

# Economic and social factors and the quality of nutrition of pregnant women

## *Czynniki społeczno-ekonomiczne a jakość żywienia kobiet w ciąży*

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Studia Medyczne 2013; 29 (2): 160–166

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**Key words:** manner of nutrition, pregnant women, education, amount of income.

**Słowa kluczowe:** sposób żywienia, kobiety w ciąży, wykształcenie, wielkość dochodów.

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### Abstract

**Introduction:** The level of education and the social-and-economical status, connected with the amount of income, are some of the factors which decide in a significant way on the manner of a person's nutrition. However, not much research has been carried out concerning the influence of these factors on the nutrition of pregnant women.

**Aim of the research:** To assess the manner of nutrition of pregnant women depending on the level of education and financial resources required to buy the necessary food.

**Material and methods:** Seven hundred and four pregnant women took part in the research. Information about social variables and the frequency of consumption of selected products and beverages, and intake of folic acid and other supplements was obtained using an anonymous questionnaire.

**Results:** Women with the highest level of education consumed the most fruit, vegetables, milk and dairy products, saltwater fish and wholegrain foods in comparison to women with lower education; whereas they drank sweetened soft drinks less frequently. More frequent use of folic acid and other vitamin and/or mineral supplements was also connected with a higher level of education. 15.4% of pregnant women declared no sufficient financial resources to buy the necessary food. This factor was connected in a significant way to lower consumption of fruit, vegetables, products providing animal protein, milk and dairy products, saltwater fish, wholegrain products, and vitamin and/or mineral supplements.

**Conclusions:** A lower quality of diet of pregnant women was connected both to the low level of education and the insufficient financial resources for buying the necessary food. Women with higher education, even if they had low income, chose products more consistent with the principles of proper nutrition, which confirms the positive influence of awareness and greater knowledge on their nutrition.

### Streszczenie

**Wstęp:** Do czynników w istotny sposób wpływających na sposób żywienia człowieka należą poziom wykształcenia oraz status społeczno-ekonomiczny, związany z wielkością dochodów. Przeprowadzono jednak niewiele badań dotyczących wpływu tych czynników na odżywianie się kobiet w ciąży.

**Cel pracy:** Ocena sposobu żywienia kobiet w ciąży w zależności od poziomu wykształcenia oraz posiadania środków finansowych potrzebnych do zakupu żywności.

**Materiał i metody:** W badaniu wzięły udział 704 ciężarne. Za pomocą anonimowej ankiety uzyskano informacje na temat zmiennych społecznych oraz częstości spożycia wybranych produktów i napojów, przyjmowania kwasu foliowego i innych suplementów.

**Wyniki:** Kobiety o najwyższym poziomie wykształcenia spożywały najwięcej owoców, warzyw, mleka i przetworów mlecznych, ryb morskich oraz razowych produktów zbożowych w porównaniu z kobietami z niższym wykształceniem, rzadziej natomiast piły słodzone napoje gazowane. Z wyższym poziomem wykształcenia wiązało się również częstsze stosowanie kwasu foliowego i innych suplementów witaminowych i/lub mineralnych. Brak wystarczającej ilości środków finansowych na zakup niezbędnej żywności zadeklarowało 15,4% ciężarnych. Czynnikiem ten w istotny sposób korelował z niższym spożyciem owoców, warzyw, produktów dostarczających białka zwierzęcego, mleka i przetworów mlecznych, ryb morskich, produktów razowych oraz suplementów witaminowych i/lub mineralnych.

**Wnioski:** Gorsza jakość diety kobiet w ciąży wiązała się zarówno z niskim poziomem wykształcenia, jak i z niedostateczną ilością środków finansowych na zakup żywności. Kobiety z wyższym wykształceniem, nawet w przypadku posiadania niskich dochodów, wybierały produkty bardziej odpowiadające zasadom prawidłowego żywienia, co potwierdza pozytywny wpływ świadomości i większego zasobu wiedzy na odżywianie.

