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INEQUALITIES AND DIFFERENCES OF HEALTH STATUS OF PRE-, PERI- AND POSTNATAL PERIOD
LONG-TERM SERIES ANALYSIS (1997-2019)

DOCTORAL (PH.D.) THESIS
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INTRODUCTION

It is a well-known fact that in the whole Central and Eastern European region - also in Hungary - the population indicators and demographic processes have developed unfavorably. In Hungary, the population number is closely related to the health status of the Hungarian population, which is true not only for the Hungarian population, but also for the population of the Central and Eastern European region. The health status of hungarian society is one of the worst in the European Union (EU), and this is especially true for men and vulnerable groups. The average life expectancy at birth in Hungarian women's in 2019 was 79.7 years, and 73.1 years for men. The increase was +4.9 years for men and +3.0 years for women compared to 2001. Although, the rate is still lower than in the EU (EU2019: 81.3 years vs. MO2019: 76.5 years). There are further differences within Hungary, for example: in terms of male-female, east-west, socio-economic groups, level of education. Considering the last 5 years, there is still no positive trend in the structure of deaths. In Hungary, more people died of diseases of the circulatory system and cancer. The most common causes of death in cancers were lung cancer, colon cancer, and breast cancer.

Another unfavorable situation is that, in addition to the subjective and objective adult health status, Hungary also tends to underperform in the health parameters of the early age (pre-, peri- and postnatal period). According to the latest available comparable data, the proportion of causes and indicators is higher than the average of the EU member states (*WHO; HFA-DB, 2021*). Infant mortality is less favorable, the proportion of infants born with low birth weight (<2500g) [MO2016: 8.5% vs. EU2016: 7.6%] and maternal mortality [MO2014: 7.0 vs EU2014: 5.0 persons / 100,000 live births] in Hungary. According to the parameters characterizing the early life period, of the 29 developed countries, infant mortality is the 5th highest in Hungary, and the low birth weight is the 2nd highest (*UNICEF, 2013*).

Health status is affected by a number of factors, for example: inherited, biological, lifestyle-related, and social and economic impacts *(ECHI, 2005; CSHD, 2007)*. Nowadays, in addition to genetic diseases, the placement of additional test factors is gaining a lot of weight. Examples are social processes and social background variables, which are largely in the health status of individuals. Early childhood health is determined by a pregnant lifestyle, such as: nutrition, harmful passions, smoking *(ÁDÁNY, 2012; FOGARASI-GRENCZER, 2012; BALÁZS, 2013; MORAVCSIK-KORNYICKI, 2013; RÁKÓCZI 2016)*. However, it is less well known that some of these factors are crucial for adult health and ability to work, not only cross-sectionally at the present time, but also from conception and time of intrauterine development, and thus also affects the health of the rising generation. High infant mortality exacerbates depopulation, the low birth weight affects early survival (*VIDA, 2007*). It is now a well-known fact and supported by evidence (BARKER, 1994) that low birth weight, developed by Barker [David James Purslove Barker is an epidemiologist and professor of medicine], is also an important risk factor for chronic adult diseases (*BARKER, 1998a*) such as hypertension and diabetes (*BARKER, 1998b; LEON, 2000*).

The results of studies published in recent years have shown that low birth weight and preterm birth are significantly affected by maternal social status in addition to maternal lifestyle factors. (*BLUMENSHINE, 2010; HAJDU, 2021*), for example: the mother's lower socio-economic situation, employment, income, education. According to a 2013 survey by the United Nations Children's Fund (UNICEF), the rate of Hungarian child deprivation among the 29 developed countries examined was

31.9% (ranking: 27th). This makes Hungary one of the five countries where the national proportion of deprived children exceeds 25%. According to the survey, the five dimensions of children's well-being (material well-being, health and safety, education, behavioral and risk factors, housing and the environment) are ranked in the national ranking and ranked 20th on average, which is also not high (score 18,4) (*UNICEF, 2013*).

Reducing risk factors that inhibit intrauterine development and ensuring optimal development for all fetuses is also an individual but also a social, health and social policy interest (*MORAVCSIK-KORNYICKI, 2014*). Given the impact of early childhood on the long-term health of the population, one of the national goals of the Public Health Program for a Healthy Nation (ENNP), established at the turn of the millennium, was to ensure the conditions for healthy development. The Semmelweis plan, published in 2011, also aimed to improve children's health care and reduce territorial inequalities. Again, knowledge of existing inequalities is a prerequisite for achieving this goal (*NEFMI, 2011*). The "Healthy Hungary 2014-2020" program, which aims to move Hungary's health in a positive direction, is also a central goal to be know of inequalities in health status, and the latest "Healthy Hungary 2021-2027" health sector strategy aims too. Perhaps one of their most important needs, which I also describe in this dissertation, is to promote the development of care competencies and capabilities at community level that meet needs, even as a starting point, taking into account territorial inequalities (*EMMI, 2021*).

Based on the known data, the European Union and the domestic social policy have launched several programs in recent years in order to catch up. Strategic drafts used current statistics, but were not always able to synchronize with data set indicators reflecting long-term health status. Due to the complexity of the causes, regional differences call for differentiated strategies. This is especially true for the parameters characterizing the health status of pregnant women and children, as indicators characterizing the early life stage have been shown to provide a picture of the health status of the population. Live births, infant mortality, preterm birth, low birth weight preterm infants and congenital developmental disorders are the most important for early childhood health, and health visitors are involved in the positive development of indicators. In Hungary, with the declining number of births, the rate of preterm birth does not show any improvement, so the care of pregnant women becomes even more valuable, ie the goal is to have as many fetuses as possible in birth in time and health.

In Hungary, there is a well-functioning, organized and supervised system for ensuring early childhood development, which is based on health visitors working in primary health care. Health visitors provide care primarily to pregnant women and 0-6 year olds, and anual report (on a monthly and annual basis) a number of data on early childhood status (including, for example, small birth weight, preterm births, special care pregnancies and infants). Periodic review and analysis of regularly collected data allows the mapping of regional inequalities and differences in pregnant women and young children of health status, which is a prerequisite and the precise definition of the interventions required.

Data from reports requested by health visitors have been available for more than two decades, but their systematic elements have not been used so far. The results of health visitors anual report data are not used well in the current healthcare sector (*GÁBOR, 2008*).

RESEARCH GOALS, RESEARCH QUESTIONS, HYPOTHESES

The overall goals of the research

The aim of the dissertation is to process the data collected in Hungarian primary care between 1997 and 2019. Examination of the description of changes over time in national data on pregnant women (prenatal) and neonates (perinatal) and infants (postnatal) from health visitor's annual reports collected and published annually. It aimed to map the extent of territorial inequalities and differences and to analyze and explain their relationship.

