**UNIVERSITY DOCTORAL THESIS (PhD)**

# THE RELATIONSHIP BETWEEN COMPETITIVENESS AND HEALTH CULTURE IN A REGIONAL APPROACH


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## 1. OBJECTIVES AND ANTECEDENTS OF THE DOCTORAL THESIS

The *objective of development, economic growth and accordingly competitiveness* of a region in a country is to improve the „well-being", standard and quality of life for inhabitants. The central category of regional competitiveness in the pyramid model of regional competitiveness by Lengyel (2003) is produced income (economic output) which measures the economic growth of a region. Although GDP is suitable for measuring incomes deriving from production, but it does not indicate what remains from this income and how much is spent on the well-being of inhabitants in the region. Naturally, both labour productivity and employment directly affects the quality of life of the population (*Lengyel,* 2003). Quality of life is a multidimensional concept which includes physical, mental and social components of health status. *Quality of life* connected to health *is a complex concept* of those physical and psychological characteristics that determine how able an individual considers oneself to be and finds joy in their activities or in leading their life (*Bácsy et al.,* 2004).

The *health condition of the population* is *highly unfavourable* considering the economic development in Hungary, taking international data into account, with a low level of health consciousness. Many are left out of the labour market due to bad health. Hungary ranks first in many illnesses and causes of mortality in international statistics. This is due to a number of reasons but all of these factors are related to the lifestyle of the population (*Net1*). The most important risk factors are connected to lifestyle. It was also revealed that numerous risk factors are deeply rooted in society. Lifestyle also reflects the personality of the individual, the peculiarities of the given community and social position in the social structure. It is closely connected to the characteristics of the individual, one's perception of life and value system of society (*Pikó,* 2004). *Kopp and associates* (1999) found, based on survey data, that worse social condition is accompanied by higher rates of illnesses. A worse social-economic condition however, does not result in higher rate of illnesses by itself but rather through complex symptoms of depression. Thus, subjective view on experiencing lagging behind is one of the most important health threatening factors (Kopp and associates, 1999).

The *health condition* and mortality *of the population* are determined by lifestyle, economic, social and behavioural factors and conditions of the physical environment in a close and broad sense, as well as the quality and accessibility of health services. Social-economic inequalities in the health condition of the population also result significant inequalities in the Hungarian regions (*Tokár et al.,* 2005).

My work is primarily focused on quality management, preparation and implementation of projects funded by the European Union. Consequently, I regularly carry out surveys and satisfaction assessments, both in the field of education and patient care, as well as regarding the results of development achieved through the use of project funds. Over the years, when examining the patient satisfaction data, I found that 40-45% of patients treated at the University of Debrecen, Medical School and Health Science Centre (UD-MSHSC) come from Debrecen, while the rest primarily come from other cities and settlements of the region. I examined the total, annual, regional distribution of patients treated at the UD-MSHSC according to age during the assessments (patient turnover, efficiency, sustainability) for various projects. The obtained results were only justified by regional treatment obligations and explanations arising from illness rates relating to age to a certain extent. Different ratio of the population sought help at the UD-MSHSC as an institution of inpatient care according to age, gender and residence.

The aim of my research was to examine whether residence, age and unemployment influences the health condition of the population and whether the identified relationships are present in the context of two different regions namely the North Great Plain and Southern Transdanubia. To answer why I chose these two regions, I can provide the following explanation: I live in the North Great Plain and work at the University of Debrecen therefore I was interested in the data and results concerning my own residence. I rejected Central Hungary when choosing the regions for comparison due to its unique and outstanding situation and function. I wanted to compare the eastern part of Hungary to the western part of the country by choosing a region which is in a similar economic-social condition and plays a similar role, while it also has a university center with a decisive role, similarly to Debrecen. Consequently, „only” Pécs and the region of Southern-Transdanubia remained as a choice.

## 2. RESEARCH METHODS

Prior to my examinations I presumed that if employment and human capital play an important role to sustain and develop regional competitiveness, then the population's ability to work influences the competitiveness of the region. Health condition has a significant impact on the ability to work, health condition, however, is influenced by lifestyle (*figure 1.*).

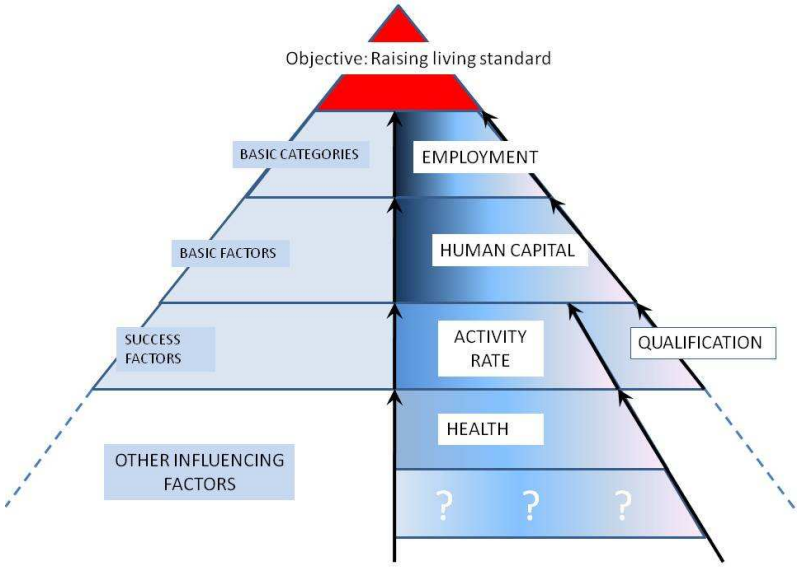


Figure 1.

*Possible influencing factors of human capital which determines the competitiveness of regions*

*Source:* Based on Lengyel, 2003, modelling of research objectives.

My examinations were aimed at identifying whether there are *regional differences in the lifestyle, health culture and health condition of the population* and if so, what these are, as well as identifying the relationships with socio-economic status, financial condition and employment opportunities. I separately examined whether regional university centers have an impact on the health culture of the individual. I carried out surveys in Debrecen and Pécs. I assessed the data of the two affected regions, the North Great Plain and Southern Transdanubia, primarily the accessible HCSO databases and studies published related to the topic (*Hajdú* Ed. 2006; *Baranyi*, 2008; Ed.. 2008), as well as processing completed questionnaires.

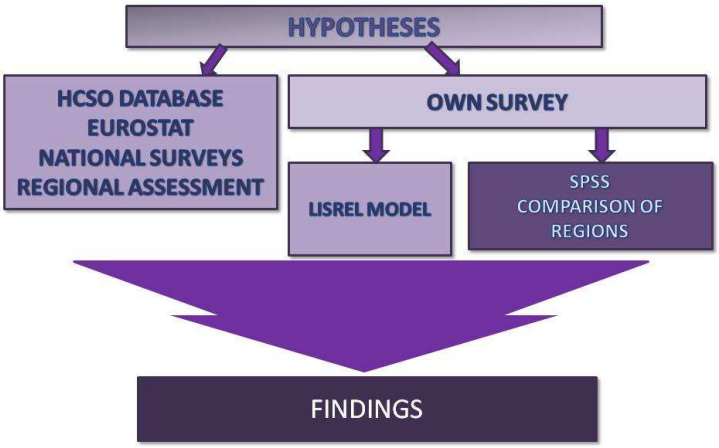


Figure 2.

*Three main methods of the research*

*Source:* Own compilation.

The survey was carried out at the inpatient units of the University of Debrecen, Medical School and Health Science Center and the University of Pécs. The head nurses handed out the questionnaires to all inpatients over the course of a two-week period, which was filled in voluntarily and anonymously. The data were processed and assessed by using Excel application, while interrelationships were evaluated by using SPSS statistical software. The evaluation of regional differences was done by Mann-Whitney, Chi-square test and Anova evaluation.

I developed the Lisrel model to examine relationships among the individual factors (*Jöreskog and Sörbom*, 1982, *Jöreskog, Karl and Sörbom*, 2001).

The population used in our samples was from Southern Transdanubia and the North Great Plain. I developed the sample according to two regions, with proportionately layered, simple random sample taking.