## Introduction

The manner of nutrition of future mothers has a significant influence on the proper course of the pregnancy and the newborn's measurements at birth [1–5]. Intrauterine malnutrition, which is the cause of low birth weight, may create favourable conditions for the development of future metabolic abnormalities by disrupting the development of blood vessels, pancreas  $\beta$ -cells, insulin resistance, impairment of muscle development, abnormal functions of the liver, kidneys and other organs [6]. The level of education and the social-and-economical status, connected with the amount of income, are part of the factors which decide in a significant way on the manner of a person's nutrition [7–10]. Research concerning the influence of these factors on the nutrition of pregnant women was conducted mainly in developing countries, whereas there are relatively few reports on the subject originating from developed countries [11–16].

## Aim of the research

The aim of the research was to assess the manner of nutrition of pregnant women depending on the level of their education and financial resources required to buy the necessary food.

## Material and methods

The research was conducted within the years 2011–2012, in gynaecological and obstetric examination rooms and outpatient clinics in the Świętokrzyskie Voivodeship. Seven hundred and four pregnant women participated in the research, and 677 women were qualified for further analysis; 12.4% of them were in their first, 25.4% in their second and 62.2% in their third trimester of pregnancy. Information about social variables and consumption of selected products and beverages, and intake of folic acid and other vitamin and/or mineral supplements was obtained using an anonymous questionnaire. The questions in the questionnaire concerned the number of consumed portions in individual groups of products. The size of a portion was defined according to the principles presented in the literature [17]. Among the examined women, 21.0% received primary education (primary or basic vocational), 37.7% received secondary education and 41.3% received higher education (Bachelor's or Master's degree). In order to assess the possession of sufficient financial resources to purchase the necessary food, the women answered the following question: Do you always have enough money to buy the food that you need? (yes/no).

## Statistical analysis

The non-parametric  $\chi^2$  test was used in statistical analysis. A  $p < 0.05$  was assumed as the level of signif-

icance. Only the products where statistically significant differences in consumption were observed, were presented in the tables. Isolation of the nutritional habits coexisting with corresponding categories of education and financial resources sufficient to buy the necessary food was done using correspondence analysis.

## Results

Women with the lowest level of education consumed the least fruit, vegetables, legumes, milk and dairy products, saltwater fish and wholegrain foods; whereas the highest consumption of the aforementioned products was found among women with higher education (Table 1). The level of education of the examined did not influence the consumption of products which were the source of animal protein, that is meat, fish and eggs; and that of sweets and cereal products in general. Pregnant women with higher education ate more regularly and drank sweetened soft drinks significantly less often than other women (Table 2); whereas no significant differences were found in the consumption of alcohol beverages depending on education. 16.5% of all examined women admitted to having drunk alcohol while pregnant.

94.3% of women with higher education, and 80.3% of those with primary education, took folic acid during pregnancy; moreover, in the second group, it was more often only after the twelfth week of pregnancy that folic acid was taken (Table 2). Less frequent use of other vitamin and/or mineral supplements, including those which provided n-3 polyunsaturated fatty acids, was also connected to a lower level of education.

Among the women in the research, 15.4% ( $n = 104$ ) declared a lack of sufficient financial resources to buy the necessary food. This factor was connected in a significant way to lower consumption of fruit, vegetables, products providing animal protein, milk and dairy products, saltwater fish, wholegrain products (Table 3) and vitamin and/or mineral supplements (Table 4). Whereas no differences were found in the consumption of leguminous vegetables, general grain products, as well as sweets and alcohol. Only sweetened soft drinks were consumed more often by women who did not have enough financial resources (Table 3).

Correspondence analysis showed that there was a connection between a higher level of education, and at the same time having enough financial resources to buy food, and intake of folic acid and other vitamin and/or mineral supplements, as well as the highest consumption of wholegrain products, saltwater fish, fruit, products being the source of animal protein, milk and dairy products, and not consuming sweetened soft drinks (Figure 1). The point standing for the lowest level of education was located in the chart very close to the point standing for the lack of sufficient financial resources to buy the necessary food. The