Research questions

1. Are there any regional / county differences in the examined parameters in Hungary, if so, to what extent?
2. Based on the long time series analyzes, is there a change in the territorial and geographical context of the examined indicators.
3. Is there a correlation between territorial inequalities in the health status of newborns and the adult population.
4. Is there a correlation between behavioral indicators determining the health of pregnant women and data on infants at birth.

Hypotheses of research

1. I hypothesize that despite the positive change in the ratios of national data reflecting the health status of pregnant women in the years under review (1997-2019), regional differences persisted despite significant developments in the field of pregnancy care over the past decade.

2. I assume that in counties with lower levels of education and higher unemployment rates, the number of pregnant women and infants cared for by a health visitor for environmental reasons was significantly higher than the average rates in other counties and the difference between counties increased during the analysis period.

3. I assume that the rate of preterm birth differs significantly in the counties of the country compared to the national ratios of the given year, especially in those counties where the general health indicator of the population (life expectancy at birth) can be said to be poor or very bad. The assumption is based on the fact that the development of preterm birth reflects the negative general health status indicators of the population in the current and later period (referring to the Barker theory).

4. I hypothesize that the number of pregnant smokers and the number of late pregnancies correlate with the number of preterm infants and the very low (below 3) and low body weight percentiles (between 3 and 10) measured at one year of age.

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RESEARCH METHODOLOGY

Source of data

According to the law, all nearly four thousand territorial health visitor working in Hungary are centrally defined (OTH, 2013), reporting a total of 134 data per year (EüM, 2009, ANTSZ-OTH, 2015) in the sectoral IT system, Of this, it represents 121 data per month (*EüM, 2004*). Between 1997 and 2005, the Central Statistical Office was responsible for the collection and publication of territorial health visitor data, and after their processing, the institution published them in health yearbooks on paper. From 2006 to 2011 it was collected by the National Center for Professional Supervision and Methodology (OSzMK), from 2012 by the Institute of Pharmaceutical and Health Quality and Organizational Development (GYEMSZI); data in printed form in health statistical yearbooks. Between 2006 and 2014, the data boards were published on the website of OSZMK, GYEMSZI (currently the Directors General of the National Hospital, the successor of OKFŐ) (*OKFŐ, 2021*). From 2015, the National Office of Chief Medical Officer (hereinafter: OTH) is currently responsible for the collection of data and the publication of raw data. Currently (from 2015) the contents of the health visitor's reports are published in electronic form on the website of the Child Primary Care Information Portal. The data come from health visitors' reports from nineteen counties and the capital (Budapest).

Methodology and duration of data collection

The research database was created from the tables of the area annual reports. The data tables refer to reports from health visitors in the years 1997-2019. The data tables of the annual reports for 1997 to 2005 were made available to me by the Central Statistics Office's Population and Social Protection Statistics Department for formal processing as an attachment to letter 4600-153 / 1/2011, in March 2011. Some of these data tables, the reports from 1997 to 2000, were already provided to me by the Department in Microsoft Office Word, while the data for the other five years were already provided to me by Microsoft Office in Excel format. In August 2010, data sheets for 2006, 2007 and 2008 became publicly available online in Microsoft Office Excel format. After downloading these tables, the concatenation of the data reported annually and the preparation of the data table required for time series data analysis began. The first round of workflow for the data table required for data analysis lasted from September 2010 to December 2010. During this time, not only the data table was merged, but several rounds of data inspection and maintenance took place.

In the spring of 2011, the previously finalized database was uploaded in the second step with additional years between April 2011 and August 2011. At that time, the database for analysis was supplemented by new years (from 1997 to 2012 inclusive).
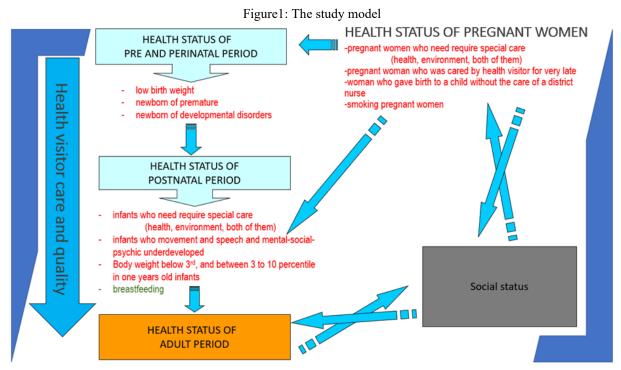
As a third step, the new available annual data tables (from 2013 to 2019 inclusive) were edited in the database between April 2020 and December 2020, and the database optimization tasks were also completed. The author of the dissertation performed all the tasks of creating the database - after requesting and / or downloading the data, concatenating the database, preparing, cleaning, creating a code dictionary, and performing several rounds. Prior to the analysis of the database, the analysis was performed after correcting the numerical errors found in the reports.

Data tables and database size

The size of the database and the associated workflow is best illustrated by the size of the data content in it. The data table provides numerical data for 134 types of content, all broken down by region and county. For the examined 23 years (1997-2019), it meant a total of 23 word and / or Excel documents, 11 data tables per year, concatenation, editing and control of only 253 data tables, and continuous maintenance. The concatenated and prepared data of the prepared research database currently provide data on 56776 data points, which includes all data reflecting the pregnant and child health status of health visitors in the last 23 years and illustrating the quantitative and qualitative work of nursing care, so it can be said to be complete for the groups concerned and for nursing care for the period 1997-2019.

The study model: the scope of the examined data, the analyzed indicators

In 2019, 131 indicators were reported by health visitors working in the field, but the number of indicators in previous years, between 1997 and 2019, exceeded one hundred. The data of the regional health visitors' annual reports can be divided into 4 major groups: pregnant women; children (newborn, infant, toddler, child); health visitors care; job as a health visitors (figure1).

Figure1: The study model

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

Data analysis, applied statistical methods

After fitting and checking the data usually published on 11 Microsoft Excel worksheets per year, the examined indicators were analyzed using Microsoft Office Excel 2017 and Data Analysis and Statistical Software 13.0 (STATA$_{13.0}$) software packages. With the help of the application of the programs, ratios, averages and ratios were calculated for the annual county and national descriptive analysis. The county data are presented in matrix format tables in order to present the time trend and to compare the deviation with the national average of the given year. The 23-year-old national and

county average ratios, indicating the deviation ranges (MT) calculated taking into account the standard deviation (SD), have been illustrated in the form of figures to aid understanding.

Using the STATA$_{13.0}$ software package, a two-sample t test was applied for each indicator to the selected ref. for the statistical proof of the differences between the national average of the year 1997 (mostly 1997) and the national average of the other years, where the difference was considered significant at $\alpha<0.05$. The 23-year county mean ratios and p-values were plotted in a matrix table for ease of understanding.

After selecting the explanatory and output variables used to analyze the correlation study, a univariate Poisson regression calculation was applied using the STATA$_{13.0}$ software package to examine the interaction of the different indicators. It also analyzed the direction in which the unit of the effect explanation increased, whether it induced a decrease or an increase in the output variable. Results were considered significant if p-values from a given statistical procedure were less than 0.05. In the tables showing the results, in addition to the output and explanatory variables, the regression coefficients (b), confidence intervals (MT), assay strength index (R2), and p-value (p), showing the significance level.