The questionnaire included 59 questions, which covered the following areas:

- demographic data,
- assessment of residence based on specific aspects,
- questions related to work and income,
- lifestyle, habits,
- questions related to health status,
- questions related to health culture.

The *number* of *completed questionnaires* in the North Great Plain region was 791, and 482 in the Southern Transdanubia region, the quantity of which proportionately fitted the population living the specific region.

I applied the Lisrel model (figure 3.), because I wanted to measure such variables as health culture, health or lifestyle, which do not exist in reality (latent), while I also wanted to reveal relationships among these items. Information of several observations was aggregated into a fewer number of latent variables, relationships of which were easier to reveal with measured variables.

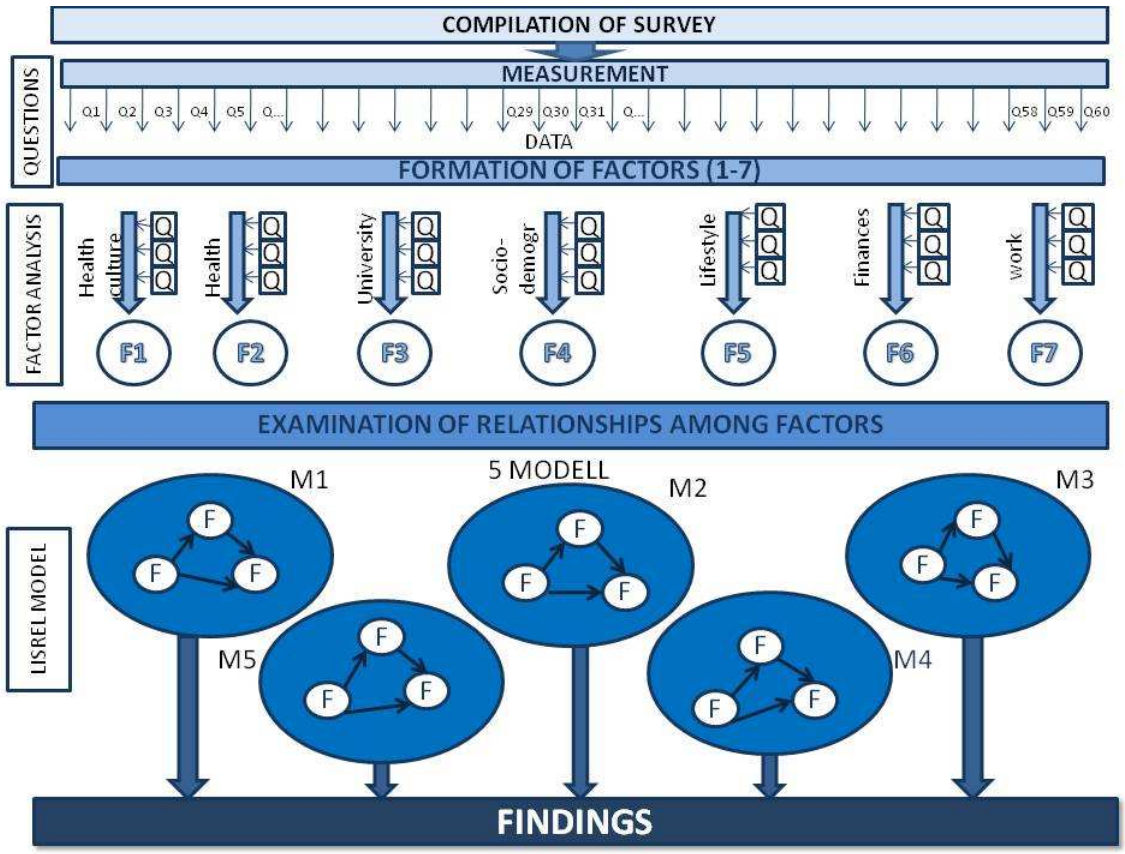


Figure 3.

*Application of Lisrel model in research*

*Source:* Own compilation.

The assessment focused on the following 5 main topics:

1. Relationship of social background with health culture and financial possibilities
2. The role of university centers in health and health culture
3. Relationship of lifestyle with health condition and health culture

4. Relationship of health condition with lifestyle and finances
5. Relationship of ability to work and health condition/behaviour

7 factors (health culture, health, university, lifestyle, socio-demographic data, work, finances) were chosen to assess relationships within the abovementioned topics. I examined the following relationships in 5 models during the statistical processing:

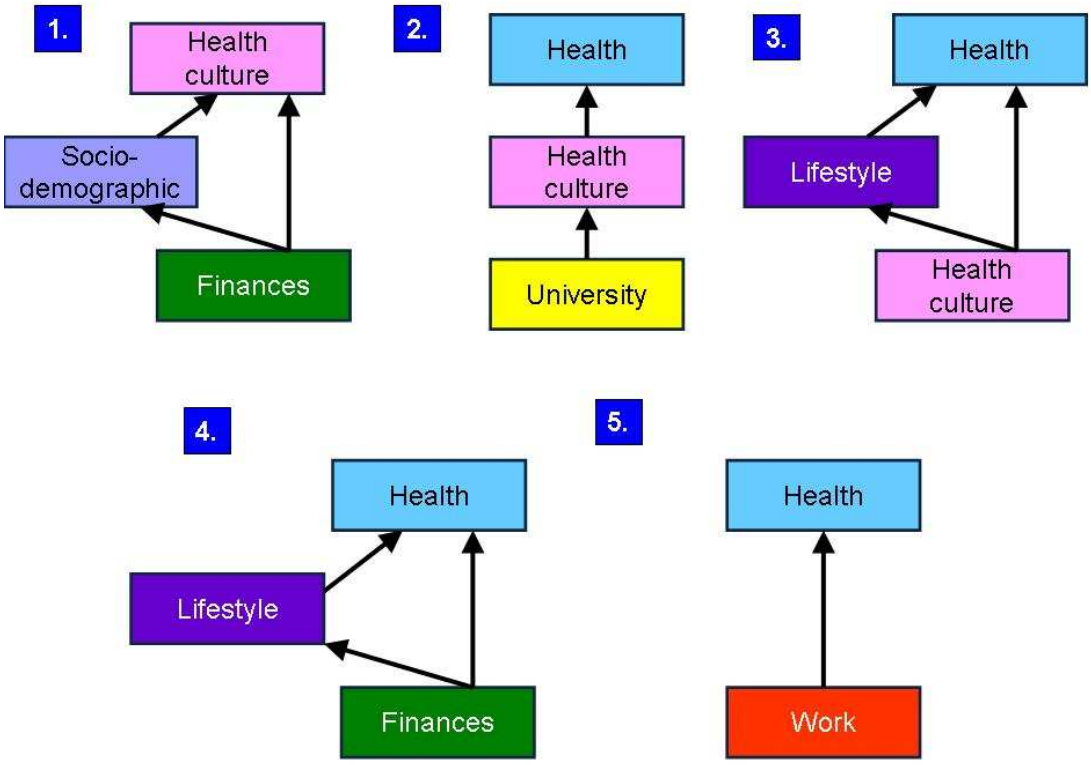


Figure 4.

*Relationship of models used during the work (1-5.), relationships of factors and their assumed relationships. I indicated the relationships (hypotheses) among specific factors with arrows.*

Source: Own compilation.

## 3. MAJOR FINDINGS OF THE THESIS

### 3.1. Regional comparison of economic-social conditions in the North Great Plain and Southern Transdanubia regions

The North Great Plain region was ranked seventh from 2004 and sixth in 2008 while the Southern Transdanubia region was ranked fourth among the regions *considering economic conditions of the regions* based on GDP per capita. 4% of the enterprises with foreign interest are located in the North Great Plain according to the capital distribution and 1% in the Southern Transdanubia region. The employment rate is below average in both regions.

Table 1.