**Table 1.** Consumption of selected products in relation to education (%)

Products	Frequency of consumption	Education		
		Higher	Secondary	Primary
Fruit <i>p</i> = 0.0001	< 1 portion a day	6.4	10.6	23.2
	1–2 portions a day	52.2	47.5	52.1
	3 portions a day	26.1	28.2	19.0
	4 or more portions	15.3	13.7	5.6
Vegetables <i>p</i> = 0.0001	< 1 portion a day	16.8	30.6	39.4
	1–2 portions a day	63.9	55.7	52.8
	3 portions a day	13.2	9.0	4.9
	4 or more portions	6.1	4.7	2.8
Legumes <i>p</i> = 0.0360	Never	26.1	33.7	37.3
	< 1 portion a week	53.2	47.5	51.4
	≥ 1 portion a week	20.7	18.8	11.3
Milk and dairy products <i>p</i> = 0.0194	< 1 portion a day	16.4	22.4	26.8
	1–2 portions a day	50.0	50.6	54.9
	3 portions a day	14.0	14.4	10.6
	4 or more portions	19.6	12.6	7.7
Saltwater fish <i>p</i> = 0.0001	Never	8.6	18.8	31.7
	< 1 portion a week	57.5	60.8	52.1
	≥ 1 portion a week	33.9	20.4	16.2
Wholegrain products <i>p</i> = 0.0048	Never	9.6	12.6	23.2
	< 1 portion a day	35.4	43.9	35.2
	1 portion a day	32.1	26.7	23.2
	2 or more portions	22.9	16.9	18.3
Sweetened soft drinks <i>p</i> = 0.0082	Yes	7.2	12.2	14.3
	Rarely	34.1	42.1	40.7
	No	58.8	45.7	45.0
Regular diet <i>p</i> = 0.0179	Yes	44.6	34.1	31.0
	Sometimes	37.5	43.1	40.9
	No	28.2	22.8	37.5

*p* – the level of significance of the test ( $\chi^2$ ) for multi-way tables; applies to all tables

lowest consumption of the following products was connected to these points: milk and dairy products, vegetables, fruit, products being the source of animal protein, saltwater fish, wholegrain products, lack of intake of folic acid and other vitamin and/or mineral supplements and the highest consumption of sweetened soft drinks.

Next, the frequency of consumption of all products and supplements by the 104 women who declared lack of sufficient financial resources to buy the necessary food was analysed in relation to their level of education. It should be stressed that significantly fewer pregnant women with higher education were found in this group than among all the examined women, that is 20.2%; and more of them were found with primary education – 40.4% ( $p = 0.0003$ ). The  $\chi^2$  test

showed that the differentiating influence of education proved to be statistically significant in the case of saltwater fish and wholegrain products consumption (Table 5). The differences in consumption of the remaining products did not, in truth, pass the level of significance, however, the percentage of women with primary education declaring the lowest category of consumption of many of the products (that is less than one portion a day) was much higher in comparison to the percentage of participants with higher education and was respectively: 38.1% vs. 26.8% in the case of milk and dairy products; 38.1% vs. 4.8% in the case of fruit and 47.6% vs. 19.0% in the case of vegetables. This fact indicates a clear tendency of less frequent consumption of the aforementioned products by pregnant women with poorer education. The dif-

**Table 2.** Intake of folic acid and other supplements in relation to the level of education (%)

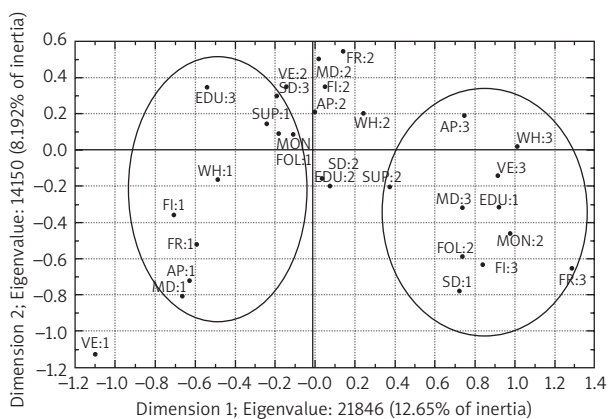
Supplement intake		Education		
		Higher	Secondary	Primary
Folic acid <i>p</i> = 0.0000	Yes	94.3	83.9	80.3
	No	5.7	16.1	19.7
The start of folic acid intake <i>p</i> = 0.0000	Before pregnancy	47.9	26.6	16.8
	1–12 week of pregnancy	47.9	62.2	61.4
	After 12 <sup>th</sup> week of pregnancy	5.2	11.2	21.9
Other supplements <i>p</i> = 0.0000	Yes	68.9	63.9	54.2
	No	31.1	36.1	45.8
n-3 Polyunsaturated fatty acids <i>p</i> = 0.0004	Yes	42.5	30.6	16.9
	No	47.5	69.4	83.1