Limitations of the study and data analysis

In most countries, data reflecting the most important health status of pregnant women and infants are collected. Despite these, there are no uniformly used concepts, methods, and there is no Europe-wide data collection system, so the comparison of the data in the health visitors' reports at the European level is difficult from Hungarians researcher. In Hungary, this data has been recorded by health visitors since 1997 after the mother-infant couple returned home from the hospital.

The district nurses/health visitors fill in the monthly reports via a form stored on a password-protected web interface on the OSZIR / eFORM website. The form itself and its completion is understandable, but compiling and calculating the data to be entered is a bit time consuming and requires very accurate prior documentation.

The year 2004 can be considered an important milestone in the report of the Visitors, as the rules for data collection were tightened at that time. Unlike in the past, for example, from this year onwards, those who have also received tea or fruit replacements should no longer be considered exclusively breastfed babies. Another turning point was in 2009, when the annual reporting obligation of health visitors was 76/2004. (VIII. 19.) ESzCsM *(EüM, 2004)*, amended to the monthly data reporting obligation *(OTH, 2013)*. In the first few years after the introduction, the raw data for the annual reports were given as the aggregation of the aggregate monthly values and not as the calculation of the rolled-up values *(MORAVCSIK-KORNYICKI, 2014)*. Therefore, it was necessary to correct some research raw data in the created database before averaging and prevalence calculations of the calculated indicators.

Another problem is that health visitors rely on the communication of mothers for several reportable parameters, who often adapt to their perceived expectations, so when reporting data, they may not mention various factors influencing reporting (such as fluid supplementation in breast milk*) (TÖRÖK, 2012)*, which is a significant factor influencing the validity and thus the accuracy of the reported data. The annual' reports do not provide information on the individual social, economic, demographic or other health data of the areas / inhabitants concerned. Thus, they are not suitable for exploring the previously detailed causal relationships underlying the analyzed data (frequencies, proportions); however, they can be compared with regional statistics collected from other data sources.

Although there is no information on the reliability of the raw data in the health visitors report and the data presented and used in this dissertation, the provision of anual data is legally mandatory, the reporting system can be traced back more than twenty years, researchers have no reason to doubt the validity of the data.

RESULTS

The Hungarian Primary Care and Health Visitor Service and the visitors work performed by pregnant women and visitors have long been proud of the Hungarian Primary Care System. As there is no other network in Europe that pays professional attention from short after conception to 6 years of age, it accompanies the development of the child and helps to preserve and protect health.

I. Prenatal age -pregnant women- health indicators, longitudinal and regional differences

Results of regional differences in prenatal health status

The postnatal but even prenatal fetal life stage has a significant impact on the quality of health in early childhood, but several studies have shown that it also determines adult health status. One of the key tasks of the healt visitors system is to provide full care for this period through maternity care. The anual report provides a number of data that provide information on the health of pregnant women and the increased need for pregnant care in its territorial division. The research results of prenatal indicators revealed that Borsod-Abaúj-Zemplén county is the most critical area for prenatal health in Hungary today, taking into account the last 23 years. The data of the county were one of the most unfavorable counties in ten of the fourteen indicators examined, with some of the first three podium places performing. Thus, the research found that the most urgent interventions and developments on the topic are the most urgent here. Borsod-Abaúj-Zemplén county has the highest proportion of pregnant women requiring increased care compared to the national average, and the proportion of pregnant women cared for due to health and environmental reasons is also the highest. It ranks first in the county ranking in terms of the proportion of pregnant women who smoke. For the other four indicators, it is in the second most unfavorable place, in terms of the proportion of pregnant women cared for due to environmental reasons, the proportion of pregnant women in time care and the proportion of pregnant women in late care. In the case of three other indicators, the third most unfavorable is in the ranking: the number of pregnant mothers and mothers registered during the year, which makes it more difficult for the territorial district nurse/health visitor perform their work with the size of the number of caregivers. Furthermore, the proportion of mothers who did not receive care but gave birth requires an increase in the quality and quantity of care.

The second in the ranking is Szabolcs-Szatmár-Bereg county, where in the case of the 14 examined indicators the index of the county is among the most unfavorable in seven cases. Szabolcs-Szatmár-Bereg is at the top of the podium (in first place) in terms of the number of pregnant women cared for for environmental reasons and the number of pregnant women who were cared for very late (last trimester). Both of the indicators described above place health visitors working in the county in a very difficult position, as late placement determines not only the behavior of pregnant women but also subsequent caring responsibilities. It also occupies a prominent place in the study of the proportion of pregnant women who smoke, where the number of pregnant smokers is several times the national rate, which also determines - according to our research - the state of health at birth and the subsequent quality of life (table1).

Table1: Summary table of descriptive analysis of prenatal health

INDICATOR GROUPS		ANALYZED INDICATORS	RANKING OF COUNTY AREAS WITH THE HIGHEST / WORST INDICATOR
Prenatal period	indicators of the health status of pregnant women and mothers	pregnant mothers registered during the year	Budapest (capital) (17,73%) Pest c. (12,62%) Borsod-Abaúj-Zemplén c. (8,01%) Szabolcs-Szatmár-Bereg c. (6,30%)
		woman who gave birth to child	Budapest (capital) (17,66%) Pest c. (13,93%) Borsod-Abaúj-Zemplén c. (7,57%) Szabolcs-Szatmár-Bereg c. (6,29%)
		pregnant women who need require special care (40,20%)	Borsod-Abaúj- Zemplén c. (54,38%) Szabolcs-Szatmár Bereg c. (52,43%) Somogy c. (49,89%)
		increased care: pregnant women cared for due to a health condition (68,96%)	Budapest (capital) (81,77%) Győr-Moson-Sopron c. (81,53%) Vas c. (81,25%)
		increased care: pregnant women cared for due to an environment condition (18,96%)	Szabolcs-Szatmár- Bereg c. (29,06%) Borsod-Abaúj- Zemplén c. (26,08%) Nógrád c. (23,88%) Somogy c. (23,78%)
		increased care: pregnant women cared for due to a health and an environment condition (12,08%)	Borsod-Abaúj-Zemplén c. (15,38%) Szabolcs-Szatmár-Bereg c. (17,91%) Somogy c. (16,00%)
		smoking pregnant (14,28%)	Borsod-Abaúj- Zemplén c. (24,75%) Heves c. (21,15%) Nógrád c. (20,90%) Szabolcs-Szatmár-Bereg c. (20,62%)
	quality of pregnancy care	women who did not receive care but gave birth (0,54%)	Bács-Kiskun c. (0,81%) Nógrád c. (0,65%) Borsod-Abaúj-Zemplén c. (0,63%) Heves c. (0,61%) Veszprém c. (0,61%)
		pregnant women in care (up to 12 weeks of gestation) (82,83%) (reverse order)	Hajdú-Bihar c. (70,65%) Borsod-Abaúj-Zemplén c. (73,37%) Bács-Kiskun c. (75,51%)
		pregnant women who cared for late (between 13 and 28 weeks of gestation) (16,03%)	Hajdú-Bihar c. (28,09%) Borsod-Abaúj-Zemplén c. (24,91%) Bács-Kiskun c. (23,19%)
		pregnant women who cared for very late (after the 28th week of gestation) (1,14%)	Szabolcs-Szatmár-Bereg c. (1,58%) Borsod-Abaúj-Zemplén c. (1,72%) Heves c. (1,45%)
		pregnant women who showed up for counseling (3,93 occasion) (reverse order)	Budapest (capital) (2,54 occasion) Bács-Kiskun c. (2,87 occasion) Csongrád-Csanád c. (2,99 occasion)
		pregnancy visit by a health visitors (4,23 occasion) (reverse order)	Budapest (capital) (1,97 occasion) Győr-Moson-Sopron c. (3,13 occasion) Pest c. (3,14 occasion)
		visit by a health visitor (mother) after returning home from the hospital (4,95 occasion) (reverse order)	Pest c. (4,11 occasion) Budapest (capital) (4,20 occasion) Győr-Moson-Sopron c. (4,34 occasion)