*Regional comparative data*

| *Indicators* | *North Great Plain region* | | *Southern Transdanubian region* | |
|---|---|---|---|---|
| | *Regional value* | *In the percentage of national value* | *Regional value* | *In the percentage of national value* |
| Number of registered enterprises, 2010 | 248,747 | 15.0 | 146,350 | 8.8 |
| Ratio of enterprises in correlation with population, 2010, % | 16.7 | - | 15.4 | |
| Number of employed, 2010, per thousand capita | 497.4 | 13.1 | 342.1 | 9.0 |
| Employment rate, 2010, % | 44.1 | - | 47 | - |
| GDP, 2008, million HUF | 2,499,135 | 9.3 | 1,746,031 | 6.5 |
| GDP per capita, , 2008, thousand HUF | 1,657 | 62.2 | 1,825 | 68.5 |
| Foreign capital per capita, 2008, thousand HUF | 371 | - | 182 | - |

*Source:* Own compilation based on HCSO data.

Regarding the distribution of research-development facilities, 11.2% are located in the North Great Plain and 7.2% in Southern Transdanubia. The Southern Transdanubian region received some 253 billion HUF fund by the EU between 2004 and 2009, while the North Great Plain region accessed nearly 556 billion HUF in funds form EU financial sources. Southern Transdanubia has the lowest population density in the nation, with the highest number such small villages, where less than 500 residents live. Regarding age, it is characterised by a higher number of elderly people compared to the national average. The

North Great Plain is the youngest, second largest and second most populous region in Hungary (figure 5.).

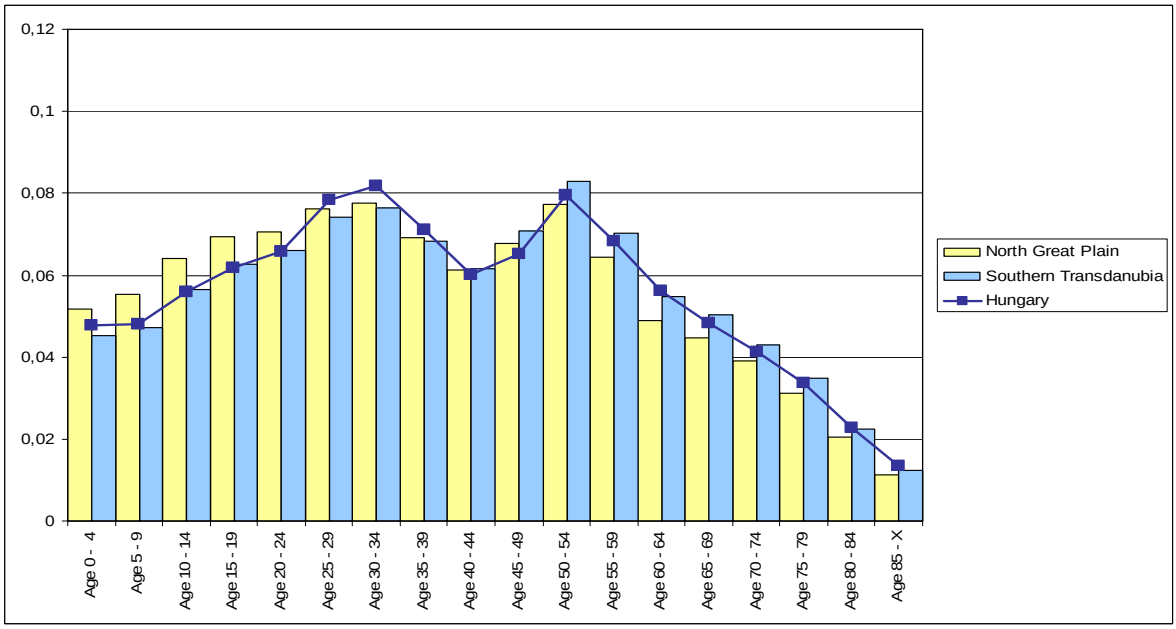


Figure 5.

*Age composition of Hungary, the North Great Plain and Southern Transdanubian region, 2007*

*Source:* Own compilation based on HCSO data.

30% of Germans and close to 30% of Croatians living in Hungary reside in *Southern Transdanubia*. The demographic conditions of both regions are affected by the ratio of roma population. Significant parts of both regions are outside the 15- or 30-minute vicinity of the motorway network, which is a disadvantageous influencing factor regarding the accessibility of settlements. The least number of people were employed in the North Great Plain (43.1%) following Northern Hungary considering the regional employment conditions. The situation in Southern Transdanubia is not much better as employment rate was 46.1%.

Both regions ranked above average considering the rate of those who have completed or less than 8 years in elementary education when examining the distribution of levels of education among the unemployed. The rate of inactive people, between the age of 25-64 is the highest (51%) in the North Great Plain and Southern

Transdanubia region in a nationwide context. The North Great Plain ranks last regarding the annual income of households per capita.

The amount of free time at one's disposal also affects *lifestyle as a factor influencing health condition.* Many studies have confirmed that Hungarian women spend almost twice as much time doing housework than men therefore, they have much less free time. When examining the health condition of the Hungarian population it can be seen that only the data of Northern Hungary are worse compared to the other two examined regions regarding the life expectancy at birth of men. The mortality rate due to cancerous illnesses is also on the rise in all regions when examining the causes of mortality. The rate of mortality due to diseases of the circulatory system must also be highlighted in the North Great Plain region (51.9%).

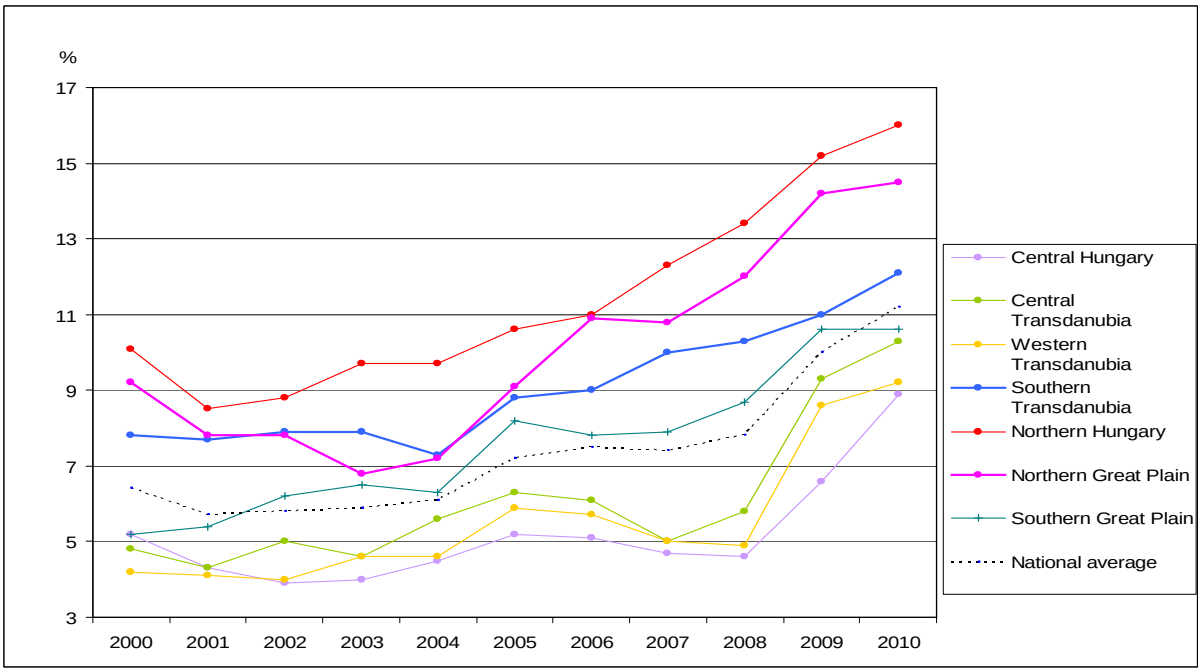


Figure 6.

*Rate of unemployment according to regions, 2000–2010*

*Source:* Own compilation based on HCSO data.

Both regions have a university center with traditions which do not only represent a research potential and employment institution but also play a significant role as intellectual centers in the life of the regions.

### 3.2. Evaluation of the questionnaire data using Lisrel model

*Model 1: Relationship of social background with health culture and financial circumstances.*

1.1. My hypothesis was that financial circumstances based on objective indicators and self-assessment is in relationship with socio-economic status and shapes health culture.

