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## NUTRITION IN THE NORTH

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# EPIDEMIOLOGY OF BREASTFEEDING, ITS IMPORTANCE FOR MATERNAL AND CHILD HEALTH, WELL-BEING AND SUSTAINABLE DEVELOPMENT OF SOCIETY: AN OVERVIEW OF CURRENT DATA

## ABSTRACT

In this article there are presented the modern data about the breastfeeding epidemiology in the countries with the different level of income, its influence on the mother's and children's health, the possible saved children's and women's lives.

This publication was prepared by using the papers in English including the modern systematic reviews and meta-analyses on the problem of breastfeeding and published like the Breastfeeding series in Lancet (2016).

**Keywords:** breastfeeding, epidemiology, prevention, children's and women's health, saved lives, "Goals for the sustainable development".

## Introduction

Breastfeeding has not lost the urgency and presently. It is extremely important for a survival and the further development of the child [19, 37]. The reproductive cycle not casually consists of two long components, pregnancy and chest feeding. During decades the medical practice of the most developed western countries underestimated breastfeeding. There was an opinion, that it is possible to replace it easily and without serious consequences with artificial feeding [35]. As a result there was a situation when developing countries on parameters of prevalence of breastfeeding have appeared in the best situation, rather than developed countries of the world. Modern epidemiological and biological researches confirm the fact, that the decision of mother to nurse has positive long-term effects for health and developments of children, and also for health of mothers. Probably, there are no other forms of behaviour concerning health which could have such various consequences for two essences which

are involved in them - mothers and the child. Opening in the field of immunology, epigenetic and microbiom of the mother and her child, stem cells which have been made for last two decades, throw light on potential mechanisms of influence of the breastfeeding on formation of health. Other more surprising mechanisms of exclusive influence of breast milk on health and development of the person since a birth from positions of the personified medicine are possible also.

Considering exclusive importance of breastfeeding for mother's and the child's, health and also its influence on social and economic spheres of human life, the international group of researchers has lead the analysis of existing systematic reviews and meta-analyses on English on the given problem. Results of this work have been published in Lancet in the beginning of 2016 like the Breastfeeding series and had the wide response among experts of all world, prosecute subjects of breastfeeding [6, 42].

The present publication represents

translation and a statement of substantive provisions of the articles in English of this series - "Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect and " Why invest, and what it will take to improve breastfeeding practices, including questions of the breastfeeding epidemiology, its value for mother's and child's health and also a role in achievement of well-being and sustainable development of the communities.

Epidemiology of the breastfeeding in the countries with the different level of the income: rates and trends

For estimation and analysis of the breastfeeding epidemiology it is important to have precise representation about used indicators. WHO offers following indicators: the early beginning of the breastfeeding – a portion of the newborns which have been enclosed to a breast within the first hour after delivery, exclusively breastfeeding up to 6 months - a portion of children in the age of from 0 up to 5 months which are fed with exclusively breast milk; continued

breastfeeding in 1 year - a portion of children in the age of 12-15 months which receive breast milk and continued breastfeeding in 2 years - a portion of children in the age of 20-23 months which receive breast milk [43].

As only some of the rich countries (with a high level of the income) in the reports use above listed indicators additional ones were applied to an opportunity of comparison with data of other countries: a share of children ever was on chest feeding; breastfeeding in 6 months - a portion of children which were on breastfeeding since a birth and up to 6 months or is more senior also breastfeeding in 12 months - a portion of children on breastfeeding in 12 months and longer.

For the countries with a middle and low level of the income in the standardized researches following additional indicators - a portion of children on breastfeeding in the age of 4-7 months (a median 6 months) and a portion of children on breastfeeding in the age of 10-13 months (a median 12 months) were used.

The general number of the countries which data were exposed to the analysis has made 127 of 139 countries with low and middle level of the income (on their share it is necessary up to 99% from

the general number of children in these countries) and 37 of 75 countries with a high level of the income. Parameters of breastfeeding were estimated for a population of children in the age of is younger than 2th years. For an estimation of dynamics of parameters of breastfeeding models of plural linear regress have been used, deviations from linear distribution [33] also were estimated.

The estimation of parameters of breastfeeding has shown that the greatest prevalence of breastfeeding among children in the age of 12 months takes place in the countries of Africa to the south from Sahara and in southern Asia, and also some countries of Latin America (a Fig. 1). In the majority of the rich countries this parameter was below 20% - from 35% in Norway and 25% in the USA up to 16% in Sweden and less than 1% in the United Kingdom.

