



Mitigation of Health Risk of Women at Child-Bearing Age Through Nutritional Patterns - Strategy Assumptions

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In this paper author uses the findings of three own epidemiological surveys carried out in 1991, 1993, 2000 on nutritional pattern and nutritional status of pregnant and non-pregnant women at child-bearing age, which contain a lot of representative features on a national scale, for the development of strategy on further research in the surveyed area during second and third decade of 21st century.

The findings were used as a inputs for development of preliminary diagnosis of current status and as assumptions for the strategy of modern research on early nutritional health risks of non-pregnant and pregnant women at child-bearing age.

The Poland lacks diagnosis that would be based on representative national survey of women population falling into 15 - 49 age category with the application of all necessary methods used in descriptive, analytical and molecular epidemiology.

The diagnosis seems to be indispensable. It was proven that in the last several decades most of nutrients served in the right quantities and proportions strengthen definitely the health condition of woman at child-bearing age and her foetus as well as genome stability.

Own surveys of the author in this field are one of the most representative on a national scale in the last several decades [1].

The dataset of 3177 all-day diets coming from three own surveys on nutritional pattern and anthropometric measurements of the nutritional status of non-pregnant women at child-bearing age collected in 1991-2000 and dataset of 1472 all-day diets of pregnant women are the most numerous of all surveys published in the last 25 years.

The major lessons drawn from the preliminary diagnosis are as follows:

- Substantiation that high percentage/>50.0% of all-day diet dataset/ with the energy from total fats (above 35%) is chronic and was found out in each of the carried out surveys both in pregnant and non-pregnant women subpopulations.
- It was proven that in the last survey it was accompanied by definite deficiency of long-chain n-3 polyunsaturated fatty acids, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).
- Far higher-than-tolerated (up to 7% of energy from all-day diet) was the share of energy from saturated fatty acids.
- This enhances unambiguously in the surveyed population a risk of lipid management disturbances, a risk of cardiovascular system diseases and a risk of diabetes type 2 and obesity [2,3].
- The sodium intake from all-day diet was proven to be twice as high as Adequate Intake (AI), in predominant number of all-day diets, both in pregnant and non-pregnant women subpopulations. It should be noted that sodium is one of highly significant diet-related risks causing, *inter alia*, hypertension [4-7].
- The lower-than-recommended iodine content was found out in the diets (mainly in the diets of pregnant women population), thus enhancing a risk of thyroid gland malfunctions, and in the foetus and infant populations – also physical and mental disorders [1,6,8-12].
- Low iron content was discovered in the diets of pregnant women, which is conducive to enhancement of anaemia risk caused by iron deficiency. It enhances risk of premature birth, low body mass at birth and reduced infant health condition.
- Iron deficiency during pregnancy reduces its reserves for the foetus and in the first year of life, and also has adverse impact on further development of infant and in subsequent years of life [13,14].

- For the population of women at child-bearing age evidence was found of lower than adequate intake (AI) from diet, on a population scale: D vitamin, proven by analytical testing, during multi-site clinical tests, published in 2012.
- The findings also confirm high risk of bone mineral management disorders, development of rickets in children population and growing risk of osteoporosis development in middle aged population [1,15-19].
- For non-pregnant and pregnant child-bearing women subpopulations the lower-than-adequate intake (AI) of calcium from diet was discovered, which given specifically low D vitamin content and high phosphorous content in food enhances risk of mineral management disorders, including in particular bone structure, as well as probable increase of obesity prevalence, caused by the deficiency of nutrient in question. During the first decade of 21st century the situation most probably did not change [20].

Lower-than-adequate intake (AI) from food, on a population scale, was discovered for:

- Dietary fibre, mainly in the diets of non-pregnant women, which by all means enhances the risk of abdominal obesity and diabetes of type 2 [1,21].
- Far lower-than-recommended folates content in the diets of Polish women at child-bearing age was discovered. Additionally, in some diets low content of riboflavin, B6 and B12 vitamins was discovered. The folate deficiencies found out in the diets of Polish women enhance a risk of neural tube defects in infant population and they also enhance a risk of genome stability disorders [1,22-25].