1.2. I assumed that socio-economic status has an effect on the activity of individuals in areas related to health culture.

*Parameter estimates of model 1.*

Table 2.

*Parameter estimates of model 1.*

| ***Linear relationship Dependent<---Independent variable*** | | | ***Parameter estimate*** | ***Standard error*** | ***Significance*** |
|---|---|---|---|---|---|
| Sociodem | <--- | Finances | 1.129 | 0.109 | 0.000 |
| Hculture | <--- | Sociodem | -0.138 | 0.065 | 0.032 |
| Hculture | <--- | Finances | 0.470 | 0.106 | 0.000 |
| K2 – age | <--- | Sociodem | 4.468 | 0.403 | 0.000 |
| K5 - residence | <--- | Sociodem | 0.235 | 0.029 | 0.000 |
| K3 – education | <--- | Sociodem | 0.592 | 0.043 | 0.000 |
| K8- foreign language skills | <--- | Sociodem | -0.326 | 0.024 | 0.000 |
| K42 – participation in screening | <--- | Hculture | 0.095 | 0.012 | 0.000 |
| K44 – awareness of screening | <--- | Hculture | -0.148 | 0.026 | 0.000 |
| K50 – money spent on health protection | <--- | Hculture | -0.662 | 0.039 | 0.000 |
| K51 – health protection | <--- | Hculture | 0.487 | 0.029 | 0.000 |
| K52 – healthy nutrition | <--- | Hculture | 0.459 | 0.034 | 0.000 |
| K54 – programs related to health | <--- | Hculture | 0.425 | 0.028 | 0.000 |
| ***K18 – real estate*** | ***<---*** | ***Finances*** | -0.072 | 0.041 | ***0.079*** |
| K19 – income per capita | <--- | Finances | -0.609 | 0.035 | 0.000 |
| K21- assessment of financial circumstances | <--- | Finances | 0.481 | 0.027 | 0.000 |
| K22 – car | <--- | Finances | -0.407 | 0.028 | 0.000 |
| K23 - computer | <--- | Finances | 0.265 | 0.015 | 0.000 |

*Source:* Own compilation based on data of questionnaire survey.

The latent variable, *„Financial circumstances”*, is determined by questions k18, k19, k21-23 which cover real estate, average monthly net income and whether the person has a car, computer and how the individual gets by financially every month. The positive direction of the Finances latent variable is caused by only two questions, k21 and k23 with parameter values of 0.481 and 0.265. Both are categorical variables and the lower value

indicates whether the individual has a computer (k23), or if the individual gets by easier financially every month (k21). The higher values of course indicate that the person finds it more difficult to get by financially and has no computer at home. If the respondent gave a higher value for these two answers, then it influences the value of the financial factor positively. Question k18, namely the type of real estate has no role ($p=0.072 > 0.05$), question k19 and k22 regarding car ownership is a highly significant financial factor. The high values of the parameter (-0.609; -0.407) also indicate this. These financial factors are responsible for the negative direction of the factor. The higher the respondent's value to these questions, the more favourable is the respondent's financial circumstances (has higher salary and even owns a car), and the more negative the value of the Finances factor is. To sum up, the negative direction of the finances factor means good financial circumstances, its positive direction indicates unfavourable financial circumstances. The type of the real estate is not a decisive factor regarding financial circumstances (table *2.*).

Age plays an important role in *measuring social background* (k2), education (k3), and residence (k5), as well as the number of spoken languages (k8). Age has the most impact on the values of the factor, followed by education with less impact. Only the question regarding the number of spoken foreign languages influences the factor negatively, its positive direction is caused by older age or lower levels of education or if the person does not live in a city but in a parish, village or farmstead. Based on these, it can be said that a lower value of the factor indicates a more favourable social background. The higher (positive) the value of the factor, the more unfavourable the respondent's social background is.

*Health culture factor* is mostly determined by the amount of money spent on preserving the respondent's health. The more the individual spends, and the more informed the person is, the more negative the value of the factor is (as -0.662;-0.148 the estimated parameters). If the individual is less informed, or spends less on preserving health, the value of the factor is influenced positively. At the same time, the positive direction of the factor is influenced by higher categories marked for questions k51, k52 and k54 which indicates, that the person does not really care about health preservation and is not interested in such publications and programs.

Following the evaluation of factors let us touch upon the assessment of relationships among factors. The positive direction of financial factors indicates unfavourable financial circumstances, and the positive direction of social background also indicates

unfavourable condition. As there is positive significant relationship between the two factors, (1.129), we can say that bad financial circumstances unfavourably influence social condition (1.1. hypothesis). The positive direction of the health culture also indicates unfavourable condition, i.e. the person does not care about health, spends less on preservation and makes less effort to stay informed. As there is positive significant relationship between the finances and health culture factor (0.470), it is confirmed that bad financial circumstances unfavourably influence health culture (1.2. hypothesis).

*Model 2: The role of university centers in health and health culture*

2.1. I assumed that regional university centers have an influence in areas of health culture.

2.2. My hypothesis was that health culture has an effect on the health condition and health behaviour of individuals.

*Parameter estimates of model 2.*

As I have given a detailed introduction of health culture factor in connection with model 1 and I received similar parameter estimates for the factor within the framework of model 2, therefore no further detail needs to be disclosed. The health factor however, requires thorough examination. The number of days spent as paid sick days by the individual played no role in establishing the factor, all the other factors (table) however did. The negative direction of the health factor are caused by factors defined in questions k46 and k47, these have a negative impact on the factor (-0.281;-0.040).

The fact that medicine is taken regularly or whether the medicine is taken based on doctor's recommendation shifts the value of the health factor in the negative direction, indicating a more health conscious lifestyle. Positive direction is caused by factors that contribute with a positive impact on the formation of the factor value (k35-37, k39, k40, k48). These data indicate bad health condition as well as the amount of money spent by the respondent on medicine. If lower category is marked by the respondent for questions k35-37, k39, k40, k48 i.e. the health status is considered to be good, then it also decreases the value of the factor. The number of visits to the doctor per year has the greatest impact on the factor (0.842). Overall, positive values indicate worse health condition while negative or lower positive values indicate better health condition *(table 3).*

Table 3.

*Parameter estimates of model 2.*

| ***Linear relationship Dependent<---Independent variable*** | | | ***Parameter estimate*** | ***Standard error*** | ***Significance*** |
|---|---|---|---|---|---|
| Hculture | <--- | University | 0.467 | 0.052 | 0.000 |
| Health | <--- | Hculture | -0.350 | 0.038 | 0.000 |
| k42 - participation in screening | <--- | Hculture | 0.088 | 0.011 | 0.000 |
| k44 – awareness of screening | <--- | Hculture | -0.124 | 0.025 | 0.000 |
| k50 - money spent on health protection | <--- | Hculture | -0.740 | 0.038 | 0.000 |
| k51 - health protection | <--- | Hculture | 0.417 | 0.027 | 0.000 |
| k52 – healthy nutrition | <--- | Hculture | 0.393 | 0.032 | 0.000 |
| k54 - programs related to health | <--- | Hculture | 0.382 | 0.026 | 0.000 |
| k35 – frequency of visits to doctor | <--- | Health | 0.842 | 0.035 | 0.000 |
| k39 – judgement of health condition | <--- | Health | 0.723 | 0.025 | 0.000 |
| k36 – when does the individual visit the doctor | <--- | Health | 0.602 | 0.032 | 0.000 |
| k37 – hospital treatment | <--- | Health | 0.828 | 0.058 | 0.000 |
| ***k38 – time spent as paid sick days*** | ***<---*** | ***Health*** | ***0.144*** | ***0.419*** | ***0.731*** |
| k40 – health condition compared to age peers | <--- | Health | 0.554 | 0.025 | 0.000 |
| k46 – taking medication | <--- | Health | -0.281 | 0.012 | 0.000 |
| k47 – prescribed medication | <--- | Health | -0.040 | 0.009 | 0.000 |
| k48 – money spent on medication | <--- | Health | 0.605 | 0.025 | 0.000 |
| k55 – participation in university events | <--- | University | 0.205 | 0.036 | 0.000 |
| k56 – reading university publication | <--- | University | 0.233 | 0.029 | 0.000 |
| k57 – information given at clinic | <--- | University | 1.210 | 0.067 | 0.000 |
| k58 – publication received at a clinic | <--- | University | 0.564 | 0.032 | 0.000 |
| k59 – judgement of university's role | <--- | University | 0.262 | 0.023 | 0.000 |

*Source:* Own compilation based on questionnaire survey.

