe, from the establishment of post-communist statehood (1990–1992) to 2005

Number of kilocalories from	1990–1992		2005		Two-way analysis of variance: <i>F</i> ratios		
	Nations of the former Soviet Union	Eastern Europe	Nations of the former Soviet Union	Eastern Europe	Soviet versus Eastern Europe ^a	1990–1992 versus 2005 ^b	Interaction ^c
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)			
Animal fat	17 (10)	60 (27)	17 (14)	52 (21)	45.5 ^{***}	0.4	0.4
Eggs	25 (19)	43 (11)	25 (14)	46 (6)	18.4 ^{***}	0.1	0.2
Milk	303 (120)	344 (70)	329 (88)	310 (80)	0.1	0.1	1.0
Nuts	8 (9)	6 (4)	5 (4)	6 (2)	0.1	0.5	0.2
Fruit	78 (55)	92 (38)	92 (59)	103 (38)	0.6	0.6	0.1
Staple foods	1676 (579)	1542 (225)	1504 (544)	1503 (396)	0.2	0.5	0.2
Meat	226 (119)	472 (114)	201 (98)	379 (75)	39.2 ^{***}	3.1	1.0
Vegetables	56 (42)	49 (10)	93 (79)	60 (19)	1.6	2.4	0.7
Fish	13 (14)	24 (22)	11 (11)	24 (23)	5.1 [*]	0.1	0.1
Beans and pulses	61 (62)	134 (115)	87 (84)	197 (83)	11.2 ^{**}	2.7	0.4
Sugar	182 (175)	348 (152)	191 (122)	354 (98)	12.5 ^{**}	0.1	0.1
Other	150 (259)	134 (98)	106 (40)	197 (101)	0.2	0.1	1.0
Total	2795 (732)	3248 (175)	2661 (512)	3231 (524)	8.1 ^{**}	0.2	0.1

^a Years combined; joint test for both regions per capita energy availability.

^b Regions combined; joint test for both regions.

^c Interaction between region and years.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 2 shows daily per capita energy availability to the South and Eastern, and Western nations of the former Soviet Union and Russia, for 1990–1992 and 2005. Two-way analysis of variance shows the Western nations of the former Soviet Union to have had greater total energy availability than those of the East and South at both times. This difference is largely due to greater availability of eggs, animal fat, fish, sugar, meat, and beans and pulses. However, total per capita dietary energy availability did not change between 1990–1992 and 2005 for either category of nation. Russia also experienced no such change, but daily per capita energy availability was slightly higher there than in the Western, Eastern and Southern nations at both times. Dietary energy availability from particular foods and food types in Russia falls between the two means for both categories of Western and Eastern and Southern nations of the former Soviet Union for all food types apart from: eggs, fish, beans and pulses nuts (higher at both times); fruit and nuts (lower at both times); animal fat, staple foods and meat (higher in 1990–1992); vegetables (lower in 1990–1992); milk (lower in 2005); and sugar (higher in 2005).

Table 3 gives daily per energy availability to the Western nations of the former Soviet Union (Belarus, Estonia, Latvia, Lithuania and the Ukraine) compared to Eastern Europe (Bulgaria, the Czech Republic, Hungary, Poland, Romania and Slovakia), in 1990–1992 and 2005. Two-way analysis of variance shows the Eastern Europe to have had higher dietary energy availability than the Western nations of the former Soviet Union at both times. Much of this difference is due to greater consumption of meat in Eastern Europe. Neither category of nation experienced increased availability of dietary energy between 1990–1992 and 2005.

4. Discussion

This analysis shows dietary energy available to Eastern Europe to have had greater total energy availability than the nations of the former Soviet Union. Among the latter nations, the Western nations of the former Soviet Union had greater dietary energy availability than the Eastern and Southern nations of the former Soviet Union. The higher energy availability in Eastern Europe relative to the nations of the former Soviet Union consists mostly of high-protein foods: meat, eggs and beans and pulses. These categories of food contribute 74% of the difference in energy availability between the two groups of nations in 1990–1992, and 83% of it in 2005. The greater daily energy availability of Western nations of the former Soviet Union relative to Eastern and Southern nations of the former Soviet Union is due greater availability of a range of foods, but most notably of sugar. In 1990–1992, sugar formed 29% of the difference in energy availability between the two groups of nations, and 41% of the difference in 2005. The relatively small difference in dietary energy availability between Western nations of the former Soviet Union and Eastern Europe are non-significant statistically, but can be attributed largely to greater availability of foods rich in protein (meat, beans and pulses).