Ten nutritional health risks listed above for the population of women at child-bearing age were paralleled by growing prevalence of obesity, mainly in the surveyed women falling into 45+ age category:

- A percentage of obese women in the 15–44 age category rose insignificantly (from 6.4% in 1991 to 7.8% in 2000),
- A percentage of obese women in the 45–49 age category declined insignificantly (from 21.1% to 20.5%),
- A percentage of obese women above 50 years of age, also found out in the population surveys in question, rose significantly in statistical terms (from 27.7% to 33.9%) ($p = 0.074$);
- Prevalence of 3rd degree of obesity in the overall population of adult women rose from 0.2% in 1991 to 0.9% in 2000 ($p = 0.001$)

- In the population of 2725 women surveyed in 1991 the obesity was found out in 10.1% of the surveyed, whereas in 2000 in the population of 1695 women, in the same age bracket, obesity was found out in a significantly higher ($p < 0.001$) percentage of surveyed people in that year (18.5%) [1].

The presented findings of three surveys carried out in the population of women at child bearing age with the application of only descriptive epidemiology methods, with underrepresentation of samples, with parallel discovery of many flaws in nutritional pattern and nutritional status, give legitimacy to the conduct of a survey, that has not been conducted so far, with the application of descriptive, analytical and molecular methods

The inevitability of such approach to the survey with random sample selection on a nation-wide basis is indicated by the state-of-the-art in the fields of mother and foetus medicine, epigenetics and nutrigenomics.

Based on survey findings the following conclusions were drawn:

- The found out, aforementioned most probably prevailing, modifiable, nutritional health and current nutritional status risks in the subpopulations of surveyed non-pregnant and pregnant women at child-bearing age is probably a material dataset of characteristics enhancing a risk of occurrence of homeostasis disorders, threatening the physiological course of pregnancy and the maintenance of health of foetus, infant and child in consecutive decades of her/his life.
- Overweight and obesity, with growing prevalence with age, enhances probably in the population of non-pregnant women a risk of chronic, low level inflammation conducive, as shown by the analysis of bibliography, to the occurrence of insulin resistance, diabetes of type 2, damage of blood vessels' endothelium, development of metabolic syndrome, congenital anomalies, and also through, inter alia, cytokines also probable genome stability disorders.
- A decisive increase of prevalence of obesity in Poland was recorded mainly in the population of women in the 44+ age category. The prevalence of overweight and obesity in the population of Polish women at child-bearing population may probably grow in decades to come due to, inter alia, disadvantageous demographic situation and insufficient efficiency of health-oriented changes in lifestyle of this subpopulation of women. Intervention measures applied have to be more effective than to date and they should start, at least, one year before fertilization [26-29].

- The analysis of current state of knowledge, based on survey findings, on early prevention of diet-related diseases (on a population scale) leads to a fundamental conclusion that molecular epidemiology, using methods applied, inter alia, in functional genomics and in epigenetics, should be introduced to diagnose health condition of women at child-bearing age as a tool with the same value as descriptive and analytical epidemiology methods. The molecular epidemiology investigating, inter alia, the susceptibility of genes to food-related conditions, seems to be an irreplaceable tool in the early diagnosis of health condition of women population described in this monograph. The collected and processed in a complementary fashion survey finding in each of the three disciplines should lay foundations for taking early interventions in the field of preventive measures and early secondary measures counteracting health disorders and diet-related diseases caused by faulty nutritional pattern, in both distinguished physiological conditions [1,30].
 - The parallel implementation of measures and methods in the three aforementioned areas, in appropriate proportions, in the field of epidemiological studies on nutritional pattern and nutritional status of surveyed non-pregnant and pregnant women population, in order to strengthen effectively this part of public health system, seems to arouse interest of the Ministry of Science and the Ministry of Health or their counterparts in most European Union Members States, and the interest of EFSA.
 - A number of material detailed findings, from cognitive and application perspectives, is provided in the individual sections of monograph.
 - This part of paper Preventing Disease of Women at Child-Bearing Age, through healthier environments, was published in 2013 year, as monograph Mitigation of Health Risk of Women at Child-Bearing Age Through Nutritional Patterns – Strategy Assumptions (583 pages), by the National Food and Nutrition Institute, in Warsaw.
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Above mentioned monograph was positively reviewed by team of experts, from: Polish Mother Memorial Hospital Research Institute in Lodz.

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