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

Four counties also ranked third in the ranking of prenatal health indicators: Heves, Somogy, Bács-Kiskun and Nógrád counties are affected. In the ranking of the analyzed 14 indicators, only Bács-Kiskun county managed to be in the first place (indicators: the proportion of women who do not receive care but are parents, the proportion of pregnant women participating in district nurse counseling). Heves county is in the second most unfavorable place in the proportion of pregnant women who smoke, it appears among the first in the case of mothers born without care and also when examining the proportion of pregnant women who registered for care very late. Somogy county occupies a preliminary place in those requiring increased care and within it in the environment and in the increased order of care due to health and environmental (all) reasons. Bács-Kiskun county was disadvantaged in

the case of indicators that were taken into care late. Nógrád county came to the fore in terms of smoking pregnant women, those born without care and increased care for environmental reasons (table1).

Regarding the indicators of the capital (Budapest) and Pest county, we often see it in the first-second place. These indicators mostly complicate the work processes of health visitors due to the number of caregivers and the size of the area, and do not require increased attention due to the differences in health status that appear at the prenatal age. Typical indicators: registered pregnancies, proportion of born, maternity visits to health visitor, visits by health visitors. In the list of counties with the most unfavorable indicators, we can also read the names of Csongrád-Csanád, Győr-Moson-Sopron, Vas and Veszprém counties in the case of an indicator (table1).

Results of long term variations in prenatal health status

A decrease in the number of registered pregnant women was observed in the 23 years analyzed. The number and trend of mothers giving birth reflects the change in the number of pregnant women. In a given year, 62% of registered pregnant women give birth in the year of pregnancy registration, and 38% give birth in the following year. The proportion of pregnant women in special care shows a decreasing (but not significant) trend. While in 1997 more than 40% of pregnant women were in special care, in 2019 it fell to 37%. The proportion of pregnant women in need of special attention due to health reasons increased significantly (statistically provably) during the period under review, by more than 20% (1997: 59%; 2019: 82%). In contrast to the indicator described above, the proportion of pregnant women with increased care for environmental reasons decreased significantly, by more than 50% (1997: 26%, 2019: 9%). The third group of causal factors of increased care includes health and environmental causes at the same time, this indicator also showed a significant decreasing trend as the years analyzed progressed (1997: 13%, 2019: 8%). Fortunately, the proportion of pregnant smokers also reflects a declining trend in the years studied. While in 1997 the health visitor registered a rate of 17.50%, in 2019 the rate was only 13%. The proportion of women who did not receive primary care by health visitors was not significantly reduced. The indicator for each year of the period under review may have given rise to respiration, but unfortunately the declining trend was not lasting.

Starting maternity care is an important task of care, which does not depend only on the quality of the service provided, but rather on the complexity of the woman being cared for. The increase in the indicator may be reassuring, but there is still a 15-17 percent gap to the detriment of those registered on time. Even in the case of late care, some decrease can be observed in favor of the probable increased share of the previous indicator. While in 1997 nearly 20% of pregnant women were taken care of by health visitors late, in 2019 the figure remained below 14%. Very late admission to care is one of the most important indicators of the condition of pregnant women, as mothers wishing to give birth have already missed significant examinations. In 2019, 1% of pregnant women applied for nursing care very late (in the third trimester). Fortunately, the still low indicator shows a slight but declining trend.

A cared-for pregnant woman received nearly four counseling services provided by the health visitors. We can see a statistically significant increase in the indicator. While in 1997 a pregnant woman appeared in the health visitor counselor almost three times, in 2019 she has appeared more than four times. A védőnői látogatások számában As the number of consultations increases, the number of visits decreases. The value of the indicator has decreased by almost half from the year 1997 (5.31), which is the reference year (2019: 2.66). There was no significant change in the number of cot visits per mother with child in the years studied. The data is available from 2005, when there were 4.80 visits to a mother with a child, while in 2019 the indicator was 4.88.

II. Perinatal age - neonates - health indicators, longitudinal and regional differences

Results of regional differences in perinatal health status

The health status around birth can be traced on the one hand to the presence or negative tendency of the health status of the previously presented pregnant mother, and on the other hand to an important indicator of the intrauterine life cycle. Examining the neonatal health parameters of perinatal age, we can say that there is no clear unfavorable trend. It is highlighted that Szabolcs-Szatmár-Bereg county is also in an unfavorable position in the list of two indicators (table2).

Of the infants born during the year, the data of Szabolcs-Szatmár-Bereg county is in the second place in the category of premature infants, and the third in the proportion of newborn visits. The parameters of Somogy county also have the same tendency as the data of Szabolcs-Szatmár-Bereg county. Here, the proportion of premature infants (in Somogy county) is the highest for research 23 years. It ranks third in the proportion of newborns with developmental abnormalities.