Interestingly, there has been no significant change in overall dietary energy availability to any category of East European nation between 1990–1992 and 2005. On the basis of this macro-level evidence, the increasing rates of obesity in Eastern European countries cannot be attributed to increased dietary energy availability. There are three possible, non-exclusive macro-level explanations for the emergence of obesity that do not rely on increased per capita daily energy availability. The first is that of physical activity decline across the period 1990–1992 and 2005. The second is that of increased real income, resulting in increased economic access to foods generally. The third is that of increased economic inequality resulting in increased inequality in access to dietary energy.

Table 2

Daily per capita energy availability (kilocalories) to the Southern and Eastern, and Western nations of the former Soviet Union and Russia, from the establishment of post-communist statehood (1990–1992) to 2005

Number of kilocalories from	1990–1992			2005			Two-way analysis of variance, Eastern versus Western nations: <i>F</i> ratios		
	Southern and Eastern	Russia	Western	Southern and Eastern	Russia	Western	Southern and Eastern versus Western ^a	1990–1992 versus 2005 ^b	Interaction ^c
	Mean (S.D.)		Mean (S.D.)	Mean (S.D.)		Mean (S.D.)			
Animal fat	11 (8)	37	33 (22)	13 (16)	29	37 (26)	9.8 ^{**}	0.2	0.1
Eggs	14 (5)	52	35 (18)	16 (6)	49	39 (8)	26.6 ^{***}	0.5	0.1
Milk	267 (89)	299	363 (135)	340 (110)	316	326 (34)	1.0	0.2	1.8
Nuts	9 (12)	2	6 (5)	4 (3)	3	9 (3)	0.1	0.2	1.7
Fruit	81 (68)	39	75 (37)	99 (72)	68	84 (24)	0.2	0.3	0.1
Staple foods	1598 (751)	1780	1768 (303)	1455 (670)	1454	1512 (342)	0.3	0.8	0.1
Meat	180 (105)	364	289 (111)	178 (99)	269	269 (98)	5.9 [*]	0.1	0.1
Vegetables	66 (51)	37	44 (11)	117 (91)	57	51 (16)	3.9	1.7	1.0
Fish	9 (7)	40	26 (27)	4 (2)	35	32 (25)	10.1 ^{**}	0.1	0.7
Beans and pulses	37 (42)	139	71 (70)	49 (72)	236	132 (34)	6.4 [*]	2.4	1.1
Sugar	99 (63)	241	280 (201)	129 (75)	416	290 (91)	12.3 ^{**}	0.2	0.1
Other	80 (227)	55	82 (61)	111 (49)	73	125 (60)	0.5	0.6	0.9
Total	2451 (841)	3085	3072 (540)	2515 (602)	3005	2906 (247)	4.3 [*]	0.1	0.2

^a Years combined; joint test for both regions per capita energy availability.

^b Regions combined; joint test for both regions.

^c Interaction between region and years.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 3

Daily per capita energy availability (kilocalories) to the Western nations of the former Soviet Union compared to Eastern Europe, from the establishment of post-communist statehood (1990–1992) to 2005