The university influence factor is made up of questions k55-59, all of which shift the value of the factor into a positive direction. Questions k57-58 have the greatest impact on determining the factor, i.e. whether the information has been provided on healthy lifestyle or things of this nature during treatments at the clinics. The questions are structured in such a way that higher value category indicates that the respondent did receive such information leaflet or handout, did not read any university publications and does not consider the role of universities important in shaping individual lifestyle. Therefore, higher values of the factor mean, that the individual has not received such information or was not interested in it, and does not consider the role of universities important in shaping one's healthy lifestyle.

If someone is less informed, spends less on health protection or cares less about her or his own health, it projects an unfavourable health culture. This is in positive relationship (0.467) with the university influence factor, which means that universities play no significant role in the development of a healthy lifestyle or did not received an information leaflet (or was not interested in such issues), then this is accompanied by an unfavourable health culture. The opposite is also true, i.e. if someone considers the role of the university to be important and was interested and received such information, then the individual also spends more on health and is more informed (the value of health culture is lower). This also proves hypothesis 2.1.

The negative values of health factor also add to the positive values of health culture due to the inverse relationship (-0.350). The negative values of the health factor indicate a more favourable health condition while the positive values of the health culture indicate an unfavourable condition. Based on the above, it can be said that if someone does not care about her or his own health and health protection (unfavourable health culture), does so because she or he regards herself/himself to be healthier. Those with worse health condition deal more with their own health and spend more on protecting their health. In this sense, health culture has an effect on health condition and behaviour (hypothesis 2.2.).

*Model 3: Relationship of health with health condition and health culture*

3.1. I expected that lifestyle influences health condition and health behaviour.

3.2. I presumed that the activity of the individual has an effect on lifestyle through areas related to health culture.

*Parameter estimates of model 3.*

Lifestyle was introduced as a new factor into the model, the definition of the other two factors (health and health culture) was explained in the introduction of previous models.

The lifestyle factor is made up of questions k24-27 and k34. Alcohol consumption (k26) of these was not significant, while the others were. Questions include holiday,

sports, smoking, theatre and cinema visits. If the individual has been on holiday (domestic, abroad), visited the theatre or cinema regularly or a few times, rarely or hardly ever smokes and does sports regularly or on a daily basis, then this shifts the value of the lifestyle factor into a positive direction. Negative direction is caused by the opposite of all these *(table 4).*

Table 4.

*Parameter estimates of model 3.*

| ***Linear relationship Dependent<---Independent variable*** | | | ***Parameter estimate*** | ***Standard error*** | ***Significance*** |
|---|---|---|---|---|---|
| Lifestyle | <--- | Hculture | -0.409 | 0.056 | *0.000* |
| Health | <--- | Lifestyle | -1.075 | 0.121 | *0.000* |
| Health | <--- | Hculture | -0.915 | 0.118 | *0.000* |
| k24 – holiday | <--- | Lifestyle | 0.389 | 0.028 | 0.000 |
| k25 – smoking | <--- | Lifestyle | 0.101 | 0.024 | 0.000 |
| k26 - alcohol consumption | <--- | Lifestyle | -0.029 | 0.017 | ***0.107*** |
| k27 – sports | <--- | Lifestyle | 0.393 | 0.025 | 0.000 |
| k34 – cinema, theatre | <--- | Lifestyle | 0.527 | 0.037 | 0.000 |
| k35 – frequency of visits to doctor | <--- | Health | 0.573 | 0.041 | 0.000 |
| k36 – when does the individual visit the doctor | <--- | Health | 0.417 | 0.033 | 0.000 |
| k37 – hospital treatment | <--- | Health | 0.572 | 0.052 | 0.000 |
| k38 – time spent as paid sick days | <--- | Health | 0.049 | 0.289 | ***0.863*** |
| k39 – judgement of health condition | <--- | Health | 0.512 | 0.034 | 0.000 |
| k40 – health condition compared to age peers | <--- | Health | 0.391 | 0.028 | 0.000 |
| k46 – taking medication | <--- | Health | -0.193 | 0.014 | 0.000 |
| k47- prescribed medication | <--- | Health | -0.027 | 0.006 | 0.000 |
| k48 – money spent on medication | <--- | Health | 0.417 | 0.030 | 0.000 |
| k42 - participation in screening | <--- | Hculture | 0.098 | 0.013 | 0.000 |
| k44 – awareness of screening | <--- | Hculture | -0.138 | 0.027 | 0.000 |
| k50 - money spent on health protection | <--- | Hculture | -0.778 | 0.038 | 0.000 |
| k51 - health protection | <--- | Hculture | 0.495 | 0.028 | 0.000 |
| k52 – healthy nutrition | <--- | Hculture | 0.467 | 0.034 | 0.000 |
| k54 – programs related to health | <--- | Hculture | 0.418 | 0.027 | 0.000 |

*Source:* Own compilation based on questionnaire survey.

As the positive value of the lifestyle factor indicates a more health conscious lifestyle and because it has opposite relationship with the health factor (-1.075), the negative health factor values pair up with positive lifestyle factor values. As the value

of health factor is negative, or indicates a healthier condition in case of lower positive values, it can be stated that a more health conscious lifestyle (more regular sport activities, entertainment, rare smoking) also indicates a healthier condition, thus I proved my hypothesis 3.1.

As the positive value of the health factor indicates a *negative view on health culture*, and as it has an opposite relationship (-0.409) with the lifestyle factor, therefore negative factor values pair up with positive health culture factor values. As the factor value of lifestyle is negative, and indicates a *less health conscious lifestyle* with lower positive values, it can be stated that a negative view in health culture results in a less health conscious lifestyle (lack of sports, frequent smoking, etc.), I proved my hypothesis 3.2.

*Model 4: Relationship of health condition with lifestyle and finances*

4.1. I assumed that the financial circumstances of individuals shape the lifestyle of the individual.

4.2. Financial circumstances determine the health condition and health behaviour of individuals.

A positive value of the lifestyle factor indicates a more health conscious lifestyle based on what has been previously said. A positive value of the health factor indicates a worse health condition, a negative or lower positive value indicates a better health condition of the respondent. The negative direction of the finances factor indicates good financial circumstance, while its positive direction indicates unfavourable financial circumstance. The type of real estate is not decisive regarding financial circumstances (table *5*).

Based on the evaluation of the relationships among the factors, as the positive value of the finances factor indicates unfavourable financial circumstances and because there is an opposite relationship with the lifestyle factor (-1.494), it can be stated that unfavourable financial circumstance is accompanied by a less health conscious lifestyle (lack of sports, frequent smoking, etc.), therefore I proved my hypothesis 4.1. As there was no significant relationship between the finances and health factor, I could not support my hypothesis 4.2 by statistical tools. According to this, financial circumstance does not necessarily influence health condition and health behaviour.