Table2: Summary table of descriptive analysis of perinatal health

INDICATOR GROUPS		ANALYZED INDICATORS	RANKING OF COUNTY AREAS WITH THE HIGHEST / WORST INDICATOR
Perinatal period	indicators of newborn	infants born during the year are premature (7,78%)	Somogy c. (9,75%) Szabolcs- Szatmár-Bereg c. (9,11%) Heves c. (9,02%)
		infants born during the year were intrauterine retarded (2,26%)	Borsod-Abaúj-Zemplén c. (4,25%) Heves c. (3,32%) Nógrád c. (3,26%)
		infants born during the year were born with a developmental disorder (2,12%)	Vas c. (3,29%) Bács-Kiskun c. (3,17%) Somogy c. (2,93%)
	Quality of newborn care	a visit to the newborn from the health visitor (6,49 occasion) (reverse order)	Zala c. (5,32 occasion) Tolna c. (5,13 occasion) Szabolcs-Szatmár-Bereg c. (5,65 occasion)

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

An outstanding result is that Heves county, in the proportion of premature babies and in the proportion of intrauterine retarded babies is at an unfavorable position. Other counties from the mentioned ranking: Borsod-Abaúj-Zemplén county (first place in terms of the number of intrauterine retarded people), Nógrád county (3rd place), Vas county had the highest number of infant with developmental disorders followed by Bács-Kiskun county in the second place. Zala and Tolna counties were scrutinized due to the unfavorable number of newborn visits (tabe2).

Results of long term variations in perinatal health status

There is no significant change in the time course of newborns diagnosed with preterm birth, despite the fact that the proportion of newborns has decreased significantly over the past 10 years. However, the rate of preterm birth did not change (1997: 7.37%; 2019: 7.86%), based on raw indicators reported by health visitors. The proportion of newborns suffering from intrauterine retardation (intrauterine malnutrition) did not change, and even increased slightly in some of the 23 years studied, and then decreased again from 2015 onwards. Currently, its value, according to 2019 data, was 2.29% nationwide. There is also no change in the number of babies born with a developmental disorder. It was 2.29% in 2019, with a slight fluctuation typical of a „sawtooth". After returning home, a significant task of caring for a healt visitor is to visit the newborn's home regularly, an indicator that has increased in recent years. It was highest in the last four years analyzed, where it exceeded 7 occasions / newborn.

III. Postnatal age - 0-11 months, first year infants - health indicators, longitudinal and regional differences

Results of regional differences in postnatal health status

Examining the county-disaggregated data of the parameters reflecting postnatal health, we have to re-establish that two counties are mostly involved in the aggregation of the most unfavorable county categories: Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg counties. Borsod-Abaúj-Zemplén county is involved in half of the 16 parameters examined, ie in eight (table3).

Table3: Summary table of descriptive analysis of postnatal health

INDICATOR GROUPS	ANALYZED INDICATORS	RANKING OF COUNTY AREAS WITH THE HIGHEST / WORST INDICATOR
indicators of infants (Postnatal period)	infants who need require special care (0-11 months) (19,80%)	Borsod-Abaúj-Zemplén c. (36,24%) Szabolcs-Szatmár-Bereg c. (30,23%) Somogy c. (28,37%)
	increased care: infants cared for due to a health condition (49,95%)	Budapest (capital) (71,54%) Győr-Moson-Sopron c. (64,99%) Vas c. (63,54%)
	increased care: infants cared for due to an environment condition (38,26%)	Szabolcs-Szatmár-Bereg c. (55,14%) Heves c. (48,20%) Borsod-Abaúj-Zemplén c. (47,87%)
	increased care: infants cared for due to a health and an environment condition (11,80%)	Borsod-Abaúj-Zemplén c. (18,32%) Somogy c. (15,58%) Szabolcs-Szatmár-Bereg c. (14,65%) Nógrád c. (14,26%)
	1 year of age infants who screened (98,84%) *(reverse order)*	Hajdú-Bihar c. (97,47%) Békés c. (97,92%) Pest c. (97,98%)
	infants who movement undeveloped (2,36%)	Somogy c. (3,08%) Baranya c. (3,01%) Békés c.(2,98%)
	infants who speech underdeveloped (0,74%)	Borsod-Abaúj- Zemplén c. (1,30%) Somogy c. (1,00%) Heves c. (0,91%) Szabolcs-Szatmár-Bereg c. (0,89%)
	infants who mental-social-psychic underdeveloped (1,20%)	Borsod-Abaúj- Zemplén c. (3,32%) Heves c. (1,68%) Szabolcs-Szatmár-Bereg c. (1,67%) Somogy c. (1,67%)
	Body weight below 3rd percentile in one years old (2,63%)	Borsod-Abaúj- Zemplén c. (4,44%) Nógrád c. (3,18%) Hajdú-Bihar c. (3,14%)
	Body weight below between 3 to 10 percentile in one years old (5,27%)	Borsod-Abaúj-Zemplén c. (8,37%) Szabolcs-Szatmár-Bereg c. (7,11%) Fejér c. (6,43%) Somogy (6,00%)
Indicators for infant breastfeeding	0 to 4 months age of infants of exclusively breastfed (54,64%) *(reverse order)*	Heves c. (48,23%) Békés c. (49,19%) Szabolcs-Szatmár-Bereg c. (49,78%)
	0 to 6 months age of infants of exclusively breastfed (34,20%) *(reverse order)*	Heves c. (25,14%) Jász-Nagykun-Szolnok c. (28,15%) Borsod-Abaúj-Zemplén c. (28,20%)
	At the age of 12 months, still breastfed (38,43%) *(reverse order)*	Jász-Nagykun-Szolnok c.(32,30%) Békés c. (33,10%) Szabolcs-Szatmár-Bereg c. (33,80%)
Quality of infants care	infants who showed up for counseling *(reverse order)*	Budapest (capital) (2,03 occassion) Zala c. (3,26 occasion) Pest c. (3,56 occasion)
	infants visit by a health visitors *(reverse order)*	Pest c. (12,86 occasion) Budapest (capital) (13,12 occasion) Komárom-Esztergom c. (14,86 occasion) Győr-Moson-Sopron c. (14,92 occasion) Hajdú-Bihar c. (14,96 occasion)
	vacant health visitors positions *(reverse order)*	Nógrád c. (20,17%) Jász-Nagykun-Szolnok c. (14,38 %) Hajdú-Bihar c. (12,46%) Heves c. (11,22%) Békés c. (10,6%) Borsod-Abaúj- Zemplén (10,04%)

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

The county provided the most unfavorable figures for the following indicators: highly cared for infants aged 0-11 months, of the infants in need of enhanced care were cared for for environmental reasons, and babies cared for for health and environmental reasons (both reasons), they lagged behind in speech development, and behind in socio development, low body weight (less than 3; body mass index 3-10). An outstanding result is that in the case of the last four listed indicators, Borsod-Abaúj-Zemplén county took the first place in the county ranking. Furthermore, the situation is more unfavorable in terms of the ratio of infants up to 6 months of age exclusively breastfed (table3).

Szabolcs-Szatmár-Bereg county is also involved in 8 research indicaters due to the disadvantaged position of the county. It is worth reviewing the county data for the following indicators: increased care for babies, requiring special attention for environmental reasons, requiring increased care for health and environmental reasons, in terms of speech development and mental-social development, those with a low body weight percentile (between 3 and 10 body mass index), from birth to four months of age were exclusively breastfed, and in infants who are still breastfed at 12 months of age (table3).

