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# CHANGE IN THE QUALITY OF DIET DURING PREGNANCY IN COMPARISON WITH WHO AND EU RECOMMENDATIONS - ENVIRONMENTAL AND SOCIODEMOGRAPHIC CONDITIONS

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**Abstract:** The organism of a pregnant woman constitutes the environment for the developing embryo. The outside world influencing the mother's organism affects not only her health but also her unborn baby's health. The aim of the work is to analyze the qualitative changes in pregnant women's diet and to specify the sociodemographic and environmental conditions determining the quality of the diet. The research was carried out among 150 pregnant women who came to randomly chosen antenatal clinics in Lublin. The tool used for research was a personally designed questionnaire. The average consumption of particular groups of products was counted. Pregnant women not only increased the amount of food they consumed but they also changed the proportions. Despite the fact that the consumption of diary products was still too much, their role significantly decreased (2.40). Women also cut down on fruit in comparison with other products (2.76). However, the amounts of meat (1.30), vegetables (4.26) and crop products (4.29) rose. Moreover, place of living impacted on the frequency of the consumption of vegetables and education – of diary products.

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## INTRODUCTION

The realisation of how important individual behaviours are for retaining and improving health is only a part of a more general health change in health care. A disease ceases to be a problem; its place is being gradually taken over by health, its improvement and development. This results from the dominance of the holistic health paradigm and salutogenetic orientation [14].

The organism of a pregnant woman constitutes the environment for the developing embryo. The outside world influencing the mother's organism affects not only her health but also that of her unborn baby. Many researchers have found that health behaviours of pregnant women, especially the supplying of all indispensable nutrients, have an impact on the frequency of pregnancy complications, development of the embryo and the occurrence of diseases when it is adult [1, 3, 4, 10, 11].

Nutrition of a pregnant woman does not differ much from the rules of rational nutrition of all of us. Obviously, in connection with the new life developing in her womb, her energetic demand increases by 300 calories in the second and third trimesters of pregnancy [18].

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**Table 1.** Nutrient demands of pregnant women according to WHO, UE, USA and former USSR.

| | proteins g/day | calcium mg/day | iron mg/day | iodine µg/day | folic acid µg/day | zinc µg/day | magnesium mg/day |
|---|---|---|---|---|---|---|---|
| WHO | 51 | 1,000-1,200 | 12,5 | 200 | 370-470 | 7.3-13.3 | 350 |
| Europe | 48-60 | 700 | 17-21 | 130 | 400 | 7.1 | 350 |
| USA | 60 | 1,200 | 30 | 175 | 400 | 15 | 350 |
| former USSR | 105 | 1,000 | 20 | X | 600 | X | X |

The increase in the calorific demand of pregnant women [13]:

• According to the UE prescriptions - 200 calories a day in the third trimester;

• USA – 300 calories a day in the second and third trimesters;

• Poland – 300 calories a day in the second and third trimesters.

According to the WHO prescriptions, the rational diet of a pregnant woman should supply an appropriate amount of energy, but should also include indispensable nutrients (proteins, fats, minerals and vitamins) in suitable amounts and proportions. What is also essential is including an appropriate amount of good quality beverages in the everyday diet.

Recommendations on nutrition of pregnant women according to the WHO and EU differ insignificantly from Polish norms.

According to the WHO and EU recommendations there is an increase in protein consumption norms in pregnant women. Animal protein constitutes about 60% of a daily protein demand. The remaining 40% should come from rich vegetable protein [13].

The appropriate amount of fats in expecting mothers' diets is the same as the one recommended for other women. Fat should constitute 30% of the energetic value of the everyday diet (saturated fatty acids consumption should not exceed 10%, cholesterol consumption – 300 milligrams a day). There are, however, changes in diet connected with the kinds of consumed fats. The demand for some necessary unsaturated fatty acids increases – for linoleic acid and alpha-linoleic acids. The main sources of these acids are vegetable oil, sea fish and seafood. Pregnant women are advised to eat natural fats. Margarines are the main source of bad fats, which are trans isomers of fatty acids. Trans isomers are also present in butter, which is acceptable as a source of fats in a pregnant women's diet because isomers contained in it are produced in a cow's gastrointestinal tract and are thus believed to be safer [13].