*Parameter estimates of model 4.*

*Table 5.*

*Parameter estimates of model 4.*

| ***Linear relationship Dependent<---Independent variable*** | | | ***Para-meter estimate*** | ***Standard error*** | ***Signifi-cance*** |
|---|---|---|---|---|---|
| Lifestyle | <--- | Finances | -1.494 | 0.202 | *0.000* |
| Health | <--- | Lifestyle | -0.370 | 0.082 | *0.000* |
| Health | <--- | Finances | -0.080 | 0.154 | ***0.602*** |
| k24 – holiday | <--- | Lifestyle | 0.267 | 0.031 | 0.000 |
| k25 – smoking | <--- | Lifestyle | 0.040 | 0.015 | 0.006 |
| k26 – alcohol consumption | <--- | Lifestyle | -0.032 | 0.011 | 0.003 |
| k27 – sports | <--- | Lifestyle | 0.182 | 0.022 | 0.000 |
| k34 – cinema, theatre | <--- | Lifestyle | 0.374 | 0.043 | 0.000 |
| k35 – frequency of visits to doctor | <--- | Health | 0.730 | 0.035 | 0.000 |
| k36 – when does the individual visit the doctor | <--- | Health | 0.550 | 0.031 | 0.000 |
| k37 – hospital treatment | <--- | Health | 0.752 | 0.055 | 0.000 |
| k38 – time spent as paid sick days | <--- | Health | 0.057 | 0.383 | 0.881 |
| k39 – judgement of health condition | <--- | Health | 0.700 | 0.027 | 0.000 |
| k40 – health condition compared to age peers | <--- | Health | 0.535 | 0.025 | 0.000 |
| k46 – taking medication | <--- | Health | -0.248 | 0.012 | 0.000 |
| k47 – prescribed medication | <--- | Health | -0.034 | 0.008 | 0.000 |
| k48 – money spent on medication | <--- | Health | 0.535 | 0.025 | 0.000 |
| k18 - real estate | <--- | Finances | -0.088 | 0.041 | 0.031 |
| k19 – income per capita | <--- | Finances | -0.608 | 0.034 | 0.000 |
| k21 – assessment of financial circumstances | <--- | Finances | 0.518 | 0.027 | 0.000 |
| k22 - car | <--- | Finances | -0.393 | 0.028 | 0.000 |
| k23 - computer | <--- | Finances | 0.255 | 0.015 | 0.000 |

*Source:* Own compilation based on questionnaire survey.

*Model 5: Relationship of ability to work and health condition/behaviour*

5. 1. Employment opportunities and work conditions have an effect on the health condition and behaviour of the population.

*Parameter estimates of model 5.*

Questions k12-16 play a role in determining the work factor, i.e. whether there are employment opportunities at the place of residence, time required to get to work, time spent at work, the individual has a side job and time spent on working at home. Side job and daily work hours were not significant factors of these. The most influential factors were the time spent on working at home and whether there are employment opportunities

at the place of residence. Questions k13 and k16 shifted the value of the work factor into a positive direction. This means, that the more time is required to get to work every day for the respondent and that the respondent works at home several hours a day. Question k12 causes a negative direction in the value of the factor. This happens, when the respondent marks a higher category as a response for this question. If the respondent is not affected by the issue of local employment opportunity as the person is entrepreneur or a private farmer, then this shifts the work factor into a negative direction. If there are no employment opportunities or there are no opportunities matching the person's qualification, then it reduces the value of the factor to a lesser extent.

Table 6.

*Parameter estimates of model 5.*

| ***Linear relationship Dependent<---Independent variable*** | | | ***Parameter estimate*** | ***Standard error*** | ***Significance*** |
|---|---|---|---|---|---|
| Work | <--- | Health | 0.214 | 0.056 | *0.000* |
| K12 – employment at place of residence | <--- | Work | -0.500 | 0.074 | *0.000* |
| K13 – time required to get to work | <--- | Work | 0.162 | 0.027 | *0.000* |
| ***K14 – time spent at work*** | ***<---*** | ***Work*** | ***-0.007*** | ***0.027*** | ***0.808*** |
| ***K15- side job*** | ***<---*** | ***Work*** | ***0.034*** | ***0.025*** | ***0.163*** |
| K16 – time spent working at home | <--- | Work | 0.341 | 0.052 | *0.000* |
| K35 – frequency of visits to doctor | <--- | Health | 0.878 | 0.036 | *0.000* |
| K36 – when does the individual visit the doctor | <--- | Health | 0.645 | 0.034 | *0.000* |
| K37 – hospital treatment | <--- | Health | 0.883 | 0.061 | *0.000* |
| K38 – time spent as paid sick days | <--- | Health | 0.158 | 0.449 | *0.724* |
| K39 – judgement of health condition | <--- | Health | 0.797 | 0.025 | *0.000* |
| K40 – health condition compared to age peers | <--- | Health | 0.613 | 0.026 | *0.000* |
| K46 – taking medication | <--- | Health | -0.295 | 0.013 | *0.000* |
| K47 – prescribed medication | <--- | Health | -0.042 | 0.010 | *0.000* |
| K48 – money spent on medication | <--- | Health | 0.634 | 0.026 | *0.000* |

*Source:* Own compilation.

*Relationship with the health factor:*

As the positive value of the health factor indicates worse health condition, and because it has an identical direction with the work factor (0.214), therefore positive work factor values pair up with positive health factor values. If the value of the work factor is positive

or has lower positive values, it indicates that it takes more time for the respondent to get to work or has to spend more time working at home and has more difficult work conditions (no employment opportunities). All of these are connected to health condition, since it can take more time to get to work and housework could also take longer, or there are no employment opportunities as a result. The model indicated significant relationship with work and health factors therefore I could prove my hypothesis 5.1.

I could prove all hypotheses except for one connected the model above (see. *Figure 7*). Upon comparing the factor values according to different aspects I found that financial circumstances are better in Southern Transdanubia, people lead a healthier lifestyle and are characterised by a relatively healthier condition. Significant differences were detected among city and village residents when examining financial opportunities and lifestyle. The health condition of people is better in cities than in villages or small settlements. I proved that those with a university or college education have different views on regarding health culture than those with lower qualifications, as they devote more attention and financial resources to their health.

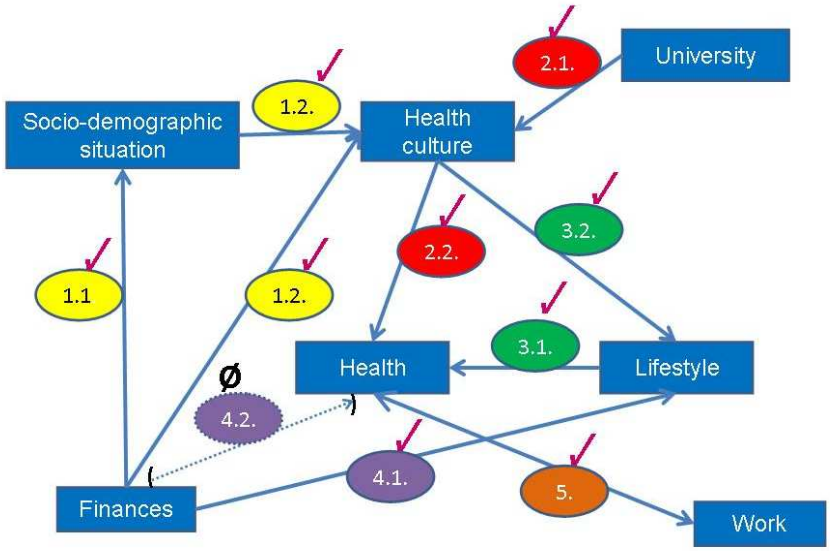


figure 7.

*Proved hypotheses*

*Source:* Own compilation.

### 3.3. Comparison of regions based on questionnaire survey

The rate of those with a full-time employment who have a secondary school or tertiary education is over 90% and there were no people with a lower than elementary

education who had a full-time job in either regions. Relatively more people can communicate in a foreign language in Southern Transdanubia. 5% more stated that there are no jobs suited for their qualifications in Southern Transdanubia. Respondents of the Southern Transdanubian region regard their financial situation and health condition more positively (figure 8.; tables 7–8.)

Table 7.

*Judgement of own financial situation according to income categories in the North Great Plain region, %*

| *Income* | *Carefree* | *Manages to get by* | *Barely gets by* | *Financial problems* | *Indigent* | *Total* |
|---|---|---|---|---|---|---|
| **< 50 th HUF** | | **11.37** | **46.92** | **29.38** | **12.32** | **100.00** |
| **50–100 th HUF** | **3.31** | **28.84** | **55.08** | **11.11** | **1.65** | **100.00** |
| 100–150 th HUF | 6.90 | 51.72 | 39.08 | 1.15 | 1.15 | 100.00 |
| 150–200 th HUF | 12.50 | 57.50 | 25.00 | 5.00 | | 100.00 |
| 200–250 th HUF | 21.43 | 57.14 | 21.43 | | | 100.00 |
| 250–300 th HUF | 50.00 | 50.00 | | | | 100.00 |
| 300 th HUF < | 16.67 | 66.67 | 16.67 | | | 100.00 |
| Total | 4.05 | 29.33 | 48.17 | 14.16 | 4.30 | 100.00 |

*Source:* Own compilation based on questionnaire survey.