The estimation of parameters of breastfeeding in 4 groups of the countries depending on a level of their income (low, below, middle, above a middle and high) has been lead. Data are received from national reviews of 153 countries with use of standard indicators for a population of children in the age of till 2th years. The following of 6 indicators - the early

beginning of breastfeeding, a prevalence of children ever was on breastfeeding, exclusively breastfeeding in 0-5 months and in 6 months, breastfeeding in 12 months and continued breastfeeding in 20-23 months (a Fig. 2) were analyzed. The strong negative interrelation between parameters of breastfeeding in 6 months and size of the internal gross revenue on the person ( $r=-0,84$ ;  $p<0,0001$ ). Doubling of the internal gross revenue has been connected with decrease on 10 % of a portion of children on breastfeeding in 12 months.

In all countries, it is not dependent on a level of the income, the majority of mothers started to nurse their children. Only in three countries - France, Spain and the USA a portion of children ever was on breastfeeding was below 80%. Nevertheless, parameters of the early beginning and exclusively breastfeeding were low for all countries.

For exception of the early beginning of breastfeeding prevalence of breastfeeding on all indicators decreased with increase of well-being of the countries. The countries with a low level of the income had high parameters of breastfeeding in all age groups but even in these countries parameters of the early beginning and exclusively breastfeeding

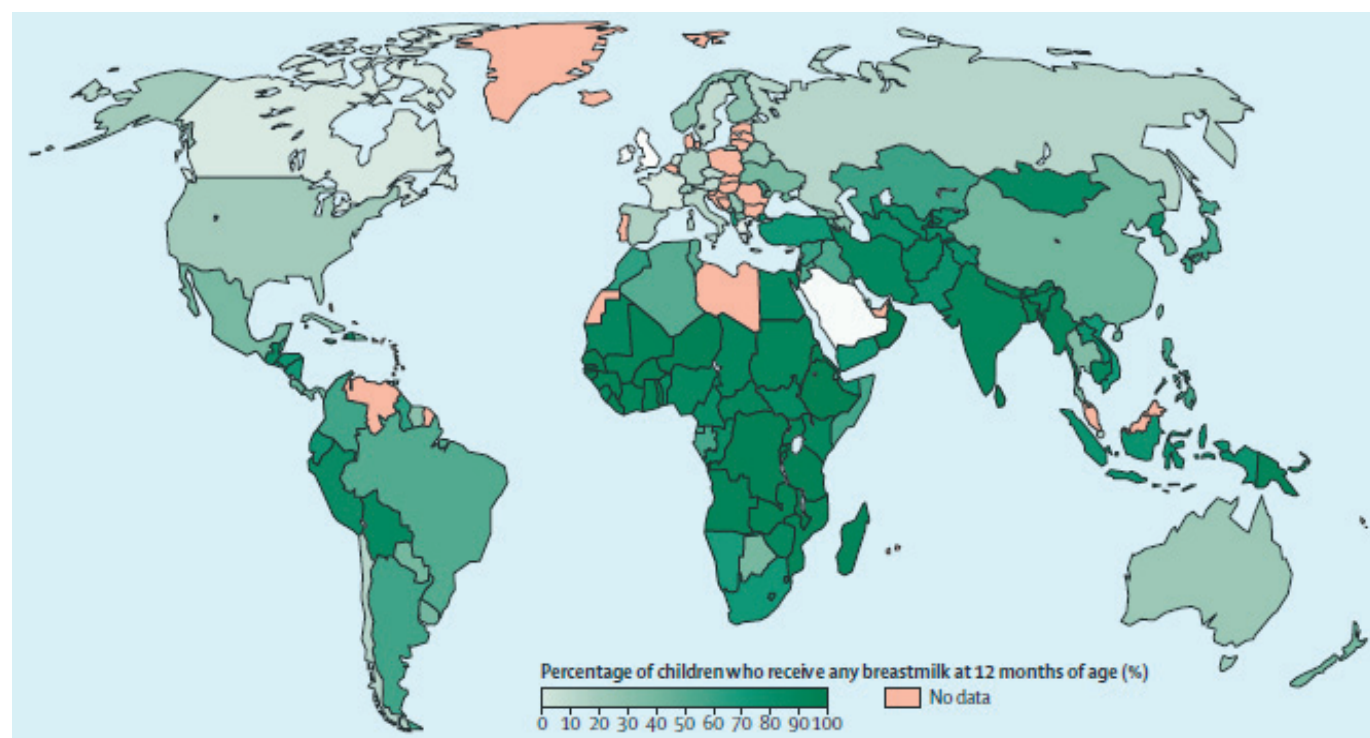
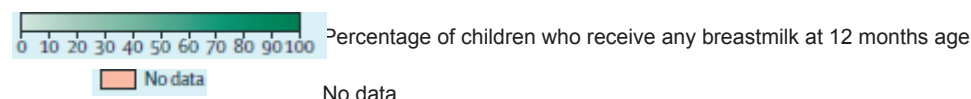


Fig. 1. Global distribution of breastfeeding at 12 months. Data are from 153 countries between 1995 and 2013



were not satisfactory.