**Table 2.** The characteristic of the group.

| | Age | | Place of living | | Education | |
|---|---|---|---|---|---|---|
| | ≤35 | >35 | City | Countryside | Primary | Secondary or higher |
| N | 41 | 68 | 68 | 41 | 68 | 68 |
| % | 34.46 | 57.14 | 57.14 | 34.46 | 57.14 | 57.14 |

Carbohydrates are the source of 55-60% of the daily energetic demand. Nutrition restrictions pertain to the consumption of sucrose - that is our sugar whose daily consumption should not exceed 10% of the energetic value of food. Pregnant women are advised to have mostly polysaccharides which are of the lower glycemic index [13].

The daily diet of a woman should contain appropriate amounts of vitamins, chemical elements and liquids. Both the lack and the excess of the nutrients have a negative impact on mother's and baby's health.

The WHO and EU prescriptions also deal with supplementing such vitamins and microelements as folic acid, calcium, magnesium, iron, zinc and iodine. The recommended doses of daily consumption of these are given in Table 1.

Many countries realise these prescriptions by means of their health policies. The Polish National Health Care programme (1996-2005) designed by a team of experts recommends every woman at reproductive age to have about 0.4-1.0 mg of folic acid daily in order to prevent inborn nervous system dysfunctions in children [16].

**The aim of the work.** The aim of the work is to analyze the qualitative changes in pregnant women's diet and to specify the sociodemographic and environmental conditions determining the quality of the diet.

## MATERIAL AND METHOD

The research was carried out among 150 pregnant women who came to randomly chosen antenatal clinics in Lublin in January 2006.

The tool used for research was a personally designed questionnaire. The first part contained such variables as age, place of residence, education, work or income (Tab. 2). The second part was constructed in such a way as to gain a picture of a woman's nutrition before becoming pregnant and the change of the diet afterwards.

Every patient was to answer the following question: how often she consumed certain groups of products before pregnancy and during pregnancy. To this end, women participating in the research had to number these groups from 1-5 beginning with the products consumed the least and ending with those consumed the most. According to the WHO the matches should be as follows: 1 – meat, 2 – diary products, 3 – fruit, 4 – vegetables, 5 – crop products (Fig. 1).