Table 8.

*Judgement of own financial situation according to income categories in the Southern Transdanubian region, %*

| *Income* | *Carefree* | *Manages to get by* | *Barely gets by* | *Financial problems* | *Indigent* | *Total* |
|---|---|---|---|---|---|---|
| **< 50 th HUF** | **0.91** | **15.45** | **53.64** | **23.64** | **6.36** | **100.00** |
| **50–100 th HUF** | **2.69** | **37.31** | **49.23** | **8.85** | **1.92** | **100.00** |
| 100–150 th HUF | 7.25 | 52.17 | 39.13 | 1.45 | | 100.00 |
| 150–200 th HUF | 33.33 | 33.33 | 23.81 | 9.52 | | 100.00 |
| 200–250 th HUF | 20.00 | 40.00 | 40.00 | | | 100.00 |
| 250–300 th HUF | 42.86 | 42.86 | 14.29 | | | 100.00 |
| 300 th HUF < | 66.67 | 16.67 | 16.67 | | | 100.00 |
| Total | 6.00 | 34.16 | 46.58 | 10.77 | 2.48 | 100.00 |

*Source:* Own compilation based on questionnaire survey.

The ratio of those who regularly take and spend more on medication is higher in the North Great Plain region. The ratio of those who feel that they make, in some cases a lot of, efforts to preserve their health is higher in the Southern Transdanubian region. The majority of those with a lower than elementary education are not interested in publications, programs and events dealing with the issue of health-illness.

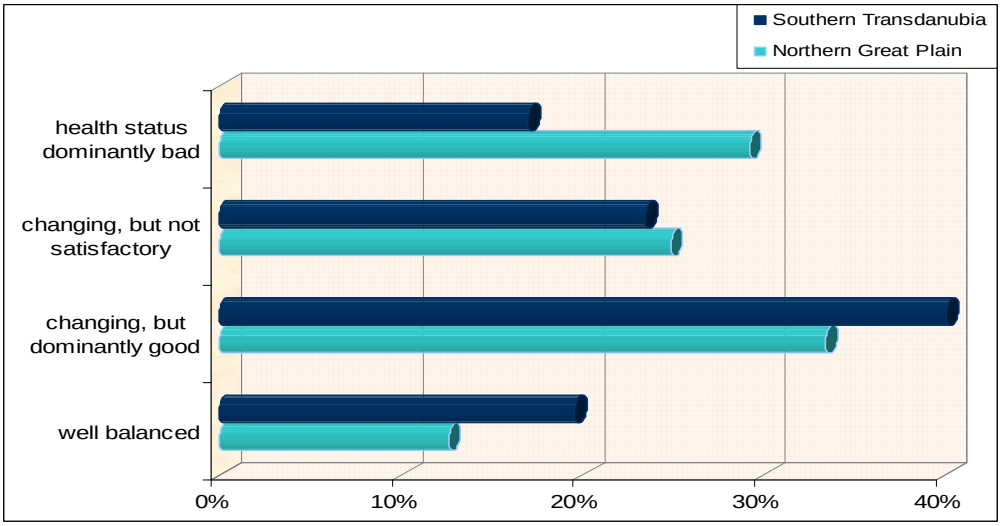


Figure 8.

*Own judgement of health condition*

*Source:* Own compilation based on questionnaire survey.

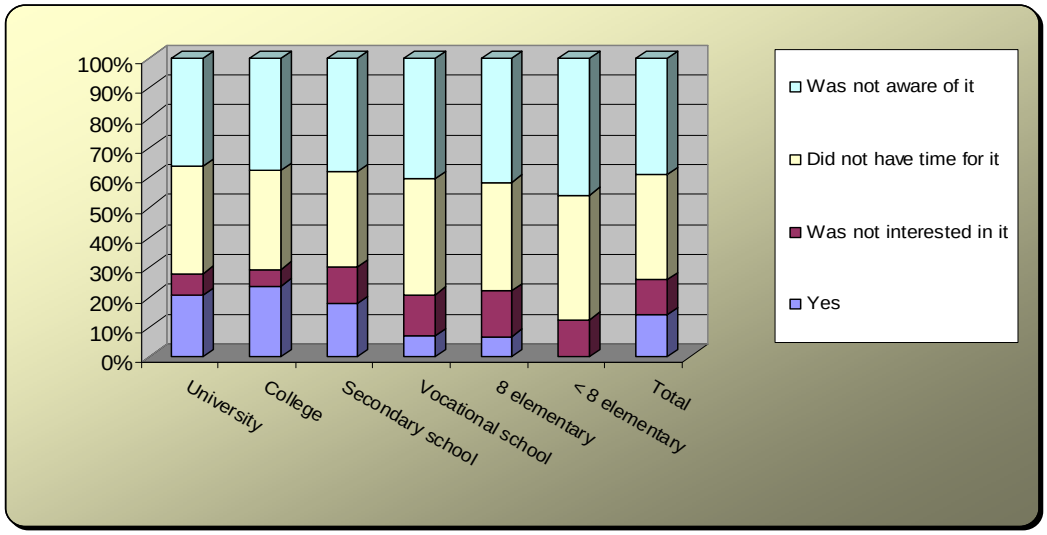


Figure 9.

*Distribution of participation in university event dealing with health-illness according to level of education, %*

*Source:* Own compilation based on questionnaire survey.

Higher ratio of respondents participated in university events dealing with health-illness and more read such university publications in the Southern Transdanubian region. The ratio of those who were unaware of such university events or have not come across such university publications is high (40-50%) in both regions.

When examining the qualification of the respondents we can see that while mostly those who have a higher level of education consider the role of universities to be important in shaping the healthy lifestyle of population in the Southern Transdanubian region, respondents in the North Great Plain region consider it important regardless of education.

### 3.4. Evaluation of factor values with parametric methods

I constituted subsamples along the provided criteria (gender, qualification, region, place of residence, marital status), then I used the Mann-Whitney method from the non-parametric methods to compare the averages of specific factor values according to subsamples in case of two subsamples and I applied the Kruskal-Wallis method in the case of several subsamples. I used the Mann-Whitney test to show differences according genders and regions, and the Kruskal-Wallis evaluation to identify differences according to qualification, place of residence and marital status. Parameter evaluations (t-probe; variance analysis) could not be used, because the normality of any of the factors could not be proved at 5% significance level with a Kolmogorov-Smirnov normality test.

*Evaluation of factor values according to regions*

Cells marked with yellow indicate which factor values differed significantly in specific regions. Based on these, it can be said that there are differences in the finances, lifestyle and health factors. There are better financial circumstances in Southern Transdanubia, healthier lifestyle, and the lower positive value of the health factor indicates relatively better health conditions (*table 9.*).

Table 9.

*Evaluation of factor values according to regions*

| *Region* | *HCULTURE* | *FINANCES* | *WORK* | *LIFESTYLE* | *UNIVERSITY* | *HEALTH* |
|---|---|---|---|---|---|---|
| North Great Plain | 0.037 | 0.079 | -0.128 | -0.021 | 0.115 | 1.029 |
| Southern Transdanubia | 0.057 | -0.145 | -0.059 | 0.089 | 0.053 | 0.565 |
| Total | 0.044 | -0.008 | -0.099 | 0.021 | 0.092 | 0.864 |
| Significance | 0.515 | 0.001 | 0.270 | 0.021 | 0.494 | 0.007 |

*Source:* Own compilation based on questionnaire survey.