Number of kilocalories from	1990–1992		2005		Two-way analysis of variance: <i>F</i> ratios		
	Former Soviet: Western	Eastern Europe	Former Soviet: Western	Eastern Europe	Former Soviet versus Eastern Europe ^a	1990–1992 versus 2005 ^b	Interaction ^c
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)			
Animal fat	33 (22)	60 (27)	37 (26)	52 (21)	3.8	0.1	0.4
Eggs	35 (18)	43 (11)	39 (8)	46 (6)	3.9	0.2	0.1
Milk	363 (135)	344 (70)	326 (34)	310 (80)	0.7	0.9	0.1
Nuts	6 (5)	6 (4)	9 (3)	6 (2)	0.2	0.1	2.1
Fruit	75 (37)	92 (38)	84 (24)	103 (38)	2.7	0.2	0.1
Staple foods	1768 (303)	1542 (225)	1512 (342)	1503 (396)	0.9	0.4	1.8
Meat	289 (111)	472 (114)	269 (98)	379 (75)	18.4 ^{***}	2.8	1.3
Vegetables	44 (11)	49 (10)	51 (16)	60 (19)	2.0	2.0	0.1
Fish	26 (27)	24 (22)	32 (25)	24 (23)	3.4	0.3	0.1
Beans and pulses	71 (70)	134 (115)	132 (34)	197 (83)	6.0 [*]	2.7	0.1
Sugar	280 (201)	348 (152)	290 (91)	354 (98)	1.7	0.1	0.1
Other	82 (61)	134 (98)	125 (60)	197 (101)	5.6 [*]	0.5	0.2
Total	3072 (540)	3248 (175)	2906 (247)	3231 (524)	18.8 ^{***}	0.1	0.4

^{**} $p < 0.01$.

^a Years combined; joint test for both regions per capita energy availability.

^b Regions combined; joint test for both regions.

^c Interaction between region and years.

^{*} $p < 0.05$.

^{***} $p < 0.001$.

In respect of physical activity, analyses of data from the International Health and Behaviour Survey carried out among university students in 23 countries between 1999 and 2001 shows female youth in Eastern European countries (Bulgaria, Hungary, Poland, Romania, Slovakia) to be much less active than their counterparts in Western European and North American nations, with male East European students being only slightly less active than their Western European and North American counterparts (Haase et al., 2004). This might explain some of the gender differences in obesity rates in some Eastern European countries. Since physical activity and physical fitness are moderately correlated in youth, decline in performance- and health-related physical fitness of youth since the mid-1960s in Poland can be taken as evidence of a secular decline in physical activity there (Charzewski et al., 2003).

With respect to real income, there are very clear differences among the categories of nations used in the present analysis (Table 4). Eastern Europe (Bulgaria; the Czech Republic; Hungary; Poland; Romania and Slovakia) is on average the wealthiest, with most of its nations having seen improvements in purchasing power since 1989. The Western nations of the former Soviet Union (Belarus; Estonia; Latvia; Lithuania and the Ukraine) are on average the next wealthiest. Most of

Table 4

Per capita gross domestic product (GDP) in actual and purchasing power parity (PPP) dollars, and change in real GDP between 1989 and 2002 in Eastern European nations. Data from United Nations Economic Commission for Europe (2005), International Task Force on Obesity (2007)

	Actual per capita GDP, 2002 (US\$)	GDP per capita PPP, 2002 (US\$)	Change in real GDP, 1989–2002 (% of 1989)	Obesity rates (BMI > 30 kg/m ²)	
				Male (%)	Female (%)
Czech Republic	6782	15,496	106	25	26
Hungary	6391	13,884	115	21	21
Poland	4944	10,212	129	19	20
Slovakia	4403	13,208	107	19	23
Romania	2044	7469	91	11	22
Bulgaria	1976	6818	95	20	21
Mean (S.D.)	4423 (1887)	11,181 (3261)	107 (13)		
Estonia	4782	10,978	110	14	15
Lithuania	3980	9061	83		
Latvia	3594	8436	93	10	17
Belarus	1441	8960	98		
Ukraine	860	4488	51		
Mean	2931 (1515)	8385 (2130)	87 (20)		
Russia	2394	8549	73	31	22
Turkmenistan	2120	4886	61		8
Kazakhstan	1647	7615	94		8
Georgia	784	3896	44		
Azerbaijan	745	3309	55		
Armenia	623	3241	71		7
Moldova	448	2508	46		
Uzbekistan	381	2627	84	10	19
Kyrgyzstan	321	2721	63		11
Tajikistan	188	1356	35		
Mean (S.D.)	806 (614)	3573 (1700)	61 (18)		