Somogy (in case of 5 indicators), Heves (in case of 6 indicators), Hajdú-Bihar (in case of 3 indicators) and Békés (in case of 4 indicators) are in a more unfavorable situation. In the list of counties with the most unfavorable indicators, we also see the names of Győr-Moson-Sopron, Vas, Pest, Baranya, Nógrád, Fejér and Zala counties (table3).

Results of long term variations in postnatal health status

A significant decrease in the proportion of infants aged 0-11 months requiring increased care can be observed in the perspective of the analyzed 23 years. In 1997, 20.88% of infants were more cared for, compared to only 13% in 2019. The decline has occurred in the last three years (from 2017). The proportion of infants receiving increased care for health reasons increased significantly (1997: 43.31% vs. 2019: 66.92%). Changes in the data of infants requiring special attention for environmental reasons show different biased data. The value of the indicator has undergone a report decline over the past 23 years, while in 1997 it fell by 41.65%, to 2019: 25.81%, by almost half.

The proportion of infants who lagged behind in motor development was low, but doubling in the 23 years analyzed (1997: 1.27% vs 2019: 4.50%). The proportion of infants who are lagging behind in speech development has not changed significantly, however, the number of indicators has increased slightly but in recent years. You can see the same change for those with a very low (<3 percentile) test weight value, as well as for those with 3 and 10 percent values. Unfortunately, we can also see a difference between 1997 and 2019 in the number of those who were exclusively breastfed until the age of four months, the value of the indicator (1997) decreased from 50.18% to 47.39%. The proportion of infants still breastfed at six months of age has increased slightly over the past 23 years, by about + 10%. The proportion of infants still receiving breast milk at the age of 12 months took the form of a „sawtooth", as it was exceptionally high in some years and low in others. In 1997, infants were breastfed by 38.70% even at the age of one, while in 2019 the same indicator was 35.63%. There has been a significant increase in the number and thus the proportion of babies who have appeared at infant counseling. It shows an increasing trend over the years under review. While in 1997 the infant counseling rate was 1.97, in 2019 it was already 7.40. In contrast, the rate of infant visits fell from 17.43 to 13.90 (occasion).

The number of vacant health visitor positions shows a significant mosaic picture. Between 2014 and 2019, the vacancy rate did not reach 10%, but did not fall below 8%.

IV. Correlation analysis in the light of maternal and infant health indicators and health visitor positions

Correlation analysis results between the condition of pregnant women (explanatory) and preterm infants, intrauterine malnutrition and infants born with a developmental disorder (output)

In the analysis of correlations, we examined whether a unit increase of an explanatory variable causes a change (increase or decrease) in the estimated value of the output (result) variable, while the values of all other explanatory variables remain unchanged.

There is a correlation between the number of pregnant women who were cared for very late (after 28 weeks of gestation) and preterm infants ($R^2 = 0.7313$; $p < 0.001$), intrauterine retarders ($R^2 = 0.3306$; $p < 0.001$) and those with birth defects. ($R^2 = 0.492$; $p < 0.001$) among the number of infants. If the number of pregnant women who are cared for late is increased by 10,000, the number of premature babies is increased by 25.4, the number of malnourished within the womb is increased by 55.4, and the number of births with developmental disorders is increased by 104. The number of births without caregiver care as an explanatory variable yielded similar results when examining the outcome variables. Increasing the explanatory variable by 10,000 results in a positive increase in preterm infants ($R^2 = 0.5519$; $p < 0.001$, 22.6), and intrauterine malnutrition ($R^2 = 0.2632$; $p < 0.001$, 62.8), and the number of births with developmental disorders ($R^2 = 0.4091$; $p < 0.001$, 109.4 persons). Both the number of late-in and out-of-care births increase the number of babies born with a developmental disorder to the greatest extent. The number of vacant health visitor positions shows a positive correlation ($p < 0.001$) with the number of preterm infants, intrauterine retarded ($p < 0.001$) and infants born with developmental disorders (table4).

Table4: Correlation analysis results between the condition of pregnant women (explanatory) and preterm infants, intrauterine malnutrition and infants born with a developmental disorder (output)

EXPLANATORY/OUTPUT VARIABLES	premature baby (person)			R2	intrauterine retardation (person)			R2	developmental disorder (person)			R2
	Coef (b)	p	95% [MT]		Coef (b)	p	95% MT		Coef (b)	p	95% MT	
Pregnant (person) in very late care (> 28 weeks)	0,00254	<0001	[0,0025051-0,002583]	0,7313	0,00554	<0001	[0,0054191-0,0056556]	0,3306	0,01040	<0001	[0,0102004-0,0105997]	0,492
Increased care pregnant (person)	0,00175	<0001	[0,0017474-0,0017595]	0,7428	0,00480	<0001	[0,0047857-0,0048224]	0,5516	0,00705	<0001	[0,0070203-0,0070811]	0,5053
Smoking pregnant (person)	0,00183	<0001	[0,0018196-0,0018395]	0,5404	0,00582	<0001	[0,0057963-0,0058523]	0,6018	0,00749	<0001	[0,0074387-0,0075389]	0,3803
Maternity woman without care (person)	0,00226	<0001	[0,0021907-0,0023323]	0,5519	0,00628	<0001	[0,0059965-0,0065653]	0,2632	0,01094	<0001	[0,0105278-0,0113546]	0,4091
Vacant health visitor position	0,00151	<0001	[0,0014444-0,0015836]	0,1078	0,00415	<0001	[0,0039403-0,004356]	0,0828	0,00461	<0001	[0,0042699-0,0019554]	0,0438

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

Correlation analysis results between the condition of pregnant women (explanatory) and the low nutritional status at one year of age (below 3 and between 3 and 10) (output)

The research results available in the various literature clearly state that pregnant smoking fundamentally determines the body weight of a newborn child. However, our correlation analyzes also showed that there is a significant association not only with the perinatal (birth) weight, but also with the low body weight percentile measured at the age of later in life. Both the number of pregnant women, those in late care, the number of births without care and the number of people receiving

increased care are related to the number of one-year-olds significantly underdeveloped (below 3 and between 3 and 10 percentiles), with p-values in all cases p <0.001. The value of the regression coefficient (b) shows that if the number of pregnant women who smoke during pregnancy increased by 10,000, it would increase the number of babies whose weight percentile is one by 47.6 (R^2 = 0.5013). under the age of 3, the number of infants with a percentile between 3 and 10 at the same age would increase by an additional 16.8 (R^2 = 0.4221). A similar method and magnitude of similarity is observed in pregnant women cared for very late (after the 28th week of pregnancy), pregnant women receiving increased care, and women born without care (table5).