Surprisingly but the majority of indicators of breastfeeding have not been interconnected among themselves. Only moderate correlation communication between exclusively breastfeeding and proceeding breastfeeding in 1 year in the countries with low and an average level of the income ( $r=0,54$ ) has been revealed. Parameters of exclusively breastfeeding among children in the age of 0-5 months in these countries averaged 37%.

For 20 years with 1993 for 2013 in the countries with low and middle level of the income parameters of exclusively breastfeeding have slightly grown from 24,9% up to 35,7%. In the richest families this increase has been considerably more expressed while among the poorest families it corresponded to the general trend. Continued breastfeeding in 1 year on the average has decreased in these countries - from 76,0% to 73,3% substantially due to decrease in this parameter among the poorest families.

Interest submits data on distinctions in parameters of breastfeeding between families with a different level of prosperity inside of the countries differing on a level of the income. In the countries with low and middle level of the income it has not been revealed distinctions between rich and poor families on parameters of exclusively breastfeeding. However, on parameters of a proceeding breastfeeding it is revealed, that in poor families nursed longer in comparison with rich. This tendency has been more expressed in the countries with an average level of the income [32]. Low parameters of prevalence of a proceeding breastfeeding among more provided families raise probability of that less provided mums will be developed aside substitutes of breast milk if their income will increase, a question which gains in strength in communication with decrease in levels of breastfeeding in poor populations. In the rich countries distinctions in parameters of breastfeeding depending on formation of women are revealed. Among formed mothers was more nursing, than among women with several years of formation [13, 20, 27]. For example, in the USA till 60th years the share of mothers, begun to nurse, was more, than among mothers with a low educational level but since then this social trend has replaced the orientation on opposite.

Short-term effects of breastfeeding: diseases and death rate among children of early age

Influence of breastfeeding on following



Fig. 2. Breastfeeding indicators by country income group in 2010

parameters of health of children of early age was considered: death rate, frequency of infectious diseases (a diarrhea, an infection of the low respiratory ways, an acute otitis), frequency of allergic diseases (eczema, a food allergy, an allergic rhinitis, a bronchial asthma), physical development (growth, weight, an index of weight of a body), health of a teeth (caries, an estimation of a bite).

On an example of the countries with low and middle level of the income it has been shown, that breastfeeding considerably reduces risk of death from infectious diseases. The probability of death among babies on exclusively breastfeeding in the first 6 months of a life makes only 12% in comparison with children who are not receiving breast milk [34]. In other researches it has been shown, that among children 6 months without breastfeeding higher parameters of death rate - above in 3,5 times among boys and in 4,1 times among girls, in comparison with children received breast milk even in a small amount were more younger. However, protective properties of breast milk decrease with the years [41]. These results have been confirmed by researches among children in the age of 6-23 months in which with breastfeeding connected decrease in death rate on 50%. About half of all cases of a diarrhea and third of respiratory infections could be prevented owing to breastfeeding [15]. Besides breast feeding could prevent 72% of cases of hospitalization owing to a diarrhea and 57% of hospitalization owing to respiratory infections.

The researches lead in the countries with a high level of the income, have

shown, that breastfeeding, is not dependent on its duration, leads to decrease on 36% of probability of sudden death among babies. On 58% the number of cases of necrotizing enterocolitis [18], diseases with high risk of a fatal outcome in any country decreased [14]. Breastfeeding has great value for preventive maintenance of an acute otitis among children younger than 2th years, but is not found convincing data concerning children older of this age [5]. Concerning preventive maintenance of allergic diseases, such as eczema and food allergy, there are no convincing proofs of a role of breastfeeding, and there are some researches concerning its value for preventive maintenance of an allergic rhinitis among children before 5 years [23]. Also it has been shown, that breastfeeding reduces on 9% probability of development of a bronchial asthma or on 5%-6% by results of more strict the analysis of results of the cohort researches.

The researches lead in the countries with low and middle level of the income has shown that breastfeeding reduces probability of infringements of a bite on 68% [28]. The majority of researches have been limited by children of early age with milk teeth, but infringement of a bite in this age group is a risk factor of infringement of a bite at adults [29]. However breastfeeding longer 12 months and night feedings associated with increase in 2-3 times of cases of caries of milk teeth that can be connected with inadequate hygiene of an oral cavity after feeding by a breast [36].