## 4. NEW SCIENTIFIC RESULTS OF THE THESIS

1. This was the first comparative, complex, topic-specific examination, theoretical and empirical evaluation regarding health on the factors that influence regional competitiveness, using established scientific methods and up-to-date scientific methods of statistics, in regional dimensions, in two, from many aspects similar, large, disadvantaged regions from an social-economic and employment aspect, which are at the same time, similarly outstanding in tertiary education, innovation and health potential in the region of the North Great Plain and Southern Transdanubia.

2. The hypothesis, that significant aspects in regional competitiveness, determine the quality of human resources, including health culture, health condition of the population, lifestyle and issues that had so far been neglected in scientific thinking which influence the quality of life, were proved as a result of empirical research.

3. The scientific evaluation concerning the North Great Plain and Southern Transdanubia region proved that the economic, social and cultural relationships, as well as the financial situation based on objective indicators and self-assessment is closely linked the socio-economic status of the individual and directly shapes health culture similarly in both regions.

4. Empirical examinations carried out at the at the University of Debrecen, Medical School and Health Science Centre and inpatient units at University of Pécs unequivocally proved that large university centers can play a significant role in the health culture of the population, thus they could contribute to disseminating information and public acceptance of the importance of a healthy lifestyle, as well as to the practical implementation of such needs.

5. Close relationships were proved through the samples of the North Great Plain and Southern Transdanubia in regional dimensions among the prevailing social-economic conditions, the disadvantageous situation and employment problems and the increased

need for a healthy lifestyle, training contents with a positive influence on health culture and the need for harmonizing activities.

6. The specific experience and deduction was also proved as a result of the research that the population of the Southern Transdanubia region is characterised by a generally healthier lifestyle and more promising life prospects than in the North Great Plain region regarding the relationship of the two regions. Consequently, application of the Lisrel model proved in regional context that a more health conscious lifestyle means a healthier physical and mental condition, while lower health consciousness is paired with less conscious health behaviour. This conclusion also focuses attention to the most important future tasks.

7. Result of the empirical (questionnaire) survey, providing the basis for scientific evaluations, also proved that the Lisrel model is a suitable and reliable method for testing and validating concepts regarding health, health culture and lifestyle as latent variables.

8. Finally, the scientific research also called the attention to new challenges that require continuous and efficient health marketing and propaganda, action, health training and dissemination beyond the healthcare, social and education institutions to handle issues of health culture.

## 5. PRACTICAL UTILIZATION OF RESULTS

Theoretical and empirical examinations carried out in the thesis could raise awareness about the importance of the quality of human resources from the aspect of regional competitiveness, and directly highlight health culture, health condition of the population, lifestyle, and factors influencing the quality of life which have so far been relatively neglected in everyday and scientific thinking.

The results of the research also unequivocally confirmed previous scientific hypothesis that the similar and at the same time different economic and social characteristics of the examined regions significantly influence lifestyle and thus directly or indirectly the health condition of the local population. As a result, significant regional differences were detected in topic specific relationships as well. The Northern Great Plain but from many aspects the even the Southern Transdanubian region also belongs to the poorer and more disadvantaged regions of Hungary. It can be clearly concluded regarding the future, that any social-economic action aimed at ensuring equal opportunities can only reach its original objective if it is practically applied rather than just in the form of written regulations or statistics, effectively prevailing in everyday life.

An important condition of implementing equal opportunity requirements in practice is to set up and expand personal and infrastructural conditions needed for achieving this goal. It is essential that government and civil organisations pay attention to the dissemination of equal opportunity approaches, primarily through oriented and efficient human resource planning. The role of public and higher education is a fundamentally decisive factor, which was also highlighted in the thesis regarding the future.

Experiences of empirical (questionnaire) examinations carried out among the clinical patients of the University of Debrecen and University of Pécs could promote a more significant impact on the health culture of the population, contribute to wider dissemination and acceptance of issues regarding healthy lifestyle based on revealed theoretical and empirical knowledge as well as to the practical implementation of such needs, even more so than previously. Therefore, it is an important deduction that University centers, such as *the University of Debrecen and the University of Pécs*,

contribute to the improvement of the quality of life and strengthening social cohesion through their role in cultural life, range of influence and involvement in social affairs.

*Education and qualification* are decisive differentiating factors *in influencing unemployment*. Based on demographic data, both the Northern Great Plain and Southern Transdanubian regions require special attention to ensure equal opportunities to those at disadvantage. At the same time, the multidimensional nature of disadvantaged conditions have to be considered when using European Union funds for such purposes, because only a funding program that is designed to treat the situation in a complex manner could contribute to enhancing the opportunities of disadvantaged regions and ensuring their development.

Last but not least, the thesis highlighted those new challenges that require continuous and efficient health marketing and propaganda, action, health training and dissemination beyond the efforts of healthcare, social and education institutions to handle health culture issues. Scientific research could provide theoretical and methodical foundations for deepening the health culture development and related health education of the population in the future.

## 6. PUBLICATIONS IN THE TOPIC OF THE THESIS


1. *Baranyi, B.* 2008: Észak-alföldi régió a „régiók Európájában". [In: Baranyi B. (edit.): Észak-Alföld.] Pécs–Budapest: MTA Regionális Kutatások Központja – Dialóg Campus Kiadó. (Kárpát-medence régiói, 8. volume. – Editor of series: Horváth Gy.) 23–50.
2. *Baranyi, B. (edit.)* 2008: Észak-Alföld. Pécs–Budapest: MTA Regionális Kutatások Központja – Dialóg Campus Kiadó. (Kárpát-medence régiói, 8. volume. – Editor of series: Horváth Gyula.)
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11. *Pulay, Gy. – Benkő, J.* 2008: Összegző, helyzetfeltáró tanulmány. A magyarországi cigányság helyzetének javítására és felemelkedésére a rendszerváltás óta fordított támogatások mértékéről és hatékonyságáról. [Báger G. (edit.)]; Állami Számvevőszék Fejlesztési és Módszertani Intézet, 2008. April.
12. *Tokár, Zs. – Kohut, Zs. – Ragó, M.* 2005: Észak-Alföldi Regionális Népegészségügyi Jelentés 2005. Országos Epidemiológiai Központ. Országos Tisztifőorvosi Hivatal. Budapest. http://www.egeszsegmonitor.hu/dok/Eszak-Alfold-web.pdf


**Internet reference**


1. Net1: 46/2003. (IV.16.) OGY határozat az Egészség Évtizedének Johan Béla Nemzeti Programjáról. http://www.oefi.hu/nepeuprg.pdf (2011.04.11)

## 7. LIST OF PUBLICATIONS BY THE CANDIDATE IN THE TOPIC OF THE THESIS, INDICATING ALL AUTHORS

**Scientific paper in foreign, domestic, proofread journals:**

1. *Balatoni, I.* 2011: The effect of health culture on regional competitiveness – description of an analysis model Acta Agraria Debreceniensis. University of Debrecen Journal of Agricultural. [Accepted for publication.]
2. *Balatoni, I.* 2011: Equal opportunities and regional inequalities. Acta medicinae et sociologiae. [Accepted for publication.]

**Foreign language, proofread, conference publication:**

3. *Balatoni, I.* 2010: The role of regional university centers in developing a healthy lifestyle; Regional responses and Global Shifts: Actors. [In: Institutions and Organisations Annual International Conference 2010.] Pécs. Hungary. 24th-26th May. 15. ISBN 978-1-897721-36-0;

**Hungarian, proofread, conference publication:**

4. *Balatoni, I.* 2009: Az egyetemi központok szerepe a régiók versenyképességének növelésében. [In: 15th „Building Services, mechanical and Building Industry Days" International Conference.] Debrecen. October 15–16. 2009; 280-289. ISBN 978-963-473-315-7;

**Hungarian, non-proofread, conference publication:**

**5.** Vargáné Szűcs, E. – *Balatoni, I.* 2008: Minőség és versenyképesség. III. Debreceni Kiválóság Konferencia. Debrecen. May 21–23. 2008

**Hungarian abstract:**

6. Molnár, P. – *Balatoni, I.* 2007: Betegelégedettség: ami a számok mögött van. ISO 9000 Fórum XIV. Nemzeti Konferencia: „Versenyképesség – fenntartható fejlődés". Balatonfüred. September 13–14. 2007