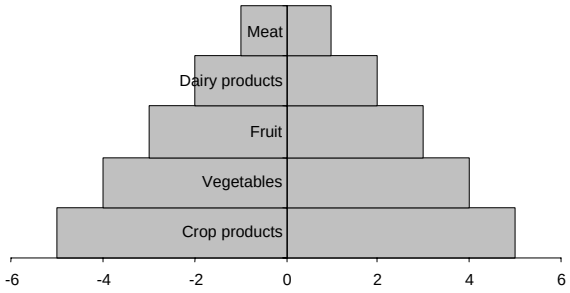


**Figure 1.** The nutrition pyramid according to the WHO.

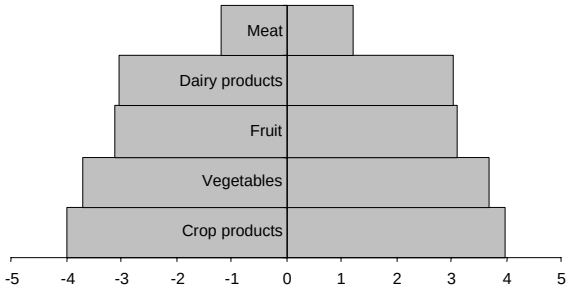


**Figure 2.** Frequency of consuming particular groups of products before pregnancy.

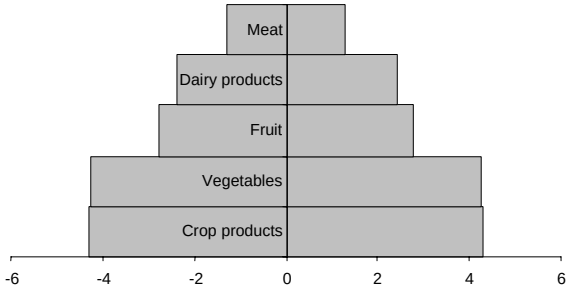


**Figure 3.** Frequency of consuming particular groups of products during pregnancy.

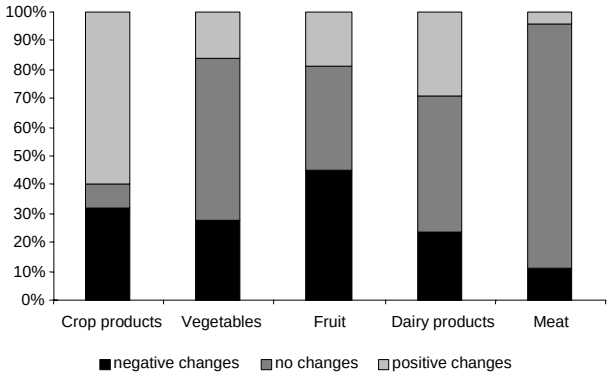


**Figure 4.** Changes of eating habits in pregnant women.

On the basis of the collected data, the average consumption of particular groups of products was counted.

The $\chi^2$ Pearson test was carried out to check the statistical significance of the relations between variables. This test checks the independence of m≥2 qualitative features expressed in nominal scales. The verification of the test depended on the counting of the values of the function $\chi^2$ and comparing them with the nominal values of this function postulated by the zero hypothesis. p=0.05, p=0.02, p=0.01 and p=0.001 were the mistake values.

## RESULTS

From among 150 questionnaires, 124 were completed and returned (82.7%). Having eliminated the papers that were not fully completed, 119 were qualified.

Before pregnancy, women ate dairy products too often (3.04) while neglecting crop products (3.97). The ratio of the frequency of consuming the other products was basically similar to that recommended by the WHO. It was noted that the consumption of meat (1.20) was a little to excessive, and that on the contrary too few vegetables (3.70) were eaten in comparison with the rest of the products (Fig. 2).

Pregnant women not only increased the amount of food they consumed but they also changed the proportions. Despite the fact that the consumption of dairy products was still too much, their role significantly decreased (2.40). Women also cut down on fruit in comparison with other products (2.76). However, the amounts of meat (1.30), vegetables (4.26) and crop products (4.29) rose (Fig. 3).

Comparing the change in the frequency of consuming particular groups of products before and during pregnancy, in relation to the model nutrition pyramid, it was possible to specify the direction of these changes (Fig. 4). Most of the women definitely changed their preferences towards crop products (59.66% - positive change; 31.93% - negative). Very little changes were noted whenit comes to meat consumption (4.20% - positive; 10.92% - negative). After becoming pregnant, a significant number of women did not alter the proportions of vegetable consumption (56.30%), fruit consumption (36.13%) and diary products consumption (47.06%). In the case of vegetables and fruit, pregnancy led more often to negative rather than positive changes: vegetables (15.97% - positive; 27.73% - negative), fruit (18.49%; 45.38%) which was contrary to the consumption of diary products (29.41%; 23.53%).

The statistical analysis showed that the place of residence (Tab. 3), education (Tab. 4) and age (Tab. 5) affect significantly the change of the amount of consumed fruit (level of the statistically important correlations: $p<0.05$). Moreover, place of living influences the frequency of vegetable consumption and education – diary products consumption.

It was noted that there were more negative changes in eating vegetables and fruit among women living in cities than among those from the countryside.

Positive alterations pertaining dairy products and fruit consumption were noted among better educated women (secondary or higher education).

**Table 3.** Changes of eating habits in pregnant women according to place of residence.

| | City | | Countryside | | $\chi^2$ | p |
|---|---|---|---|---|---|---|
| | N | % | N | % | | |
| Crop products | | | | | | |
| Negative changes | 19 | 27.94 | 19 | 37.25 | 2.032 | NS |
| No changes | 9 | 13.24 | 1 | 1.96 | | |
| Positive changes | 40 | 58.82 | 31 | 60.78 | | |
| Vegetables | | | | | | |
| Negative changes | 23 | 33.82 | 10 | 19.61 | 4.236 | <0,05 |
| No changes | 34 | 50.00 | 33 | 64.17 | | |
| Positive changes | 11 | 16.18 | 8 | 15.69 | | |
| Fruit | | | | | | |
| Negative changes | 33 | 48.53 | 21 | 41.18 | 3.225 | <0,05 |
| No changes | 19 | 27.94 | 19 | 37.25 | | |
| Positive changes | 16 | 23.53 | 11 | 21.57 | | |
| Dairy products | | | | | | |
| Negative changes | 18 | 26.47 | 10 | 19.61 | 1.669 | NS |
| No changes | 31 | 45.59 | 25 | 49.02 | | |
| Positive changes | 19 | 27.94 | 16 | 31.37 | | |
| Meat | | | | | | |
| Negative changes | 2 | 2.94 | 3 | 5.88 | 0.954 | NS |
| No changes | 61 | 89.71 | 40 | 78.43 | | |
| Positive changes | 5 | 7.35 | 8 | 15.69 | | |