Gaps in obesity rates for adults are due to lack of data, and do not represent zero rates of obesity.

these nations, however, have experienced declines in purchasing power since 1989. In this respect, only Estonia has seen an improvement, while Belarus has seen no change. The Eastern and Southern nations of the former Soviet Union generally have the lowest gross domestic product (GDP) and purchasing power, and have universally undergone declines in purchasing power since 1989. In about half of these nations, the decline has been extreme. Obesity rates to some extent map onto GDP and purchasing power. Adult male and female obesity rates (for the 10 nations for which data for both sexes are available) show positive, but non-statistically significant correlations with GDP and purchasing power parity GDP for both males ($r = 0.36$ and 0.48 , respectively) and females ($r = 0.23$ and 0.41 , respectively), but no association with change in GDP between 1989 and 2002 ($r = -0.03$ and -0.04 for males and females, respectively). Similarly, total daily per capita dietary energy availability was positively, but non-statistically significantly correlated with GDP ($r = 0.36$), purchasing power parity GDP ($r = 0.37$), change in GDP between 1989 and 2002 ($r = 0.29$), and male and female obesity rates ($r = 0.20$ and 0.40 , respectively). The analysis shows that wealthier nations have higher dietary energy availability. However, within-nation, access to energy may vary along socioeconomic and/or class lines. Although the correlation analyses are suggestive of a macro-economic explanation of obesity in Eastern Europe, this does not take into account the lack of increase in total dietary energy availability between 1990–1992 and 2005, nor the existence of obesity in nations experiencing both low per capita GDP and declining real GDP between 1989 and 2002 (Turkmenistan, Kazakhstan, Armenia, Uzbekistan and Kyrgyzstan). The existence of obesity in Russia, Romania, Bulgaria and Latvia, all nations experiencing declining real GDP between 1989 and 2002, might be explained by the persistence of existing levels of obesity prior to the collapse of communism into more recent times. Data is needed to test this possibility, however.

An alternative plausible explanation for obesity in nations with low GDP and/or decline in real GDP might be increased economic inequality. In the majority of Eastern European nations, economic inequality increased after the collapse of communism, the Gini coefficient increasing most sharply between 1989 and 1994 in the nations with the highest levels of economic inequality in 1989 (Rosser et al., 2000). Thereafter, income inequality declined in nearly all nations, such that by 1999, the range of values displayed by Eastern European nations was lower than in 1989, decreasing further by 2003–2006 (Fig. 1). Current economic inequality does not explain current adult obesity rates. However, it is possible that the increased inequality in the first few years after the collapse of communism could have contributed to it. This remains to be tested.

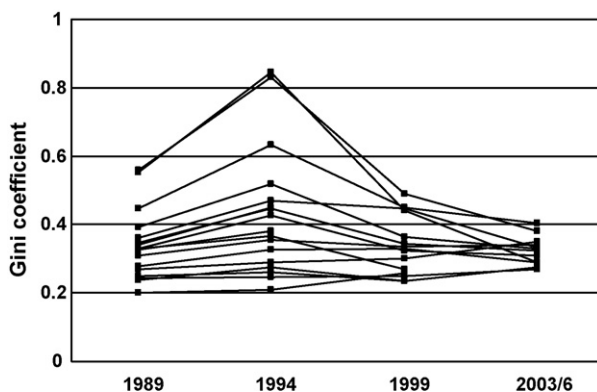


Fig. 1. Gini coefficients of Eastern European nations in 1989, 1994, 2000, 2003–2006. Data from Rosser et al., 2000; Central Intelligence Agency, 2007.

Of the evidence adduced here, the most plausible macro-level explanations for the obesity patterns observed in Eastern European nations are declines in physical activity and differences in wealth. The two are likely to be linked, since greater wealth is usually associated with greater overall consumption, not just of food energy. This usually includes the consumption of goods that can contribute to physical activity decline: cars, televisions and computers. In this sense, obesity in Eastern Europe can be considered as much a disorder of convenience (Ulijaszek, 2007) as elsewhere in the industrialized world.

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