**Table 3.** Consumption of selected products in relation to having enough money to buy the necessary food (%)

Products	Frequency of consumption	Enough money to buy the necessary food	
		Yes	No
Fruit <i>p</i> = 0.0022	< 1 portion a day	9.6	22.1
	1–2 portions a day	51.0	50.0
	3 portions a day	26.5	19.2
	4 or more portions	12.9	8.7
Vegetables <i>p</i> = 0.0415	< 1 portion a day	24.8	37.5
	1–2 portions a day	59.5	52.9
	3 portions a day	10.5	6.7
	4 or more portions	5.2	2.9
Meat, fish and eggs <i>p</i> = 0.0280	< 1 portion a day	16.4	26.9
	1–2 portions a day	60.2	58.7
	3 portions a day	17.8	9.6
	4 or more portions	5.6	4.8
Milk and dairy products <i>p</i> = 0.0025	< 1 portion a day	18.3	34.6
	1–2 portions a day	55.2	49.1
	3 portions a day	14.1	9.6
Saltwater fish <i>p</i> = 0.0380	4 or more portions a day	12.4	6.7
	Never	15.9	25.0
	< 1 portion a week	57.8	56.7
Wholegrain products <i>p</i> = 0.0494	1 or more portion a week	26.4	18.3
	Never	13.1	16.4
	< 1 portion a day	36.8	48.1
Sweetened soft drinks <i>p</i> = 0.0050	1 portion a day	29.7	20.2
	2 or more portions	20.4	15.4
	Yes	9.0	19.2
	Rarely	38.5	38.5
	Never	52.5	42.3

**Table 4.** Intake of folic acid and other supplements (%)

	Supplement intake	Enough money to buy the necessary food	
		Yes	No
Folic acid <i>p</i> = 0.0001	Yes	89.5	76.0
	No	10.5	24.0
The start of folic acid intake <i>p</i> = 0.0191	Before pregnancy	34.3	33.7
	1–12 week of pregnancy	56.9	47.5
	After 12 <sup>th</sup> week of pregnancy	8.8	18.8
Other supplements <i>p</i> = 0.0335	Yes	36.1	47.1
	No	63.9	52.9
Including n-3 polyunsaturated fatty acids <i>p</i> = 0.0411	Yes	64.2	78.2
	No	35.8	21.8



**Figure 1.** Relationship between consumption of selected products in pregnant women and the level of education and financial resources required to buy the necessary food – results of the correspondence analysis

EDU (education): 1 – primary, 2 – secondary, 3 – higher; MON (enough money for food): 1 – yes, 2 – no; FR (fruit), VE (vegetables), MD (milk and dairy products), AP (products being the source of animal protein: meat, fish, eggs in general): 1 –  $\geq 3$  portions a day, 2 – 1–2 portions a day, 3 –  $< 1$  portion a day; FI (saltwater fish), WH (wholegrain products): 1 –  $\geq 1$  portion a day, 2 –  $< 1$  portion a day, 3 – never; SD (sweetened soft drinks): 1 – yes, 2 – sometimes, 3 – never; FOL (folic acid), SUP (other vitamin and/or mineral supplements): 1 – yes, 2 – no

ferences in supplement intake by women not having enough financial resources in relation to the level of their education also did not turn out to be statistically significant. It should however be stressed that 67% of women in the group with higher education took them, 61% in that with secondary education and only 38% in that with primary education, whereby none of the women with primary education took supplements containing n-3 polyunsaturated fatty acids.