In the researches lead in the countries



with middle level of the income it has not been revealed distinctions in growth and weight of babies to 6 months of a life [11]. But some decrease in an index of weight of a body at children which mothers participated in programs of intervention on support of breastfeeding took place.

#### **The long-term effects of breastfeeding: obesity, noncommunicable diseases and intelligence**

Health of children more advanced age and also teenagers and adult population was estimated on following parameters: levels of arterial pressure and the general cholesterol, presence of superfluous weight of a body and obesity, diabetes type 2, the estimation of intelligence (IQ factor) also was spent.

The analysis of scientific researches on studying the remote influence of breastfeeding on size of the arterial pressure, the general cholesterol of blood, risk of development of superfluous weight of a body and obesity, diabetes type 2 is resulted in systematic review and the meta-analyses presented by B.L. Horta et al. [17]. The researches taken in the analysis have been lead among children, teenagers and adult population, the majority of them - in the countries with a high level of the income. It is revealed, that longer period of chest feeding reduces risk of development of superfluous weight of a body and adiposity to 13%-20%. And, this influence extends and on the countries with low and an average level of the income. Breastfeeding reduces risk of development of a diabetes type 2 on 14 %. However, it has not been revealed interrelations between duration of breastfeeding and sizes of arterial pressure and also the maintenance of the general cholesterol in blood.

Influence breastfeeding on intellectual development of children and teenagers is proved. Breastfeeding increases factor of intellectual development (IQ) by 3,4 items in view of employment with children of the house [16]. In other researches in which intellectual development of mothers was considered influence breastfeeding on increase IQ of factor it was estimated in 2,6 items. Prospective researches according to intelligence among children in the age of 6,5 years born premature have revealed increase IQ of factor at 7 items among children received breast milk in comparison with children who were fed by formula [21, 24]. Positive influence of breastfeeding on progress of children at school has been shown in the researches lead to the Great Britain [25, 31], New

Zealand [12] and Brazil [38]. Research which was spent in Brazil during 30 years has allowed reveal positive influence of breastfeeding on intelligence, progress at school and the salary of the adult person, and influence of breastfeeding on size of the received salary contacted increase IQ of factor [39].

The opinion on possible preventive effect of breastfeeding concerning diabetes type 1 expresses [18]. Besides data are obtained that breastfeeding reduces on 19 % risk of development of children's leukemia [1].

#### **Breastfeeding and women's health**

Influence of breastfeeding on health of women was spent in view of following parameters: duration of lactation amenorrhea, change of weight of a body after sorts, presence of a cancer of a breast and ovaries, diabetes type 2 and development of a bony rarefaction (a mineralization of bones).

In 2015 the modern review according to influence of breastfeeding on health of mothers on its such parameters, as lactation amenorrhea, a cancer of breast and ovaries, diabetes type 2 and bony rarefaction has been published [7]. Besides there are also other publications concerning a role of lactation amenorrhea in preventive maintenance of a diabetes and postnatal depression for mothers, and also in restoration of weight after delivery. The majority of researches were spent in the countries with a high level of the income, except for researches on lactation amenorrhea.

The role of breastfeeding as natural method of contraception is proved. It is counted up, that in the countries where long breastfeeding prevails, for example, in Uganda and Burkina Faso it would be possible to expect 50% of additional birthes at absence of breastfeeding [3]. Increase in duration of breastfeeding especially exclusively and mainly breastfeeding connect with longer period lactation amenorrhea [7.] Random controllable researches according to the programs of intervention directed on increase of a level of breastfeeding confirm this effect [22].

Breastfeeding is preventive maintenance of breast cancer. The analysis of 47 researches lead in 30 countries in which it was observed more than 50000 women with breast cancer and about 97000 healthy women has allowed to assume that each 12 months of feeding by a breast reduce risk of development invasive cancer of a breast on 4,3%. [8]. Among the parous

women with identical number of births longer breastfeeding reduces risk of development of breast cancer on 7% [7].

The analysis of 41 researches on studying influence of breastfeeding on risk of development of ovarian cancer and a bony rarefaction at women has shown that long breastfeeding reduces risk of ovarian cancer on 30% [7]. Exception of the analysis of parous women and standardization of the received data on number of births have allowed to assume, that decrease in risk of ovarian cancer can make 18%. It has been revealed interrelations between breastfeeding and mineral density of a bone.