**Table 4.** Changes of eating habits in pregnant women according to education.

| | Primary | | Secondary or higher | | $\chi^2$ | p |
|---|---|---|---|---|---|---|
| | N | % | N | % | | |
| Crop products | | | | | | |
| Negative changes | 10 | 40.00 | 28 | 29.79 | 1.800 | NS |
| No changes | 2 | 8.00 | 8 | 8.51 | | |
| Positive changes | 13 | 52.00 | 58 | 61.70 | | |
| Vegetables | | | | | | |
| Negative changes | 6 | 24.00 | 27 | 28.72 | 1.165 | NS |
| No changes | 13 | 52.00 | 54 | 57.45 | | |
| Positive changes | 6 | 24.00 | 13 | 13.83 | | |
| Fruit | | | | | | |
| Negative changes | 9 | 36.00 | 45 | 47.87 | 4.359 | <0,05 |
| No changes | 12 | 48.00 | 26 | 27.66 | | |
| Positive changes | 4 | 16.00 | 23 | 24.47 | | |
| Dairy products | | | | | | |
| Negative changes | 8 | 32.00 | 20 | 21.28 | 3.985 | <0,05 |
| No changes | 13 | 52.00 | 43 | 45.74 | | |
| Positive changes | 4 | 16.00 | 31 | 32.98 | | |
| Meat | | | | | | |
| Negative changes | 1 | 4.00 | 4 | 4.26 | 2.325 | NS |
| No changes | 19 | 76.00 | 82 | 87.23 | | |
| Positive changes | 5 | 20.00 | 8 | 8.51 | | |

**Table 5.** Changes of eating habits in pregnant women according to age.

| | Under 35 | | Over 35 | | $\chi^2$ | p |
|---|---|---|---|---|---|---|
| | N | % | N | % | | |
| Crop products | | | | | | |
| Negative changes | 12 | 29.27 | 26 | 33.33 | 0.654 | NS |
| No changes | 4 | 9.76 | 6 | 7.69 | | |
| Positive changes | 25 | 60.98 | 46 | 58.97 | | |
| Vegetables | | | | | | |
| Negative changes | 11 | 26.83 | 22 | 28.21 | 0.365 | NS |
| No changes | 23 | 56.10 | 44 | 56.41 | | |
| Positive changes | 7 | 17.07 | 12 | 15.38 | | |
| Fruit | | | | | | |
| Negative changes | 17 | 41.46 | 37 | 47.44 | 3.265 | <0,05 |
| No changes | 16 | 39.02 | 22 | 28.21 | | |
| Positive changes | 8 | 19.51 | 19 | 24.36 | | |
| Dairy products | | | | | | |
| Negative changes | 9 | 21.95 | 19 | 24.36 | 0.154 | NS |
| No changes | 20 | 48.78 | 36 | 46.15 | | |
| Positive changes | 12 | 29.27 | 23 | 29.49 | | |
| Meat | | | | | | |
| Negative changes | 4 | 9.76 | 1 | 1.28 | 0.118 | NS |
| No changes | 33 | 80.49 | 68 | 87.18 | | |
| Positive changes | 4 | 9.76 | 9 | 11.54 | | |

Age influenced the amount of fruit eaten by pregnant mothers. Those over 35 consumed more fruit than before conception in comparison with younger mothers.

## DISCUSSION

The basis of a good state of health of the adult population is an appropriate way of nutrition from the earliest years of life, and an appropriate way of nutrition of pregnant mothers [1, 3, 4, 10, 11, 14, 17].