**Discussion**

Analysis of the influence of social factors on the birth weight of newborns in the Polish population showed that a mother’s low level of education significantly heightens the risk of low birth weight in their children [18]. Results of the research conducted in the Świętokrzyskie Voivodeship show that the existence of this kind of relationship may, to a great degree, be due to an insufficient quality of the diet of pregnant women. Both the level of education and lack of sufficient financial resources to buy the necessary food lower in a significant way the consumption by the examined women of vitamin and/or mineral supplements and products such as fruit, vegetables, milk and dairy products, saltwater fish, wholegrain products, and in the case of a financial deficit, also of products

**Table 5.** Consumption of some of the products by women who declared lack of sufficient financial resources to buy the necessary food, in relation to the level of education (%)

Products	Frequency of consumption	Education		
		Higher	Secondary	Primary
Saltwater fish <i>p</i> = 0.0348	Never	0.0	26.8	35.7
	$< 1$ portion a week	66.7	58.5	50.0
	1 or more portion a week	33.3	14.6	14.3
Wholegrain products <i>p</i> = 0.0075	Never	4.8	14.6	23.8
	$< 1$ portion a day	42.9	48.8	54.8
	1 or more portion a day	52.4	36.6	21.4

being a source of animal protein. The social and economic factors under consideration did not influence only the consumption of products such as sweets and alcohol; whereas the consumption of sweetened soft drinks was higher in the group of women with a lower level of education and declaring financial deficits. The study of literature done by Skagerström *et al.* [19] shows that drinking alcohol by pregnant women was most related with its consumption before the pregnancy and exposure to violence. Some of the research showed that high income and/or a high social status favour drinking alcohol. Research concerning the influence of education or unemployment on drinking during pregnancy were the least coherent.

Results of other authors' research confirm that pregnant women with a lower education and having lower income had a worse diet in terms of quality [11–16, 20]. Especially, insufficient consumption of vegetables [11] and fish [12] was found. Previous research in the Świętokrzyskie Voivodeship also showed that after taking into consideration the intake of supplements during pregnancy, as well as consumption of saltwater fish in accordance with recommendations, the risk of n-3 polyunsaturated fatty acids' deficiency occurred in a significantly lower percentage of women with higher education (44.6%) than in women with secondary education (61.4%) or primary education (71.1%) [15].

It is mostly the limited financial capabilities for a free choice of food that decide about the errors in nutrition made by people with a low social and economic status. Less wealthy people to a greater degree satisfy their nutritional needs with cheaper food, one with lower nutrient content, but with more energy value [10, 21, 22]. Low energy value of products such as vegetables, fruit and fish is connected with a higher cost of a food-ration; also the cost of wholegrain products is usually higher than that of white-flour products. Admittedly, the definition of having insufficient financial resources is subjective in this research and does not have to precisely reflect the actual income, however the percentage of women who declared a difficult financial situation (15.4%) seems to be similar to the results of sociological research. It was lower than the percentage of people living below the relative poverty threshold, which is 26.2% in the Świętokrzyskie Voivodeship, and only slightly higher than the percentage of people living below the statutory poverty line (11.9%) [23]. Research on determinants of nutritional behaviour shows that, in general, with growth of education there is not only growth of income but also a higher level of knowledge about the available products and the possibilities of their use, and greater expectations towards the purchased products, which in a significant way influences the rationalisation of the diet [24]. Lack of sufficient income may also be a strong stimulus of stress for pregnant women. Fowles *et al.* [16] proved that psychosocial stress in

pregnant women with low income had a significant and direct influence on worse nutritional habits and a direct and indirect one on the quality of their diet.

## Conclusions

The diet of pregnant women, worse in terms of quality and characterised by low consumption of fruit, vegetables, milk and dairy products, saltwater fish and wholegrain products as well as more frequent consumption of sweetened soft drinks was connected with both insufficient financial resources to buy the necessary food and a low level of education. The social and economic factors under consideration did not, however, differentiate the consumption of sweets and alcohol among the examined women.

Women with higher education, even in the case of having low income, chose products more consistent with the principles of proper nutrition, which confirms the positive influence of awareness and greater knowledge on their nutrition.