Table5: Correlation analysis results between the condition of pregnant women (explanatory) and the low nutritional status at one year of age (below 3 and between 3 and 10) (output)

EXPLANATORY/OUTPUT VARIABLES	Body weight below 3 percentile (persons)			R2	Body weight between 3 and 10 percentile (persons)			R2
	Coef (b)	p	95% [MT]		Coef (b)	p	95% MT	
Pregnant (person) in very late care (> 28 weeks)	0,00539	<0001	[0,0052848-0,0054919]	0,4285	0,00181	<0001	[0,0017773-0,0018487]	0,336
Increased care pregnant (person)	0,00444	<0001	[0,0044232-0,0044553]	0,6391	0,00154	<0001	[0,0015318-0,0015434]	0,4984
Smoking pregnant (person)	0,00476	<0001	[0,0047369-0,0047891]	0,5013	0,00168	<0001	[0,0016667-0,001685]	0,4221
Maternity woman without care (person)	0,00477	<0001	[0,0045638-0,0049753]	0,2800	0,00345	<0001	[0,003325-0,0035698]	0,4292
Vacant health visitor position	0,00656	<0001	[0,0063093-0,0068046]	0,1489	0,00126	<0001	[0,0011952-0,0013314]	0,064

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

Correlation analysis results between the condition of pregnant women (explanatory) developmental delay at one year of age (movement, speech, social) (output)

An important indicator of infants 'health status is the result of a one-year-old healt visotor status survey. According to the Barker hypothesis, stagnation of intrauterine development can determine not only the perinatal but also the later infancy. Thus, it is worth examining the relationship that seeks to prove that maternal (pregnancy) status indicators affect the changes observed in infancy, developmental delay (movement, speech, social). In the case of the indicators of pregnant women, there is a correlation between movement and speech development and mental-social development (p <0.001 for all explanators). Very late in care (R^2 = 3123; 31 children), increased care for pregnant women (R^2 = 3616; 23.3 people), women born without nursing care (R^2 = 0.2840; 29.5 people), but even the number of pregnant smokers (R^2 = 18.64; 21.1 children) moves in a positive direction after a unit increase in the number of infants with developmental disabilities observed at one year of age. The number of pregnant women smoking, together with the effect of other explanatory variables, significantly influences the number of infants with speech development (169.8 persons; 142.9 persons; 147.5 children; 157.6 children increase, in each case p value: <0.001). The presence of increased care has the greatest impact on the lack of speech impaired (10,000 children with elevation, 142.9 children; R^2 = 0.6070). Pregnant smokers also significantly increase the number of children who are speech impaired (147.5 children; R^2 = 50.53).

The vacancies for health visitor and the results of the one-year status check are related if we increase the number of vacancies by one, the lack of movement development by 0.00284 children; speech

development increased by 0.01404 people; the lag in social development is increased by 0.00516 children, the total dependence is significant (p <0.001) (table6).

Table6: Correlation analysis results between the condition of pregnant women (explanatory) developmental delay at one year of age (movement, speech, social) (output)

EXPLANATORY/OUTPUT VARIABLES	movement undeveloped (person)			R2	speech underdeveloped (person)			R2	mental-social-psychic underdeveloped (persons)			R2
	Coef (b)	p	95% [MT]		Coef (b)	p	95% MT		Coef (b)	p	95% MT	
Pregnant (person) in very late care (> 28 weeks)	0,00310	<0001	[0,0030341-0,0031704]	0,3123	0,01698	<0001	[0,0166291-0,0173326]	0,3812	0,00515	<0001	[0,0050066-0,0052875]	0,2048
Increased care pregnant (person)	0,00233	<0001	[0,0023193-0,0023415]	0,3616	0,01429	<0001	[0,0142392-0,0143468]	0,6070	0,00495	<0001	[0,004935-0,0049767]	0,4478
Smoking pregnant (person)	0,00211	<0001	[0,0020903-0,0021284]	0,1864	0,01475	<0001	[0,0156611-0,0158351]	0,5053	0,00587	<0001	[0,0058345-0,0058988]	0,4611
Maternity woman without care (person)	0,00295	<0001	[0,0028291-0,0030779]	0,2840	0,01576	<0001	[0,015096-0,0164174]	0,3072	0,00427	<0001	[0,003917-0,004555]	0,1125
Vacant health visitor position	0,00284	<0001	[0,0027195-0,0029514]	0,1172	0,01404	<0001	[0,013452-0,0145203]	0,1250	0,00516	<0001	[0,0049469-0,0053807]	0,1119

Source: Á. Moravcsik-Kornyicki 2021. (self edit)

DISCUSSION OF KEY FINDINGS- SUGGESTIONS

Over the last few decades, the health status of the population in European countries has improved significantly and the number of premature deaths has decreased significantly. Living and working conditions and more health-conscious thinking have certainly contributed to the increase in life expectancy, but the development of health care is probably the biggest factor.

The novelty of the research is mainly due to the fact that the long time series analysis made of the health visitor' reports - from such a broad approach, taking into account objective factors - has not been carried out so far. The huge and potentially very valuable data set generated annually and monthly in nursing care is growing without professional utilization (although the need for monthly data collection was supported by the management in 2009 to allow rapid identification of areas in need of intervention, up to a year within). The creation of the data set and database creates an opportunity for researchers and practitioners to review the county data from different perspectives, but with local expertise.

According to the legal regulations, the health visitor report the results of their work regularly and in a regulated manner, but it is unfortunate that the time spent by nearly 4,000 regional health visitor on monthly reporting (since 2009) does not seem to pay off, as the processing of data and its feedback has so far failed.

The raw data, systematically reported since 1997, after processing will become valuable indicators for both professional and practical implementers, but even for policy makers, as the health of pregnant women and infants in Hungary and the mapping of spatial and temporal differences before planning a national strategy indispensable. Nothing supports this statement better than the results presented in this dissertation read in chapter.

A detailed long time series analysis of the data has drawn attention to the fact that sometimes statutory reports may contain numerical errors, the detection and correction of which remain hidden for many years in the absence of a detailed analysis. Attempting to identify and correct numerical errors in data

management and integration into the database is of practical importance for data sorting. This also helps to develop a transparent, long-term, easy-to-implement analytical strategy.

In addition, after correcting and correcting the data, it would be necessary to review the data content reported in the same form and methodology since 1997. After all, the content of the annual reports of district nurse does not follow the provisions of the regulations and legislation. In my empirical work, I also found that the reports of the health visitor and the legal environment contain a fitting gap, which would be worth reviewing and changing the reporting data and the scope of the data provided accordingly. It would be necessary to override the less informative and inadequate parameters of annual reports. Such collected data, which were not significantly informative in the context of the current analysis, are therefore not justified to be collected on a monthly basis.
Mentioned in the non-exhaustive list include:
- number of visits to women care/ protection (once a year is justified)
- number of consulting to women care/ protection (once a year is justified)
- amount of breast milk collected: breast milk collector (once a year is justified)
- amount of breast milk collected: Door to Door (once a year is justified)

The incorporation of additional raw indicators that are significant from a practical point of view is essential for further correct analysis work. Such parameters could be data generated in the practice of territorial health visitor, which are not currently reflected in the reports, such as: inclusion of sociocultural, socioeconomic, sociodemographic data, education, economic activity, childbearing (background information).