The research carried out showed that the diet of women before pregnancy differed from the that recommended by the WHO. These women consumed on average too many dairy products and too few crop products and vegetables.

Pregnancy positively influenced the general quality of the women's diet. The nutrition pyramid of pregnant women was closer to the one recommended by the WHO in comparison with eating habits before pregnancy. This can be noticed in the more appropriate proportions of the consumed food products, which speaks volumes about the high health consciousness of women and a high notion of responsibility not only for their own health but also for the health of their unborn babies. The fact that they consumed too many dairy products in relation to the other products agrees with the increased demand for protein and calcium during pregnancy. What is alarming, however, is the change in the frequency of fruit consumption. Smaller amounts of fruit in the everyday diet of pregnant women may lead to vitamin and microelement deficits. In

comparison with some EU countries, the outcome of the research is promising and acknowledges the good quality of the diet of Polish expecting mothers.

The authors found some statistically important dependencies. The changes in consumption of particular products during pregnancy depend on age, education and place of residence. Older age, higher level of education and living in the countryside are connected with better diet.

Research carried out in Germany showed that the quality of the diet in pregnant women was indeed connected with age and education. Better educated women had higher indexes of qualitatively beneficial diet than less educated women. However, the research did not depict any relation between place of residence and the quality of the diet. Moreover, the research showed that pregnant women had significantly lower indexes of healthy diet because they consumed more fat and sugar than the rest of the women in their population. It was also noted that pregnant women more regularly took vitamins and microelements. Unfortunately, they consumed a lot of unhealthy food [19].

Research carried out in Italy among women from the second trimester onwards also found that eating habits of pregnant women, both quantitative and qualitative, were not rational, and that the awareness of the issue was very poor. Patients consumed too many high-calorie products and saturated fats, but ate too few dairy products and vegetables. The food they consumed increased the risk of the occurrence of vitamin deficits, especially of folic acid [7, 8].

In England, a 7-day-observation method presented the consumption of particular products of women in the 28th week of pregnancy. It was noted that income, house ownership and social position had a huge influence on the consumption of carbohydrates, proteins and fats. Smoking and prenatal education had a significant impact on their diet. Smoking, bad housing conditions, lower education and lower social status were the risk points of a bad diet [12].

Spanish researchers decided that the consumption of food and microelements does not differ much in women before and during pregnancy. Pregnant women drank more milk, ate more fruit and vegetables, but cut down on sugar and alcohol. The average amount of supplied energy was more or less the same in both groups of women [2].

In Finland, pregnant women consumed more food and microelements (30-40% more) than the amounts recommended by the WHO. A 10-day-observation method showed that women in the first and the last week of the 8th month of pregnancy ate too much pork, margarine, citrus fruit and giblets. Moreover, it was noted that the average amount of the consumed food and nutrients was bigger at the end of the 8th month than at the beginning (especially fat milk, fizzy beverages, ice-cream and fish) [6].

In the United States, the quality of the diet of pregnant women was valued according to the Index of the Diet for Pregnant Women and achieved 56/80 points. Well educated, well-off women over 30 had significantly better results. A higher percentage of women consuming vegetables in accordance with the WHO was noted among better-off, older and better educated women. On the other hand, a higher percentage of poorer women took the recommended doses of folic acid and iron [5].

It was also noted that 80% of poor pregnant women did not consume food products in amounts prescribed by the WHO in the nutrition pyramid [9].

The authors of other experiments carried out in the USA found a relation between safe nutrition during pregnancy and better material status and higher level of education, and the reverse relation between the older age of patients and healthy nutrition [15].

## CONCLUSIONS

The research carried out among patients who consulted gynaecologists in Lublin points to the high quality of the diet of pregnant women in Poland in relation to the WHO and EU recommendations. The diet of pregnant women in our country does not differ much from the quality of the diet of pregnant women in other EU countries or in the USA in the analysed fields. The analysis of the outcome of the research from many countries definitely points to the cultural and environmental conditioning of the diet during pregnancy. It was noted that the higher quality of the diet, i.e. following to a greater extent the WHO and EU prescriptions, positively correlates with the age of patients over 35, a higher level of education and living in the countryside.

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