## References

1. Oken E, Kleinman K, Olsen S *et al.* Associations of seafood and elongated n-3 fatty acid intake with fetal growth and length of gestation: results from a US pregnancy cohort. *Am J Epidemiol* 2004; 160: 774–783.
2. Mikkelsen TB, Osler M, Orozova-Bekkevold I *et al.* Association between fruit and vegetable consumption and birth weight: a prospective study among 43,585 Danish women. *Scand J Publ Health* 2006; 34: 616–622.
3. Rodríguez-Bernal CL, Rebagliato M, Iñiguez C *et al.* Diet quality in early pregnancy and its effects on fetal growth outcomes: the Infancia y Medio Ambiente (Childhood and Environment) Mother and Child Cohort Study in Spain. *Am J Clin Nutr* 2010; 91: 1659–1666.
4. Thompson JMD, Wall C, Becroft DMO *et al.* Maternal dietary patterns in pregnancy and the association with small-for-gestational-age infants. *Br J Nutr* 2010; 9: 1–9.
5. Heppel DH, van Dam RM, Willemsen SP *et al.* Maternal milk consumption, fetal growth, and the risks of neonatal complications: the Generation R Study. *Am J Clin Nutr* 2011; 94: 501–509.
6. Godfrey KM, Barker DJP. Fetal nutrition and adult disease. *Am J Clin Nutr* 2000; 71 Suppl: 1344–1352.
7. Waśkiewicz A, Sygnowska E, Szcześniewska D. Impact of educational level on the dietary pattern in randomly selected population groups over 10-years of observation – Pol-MONICA Warsaw Study. *Pol J Hum Nutr Metab* 2000; 27: 219–237.
8. Hulshof KFAM, Brussaard JH, Kruizinga AG *et al.* Socio-economic status, dietary intake and 10 y trends: the Dutch National Food Consumption Survey. *Eur J Clin Nutr* 2003; 57: 128–137.
9. Sekuła W, Figurska K, Barysz A *et al.* Income inequalities and their effect on the distribution of the fruit and vegetable consumption in Poland. *Pol J Hum Nutr Metab* 2004; 35: 14–23.
10. Darmon N, Drewnowski A. Does social class predict diet quality? *Am J Clin Nutr* 2008; 87: 1107–1117.

11. Bodnar LM, Siega-Riz A. A Diet Quality Index for Pregnancy detects variation in diet and differences by sociodemographic factors. *Pub Health Nutr* 2002; 5: 801–809.
12. Sontrop JM, Campell MK, Evers SE et al. Fish consumption among pregnant women in London, Ontario: associations with socio-demographic and health and lifestyle factors. *Can J Pub Health* 2007; 98: 389–394.
13. Northstone K, Emmett P, Rogers I. Dietary patterns in pregnancy and associations with sociodemographic and lifestyle factors. *Eur J Clin Nutr* 2008; 62: 471–479.
14. Rifas-Shiman SL, Rich-Edwards J, Kleinman K et al. Dietary quality during pregnancy varies by maternal characteristics in Project Viva: a US cohort. *J Am Diet Assoc* 2009; 109: 1004–1011.
15. Suliga E. Nutritional behaviours of pregnant women. *Pediatr Endocrinol Diabet Metab* 2011; 17: 76–81.
16. Fowles ER, Bryant M, Kim SH. Predictors of dietary quality in low-income pregnant women: a path analysis. *Nurs Res* 2011; 60: 286–294.
17. Szostak-Węgierek D, Cichońska A. *Żywność kobiet w ciąży*. Wydawnictwo Lekarskie PZWL, Warszawa 2005.
18. Borkowski W, Mielniczuk H. Wpływ wybranych czynników społecznych i zdrowotnych, w tym tempa przyrostu masy ciała w ciąży i masy przed ciążą, na małą masę urodzeniową noworodka. *Ginekol Pol* 2008; 79: 415–421.
19. Skagerström J, Chang G, Nilsen P. Predictors of drinking during pregnancy: a systematic review. *J Women's Health* 2011; 20: 901–913.
20. Ebrahimi F, Shariff ZM, Rezaeian M et al. Socioeconomic status and intake of energy and sodium are associated with calcium intake among pregnant women in Rafsanjan city, Iran. *J Obstet Gynaecol Res* 2013; 39: 146–153.
21. Aggarwal A, Monsivais P, Drewnowski A. Nutrient intakes linked to better health outcomes are associated with higher diet costs in the US. *PLoS One* 2012; 7: e37533.
22. Monsivais P, Aggarwal A, Drewnowski A. Are socio-economic disparities in diet quality explained by diet cost? *J Epidemiol Community Health* 2012; 66: 530–535.
23. *Ubóstwo w Polsce w 2010 r. (na podstawie badania budżetów gospodarstw domowych)*. Główny Urząd Statystyczny 2011.
24. Jeżewska-Zychowicz M. *Zachowania żywieniowe i ich uwarunkowania*. Wydawnictwo SGGW, Warszawa 2004.

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