Breastfeeding can be preventive maintenance of a diabetes type 2 among nursing women [2]. However it has not been revealed influences of breastfeeding on decrease in weight of a body of women after delivery [26]. Nevertheless, there are the researches confirming remote influence of breastfeeding on preventive maintenance of obesity. Researches on supervision over 740000 British women for a long time revealed that on the average the index of weight of a body decreases on 1 % for each 6 months of feeding by a breast [4].

The authentic interrelation between breastfeeding and depression at mothers [10] is revealed. But remains not clear breastfeeding reduces depression or absence of depression increases probability of that mother will nurse.

Estimation of the saved lives among children and mothers

For forecasting number of the saved lives among children and mothers due to achievement of an optimum level of breastfeeding the special technique "Tools according to kept lives " was on a global scale used [40]. Calculation of potentially saved lives by 2015 in comparison with 2013 has been lead [30, 34]. For optimum parameters of breastfeeding the following have been accepted: exclusively breastfeeding among children younger 1 month - 95% and among children younger 6 months - 90% and also breastfeeding among children 6-23 months - 90%. Potentially possible number the prevented death owing to all infectious diseases among children till 2th years and also 15% of death among premature children who could be connected with complications after the first week of a life among this category of babies was considered. Among women potentially possible number of the prevented death owing to

a cancer of a breast was estimated.

Use of the special tool for an estimation of the saved lives has allowed to count up, that at optimum levels of breastfeeding by 2015 it would be possible to prevent annually 823000 or 13,8% of death among children is more younger than 2th years in 75 countries with the highest parameters of infant death rate [6]. From them of 87% would have on babies up to 6 months as at this age the highest death rates and great value for their preventive maintenance are marked has exclusively breastfeeding.

It has been counted up that the global level of breastfeeding existing now warns 19464 death from a cancer of a breast annually in comparison with the conditional script if women did not nurse [6, 8]. In regions with a low level of the income but with long breastfeeding (Africa and southern Asia) is annually prevented 58% of death from a cancer of a breast in comparison from 36% from the general population included in the analysis. Also it has been calculated that it would be possible to save in addition 22216 lives annually if duration of breastfeeding would be increased up to 12 months for each child in the rich countries and till 2th years in the countries with low and middle level of the income. It is possible to assume that the effect of the saved lives will differ in the different countries. For example, in the countries of Latin America, central and the East Europe, the Countries of Independent Commonwealth and also the rich countries the effect of the saved lives will be more significant as in these countries higher prevalence of a cancer of a breast and smaller duration of feeding are marked by a breast.

For achievement of full effect from breastfeeding it should proceed till 2th years. Results of ethnographic researches show that the general duration of feeding by a breast varies from 2 till 4th years in the most traditional communities that gives a material for modern international recommendations concerning its duration [9].

Breastfeeding, well-being and sustainable development of the community

Value of breastfeeding is not limited only to its influence on health of mother and the child but also mentions the important social and economic spheres of human life [42].

Absence of breastfeeding associates with lower intelligence and economic costs which annually make approximately

302 billion dollars or 0,49 % from the world total national income.

Breastfeeding and breast milk - ecologically pure activity, allowing to receive a product within all year and consequently should be considered as the important ecological problem of a national and global level. It is counted up that for manufacture of only 1 kg of a powder milk formula it is required more than 4 000 liters of water. In the USA for packing mixes 86 000 tons of metal and 364 000 tons of a paper which, eventually, appear on a dump are annually used 550 million cans.

Breastfeeding is not mentioned by obvious image in "Purposes of sustainable development" (United Nations), however available scientific data show that perfection of sphere of breastfeeding will promote achievement of the purposes in other spheres such as public health services, food safety, education, equality, development and preservation of the environment.

#### Conclusion

Breastfeeding is important for all mothers and children, it is not dependent on where they live and whether are poor or rich. It protects children from such diseases as a diarrhea, respiratory infections and acute otitis. In the countries where infectious diseases are a principal cause of death breastfeeding provides significant protection but even in the developed countries it reduces death rate from necrotizing enterocolitis and a syndrome of sudden death of babies. Breastfeeding increases the human capital due to increase of intelligence. Besides breastfeeding reduces probability of superfluous weight of a body and obesity, diabetes and children's leukemia and also reduces risk of development in mothers of breast and ovarian cancer and diabetes.

Value of breastfeeding is not limited only to its influence on health of mothers and children but also mentions the important social and economic spheres of human life being the important component for achievement of "Purposes of sustainable development" (United Nations) in the field of public health services, food safety, education, equality, development and preservation of the environment.

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