Other novel findings of the study are that they have highlighted areas not only geographically but also professionally where interventions are most pressing, as these are areas that differentiate at the regional and county levels. With regard to the analyzed indicators, the research result draws attention to the data of the already disadvantaged counties, which increase the additional disadvantages, where it is usually known that the problems are preserved and reproduced without conducting an intervention strategy.

As a result of the time series analysis of the indicators reflecting the health status of pregnant women, it can be stated that the number of registered pregnant women is rapidly decreasing from year to year. This result can be explained on the one hand by the fact that fertility is currently moderately high in Hungary in Europe and on the other hand by the fact that women of childbearing age are having their first child later, only in their thirties or beyond. In addition to the extended maternal age, which influences the proportion of babies born with low birth weight and determines the direction of future pregnancy care, it is a significant and factual data that the proportion of women born under the age of 20 per year : 6.61%), which places an additional burden on specialist care in addition to primary care, and urges the development and launch of targeted interventions.

There is a slight but fortunately improving trend in the proportion of pregnant smokers and pregnant women who came to health visitor care very late, only after the 28th week of pregnancy, but with this national improvement, there is growing county territorial inequality, typically in counties where indicators reflecting socio-economic status are also the lowest. The joint study of socio-economic factors and smoking is of paramount importance, as it is a known fact that low status and education result in behavior that is harmful to health, such as smoking. Studies to explore the characteristics of pregnant smokers have shown a clear impact and extent of demographic and socio-economic

determinants (*Balázs, 2013*). Fónai and Pénzes (2006) examined the health status of the Roma in north-eastern Hungary and found that women (2/3) compared to men (1/3) are in the majority of smokers in the study population. The opposite has been observed with alcohol consumption (*FÓNAI, 2006*).

It was found that there is a discrepancy in the county-level data for all examined parameters, which mainly concern Borsod-Abaúj Zemplén and Szabolcs-Szatmár-Bereg counties. The extent of the differences varied in a wide range compared to the national base number of the indicator, depending on the examined indicators, from insignificant differences to very large lags. There are certain indicators where further increases in the variation between counties can be observed in the recent period. It mainly affected those counties that lagged behind and lagged behind the national data in terms of other socio-economic indicators (eg Borsod-Abaúj-Zemplén, Heves, Nógrád, Szabocs-Szatmár-Bereg, Békés, Bács-Kiskun, Somogy).

The most significant and unfavorable change occurred in the structure of increased care causal factors in cared for pregnant women and infants aged 0–11 months. While the increased care rate for health reasons increased significantly in both groups of carers from 1997 to 2019, the care rate for environmental reasons decreased, in contrast, but to a similar extent in the 23 years studied. There was another significant change in the number of visits to the counseling center for both groups of carers mentioned above, which increased significantly, while the number of home visits by the district nurse decreased in direct proportion. It should be emphasized that the number of infants with reduced mobility developed on the basis of the one-year status examination also increases significantly in the examined period.

There is a correlation between the number of pregnant women who were cared for very late (after 28 weeks of gesture) and preterm infants ($R^2 = 0.7313$; $p < 0.001$), intrauterine retarders ($R^2 = 0.3306$; $p < 0.001$) and those with birth defects. ($R^2 = 0.492$; $p < 0.001$) among the number of infants. The number of births without caregiver care as an explanatory variable yielded similar results when examining the outcome variables. The number of both late-on-care and non-care births increases the number of infants born with developmental disorders to the greatest extent.

With regard to the development of health visitor positions, the transfer of knowledge, early detection, signaling and, where necessary, increased care cannot be realized. This can have adverse, irreversible effects on children's health in the long run. This danger is particularly pronounced in the case of multiple disadvantaged settlements, as it is the most difficult to find a health visitor to fill the "difficult areas". The following factors also hinder the use of territorial nursing care: the provision of several settlements; permanent replacement; mixed district (district, kindergarten, school); high / low-level health visitors positions.

The long-term goal is to reduce the unfair inequalities in access to care due to vacant positions as soon as possible by effectively eliminating vacant district nurse positions, ensuring permanent care locally in the affected settlements. Particular attention should be paid to large, disadvantaged areas and to improving care, both in terms of funding and human resources.

In order to address equal access to health visitor care, it is essential to improve conditions (personal, training, further training, transport, etc.), which will require a rethinking and changing the relevant legislation and the provision of additional resources. Making the care of district nurses in multiple disadvantaged settlements more attractive, retaining health visitor with measures as soon as possible will improve the health of the next generation and thus the quality of human resources in society. With

the introduction of the scholarship program announced in the districts that have been announced for years, the desire of recent graduates to find employment could be motivated.

The development of the health visitor service is a priority. A number of innovations are warranted that would make this unique profession viable. It would be very important, above all, to perform the current tasks at a higher level. The use of modern methods - computer and internet access - as paper-based accounting is carried out in several nursing districts, especially in disadvantaged counties, so the administrative burden increases, which greatly affects the effectiveness of nursing care.

Depending on the indicators, it would be important to educate the parents of pregnant women and infants as soon as possible, taking into account the differences experienced, it is necessary to start work as soon as possible, where indicated by the indicators.

It would also be necessary to build a feedback system for reportable health visitors, motivate them on the importance of the report and thus increase the validity of the data.

The aim of this dissertation is to point out several research needs, for which, in addition to the infrastructure and a unified methodology, a well-developed data collection strategy is essential, as well as the transfer of a huge amount of data on children's health to a unified, central database.

SUMMARY OF NOVEL FINDINGS

1. 1. We was create a database as a basis for analysis. Use of raw data of health visitors' annual reports reported between 1997 and 2019 and their integration into a database, harmonization and harmonization.

2. There is a correlation between the number of pregnant women cared for very late (after 28 weeks of gestation) and preterm infants ($R^2 = 0.7313$; $p < 0.001$), intrauterine retarded ($R^2 = 0.3306$; $p < 0.001$) and developmental disorder ($R^2 = 0.492$; $p < 0.001$) among infants. The number of births without caregiver care as an explanatory variable yielded similar results when examining the outcome variables. Both the number of late entry into care and the number of births without care increase the number of babies born with developmental disorders to the greatest extent. In the light of the results, the importance, need and development of pregnant care will be appreciated.

3. There is a slight but fortunately improving trend in the proportion of smoking the pregnant women, and pregnant women who applied for health visitor care very late, only after the 28th week of pregnancy, but with this national improvement, there is a growing county territorial inequality.

4. Based on the time series analysis, when processing the indicators characterizing the health status of pre (pregnant), peri (newborn) and postnatal (infants), it was established that the interventions are the most burning in Hungary in Borsod-Abaúj-Zemplén and Szabolcs-Szatmár-Bereg counties. Plan and start the strategy as soon as possible to protect the health of the next generation.

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Articles related to the thesis (first author)

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