A Spatial Analysis of the Socio-economic Structure of Bonyhád Based on the Census of 1869*

Réka Gyimesi and Dániel Kehl
University of Pécs, Faculty of Humanities
gyimesi.reka@pte.hu

In this study, we examine the social structure of Bonyhád, a multi-ethnical and multi-confessional Transdanubian town in Tolna County. We analyze the individual level data of the census of 1869 and offer a visual rendering of the results on a historical map of the town. The surviving material of this inventory covers the entire population of Bonyhád, providing a detailed picture about 6,036 inhabitants. Records include the names, sex, birth year and place, marital status, occupation and occupational status, literacy, residence, and whether the person in question was present or absent at the time the census was taken. As in Tolna County a cadastral survey was finished in 1866, a contemporary cadastral map is also available. Combined, these sources provide rich information about the spatial structure of the town, because the coordinates are also available using the mapire.eu website, which is overlaid on the OpenStreetMap and the HERE satellite base map. One can use the degrees of longitude and latitude of each household and study the census and the map together in R, a free software environment for statistical computation and graphics.

Bonyhád was the economic center of a small region and had a position of strategic importance in the control of local trade routes. After the end of the period of Ottoman occupation, German settlers arrived and lived alongside the original Hungarian and Serb population. Later, a significant Jewish community settled in the area in the eighteenth and nineteenth centuries. The denominational composition of the population, according to the census of 1869, was 41 percent Roman Catholics, 31 percent Lutherans, 5 percent Calvinist and 23 percent Jewish. The analysis of the census-based information and the visual rendering of the results on the cadastral map explain valuable details about the socio-economic structure of Bonyhád, including the question of segregation, which would be difficult to demonstrate on the basis of qualitative sources, as is typically the case with historical research.

Keywords: socio-economic structure, spatial pattern, R software, segregation, nineteenth c. censuses

---

* Supported by the UNKP-18-3-IV-PTE-323 New National Excellence Program of the Ministry of Human Capacities.

---

Introduction

Bonyhád acquired central functions in the Völgyseg, which can be described as an agricultural region in Tolna County. The settlement started to develop dynamically in the eighteenth century due to its role as a “geographical gate.” A trade route led through it, and two bridges made it possible for travelers to cross the valley. According to the secondary literature on the local history of the area, this increasingly urbanized town evolved into an industrial-commercial center, which became a market town in 1782 with the right to hold four fairs per year. In the 1850s, Bonyhád turned into the administrative center of the executive unit, called Völgyseg (which essentially means valley region).1 In the work of Vera Bácskai and Lajos Nagy on the urban structure of Hungary, Bonyhád was introduced as a settlement with local significance. Its fairs were mainly visited by its own inhabitants, as they did not attract people from a larger range.2 This essay also emphasizes the role of local merchants in arranging trade through Tolna County.3

After the Ottoman Era, the town was inhabited by Calvinist Hungarians and Orthodox Serbs, but a few years later, the settlement was considered uninhabited territory. Large-scale German settlement started in the early eighteenth century. It enjoyed the support of the state and the secular and clerical landowners, who sought to repopulate their lands. As a result of this process, Bonyhád evolved into a town with a Roman Catholic German majority.4 While in 1715, records indicate only seven Hungarian and nine Serb families were counted, in 1728 42 Hungarian and 15 German families were paying taxes, and in 1748, these figures had shifted to 11 Hungarian and 29 German families.5 Until the middle of the following century, the number of inhabitants steadily increased. In 1785, there were 2,999 people living in Bonyhád. By 1828, this number had risen to 4,639, and the census in 1850 indicated 6,524 inhabitants and the one in 1857 indicated 6,371.6

The German settlers were not all Roman Catholic. A large number of Lutherans also arrived. German Calvinists from Hessen settled in Bonyhád as they

---

1 Szőts, A válogatott nemzetiség-székhelyek együttese, 196.
3 Ibid., 252.
6 Magyarország történeti statisztikai helyszínértéke, 42.
did in other towns in Tolna County, but they mostly assimilated into the Lutheran majority. Hungarian were Roman Catholics and Calvinists. In the eighteenth century, the settlement of Jews in the town began, a process which peaked in the 1780s, when there were more than 400 Jewish inhabitants in Bonyhád. As a result of the abovementioned denominational mix, five denominations and four churches were found in Bonyhád in the period in question. By the beginning of the nineteenth century, alongside the Roman Catholics, Calvinists and Lutherans were also building churches in the town, and a synagogue was also constructed.

Sources and Methods

The analysis was based on the individual sheets of census 1869, which contain data concerning people living together in the same households. The fact that this source is even extant is exceptional, as the original individual sheets survived only in the case of a few settlements of present-day Hungary.

Bonyhád offered a good research opportunity given the survival of these sources, and the population was heterogeneous from the religious and socio-economic perspective.

In our analysis, we examined and combined housing statistics and individual level data of inhabitants from the census material and projected the results on the nineteenth-century map of Bonyhád. In the first place, we concentrate on the denominal and occupational distribution of the population and the connection between these two variables. Our aim in this study is empirically to test some of the well-known relations between religious belonging and occupations (for example Jews were mainly occupied as merchants) and to compare results of previous studies to the data regarding Bonyhád. While there was no religious pattern or concentration of inhabitants in Sátoraljaújhely besides that of the Jewish population, we can assume that the results will be different in the case of a resettled community.

According to the census, of the altogether 6036 inhabitants of Bonyhád in 1869, 2,961 were males and 3,075 were females, which means a sex ratio of 1,038 females to 1,000 males. The census registered housing statistics on a separate sheet (location, number of rooms and outbuildings, whether the building served as a place to live only or also as a shop, etc.), as it did in the case of domestic animals. On the middle sheet, the name, sex, year and place of birth, religion, marital status, occupation and occupational status, residence, presence or absence, and literacy of the inhabitants were given. Comments involving factors like e.g. illness, military service, place of absence, etc. were written in the last column. In cases of multiple households sharing the same house, a vertical line separated the Wohnpartei.

The numbering of the houses was continuous in the settlement, so the figures started from one and increased to the number of the last house of the town, independently of the streets. 1306 Wohnparteien lived in Bonyhád in 763 houses, which means 1.7 households per houses. This figure is higher than the average for Pest County (1.3–1.4). The average size of households was 4.6 persons, which correspond to the national average at the time.

In the course of our investigation, we applied five broader categories of occupations in order to increase the efficiency of analysis. We employed the method introduced by Péter Óri and Levente Pakot, who created the following socio-professional groups based on HISCLASS: (1) Groups of higher status (non-manual), (2) Craftsmen (artisans and merchants), (3) Farmers (landowners), (4) Groups of lower status (unskilled) and (5) Other.

---

7 Schmidt, Német telepesek borsodítása, 81.
9 Szita, A lutheránus nemzet meghatározása, 7–8. Fényes, Magyarország geográfiai régészete; Bonyhád, 238.
10 TML V. 709./c
12 Katus, Modern Magyarország, 158, 175.
13 Where a similar investigation was carried out for the census sheets of 1869.
14 Demeter and Bagdi, A társadalom differenciáltsága, 17.
15 The problematics of Wohnparteien is inevitable for researchers who are working with census materials. The expression was transferred to the Hungarian vocabulary from the German instructions for the census in 1850. The differentiation of the notions of Wohnpartei and households led to difficulties and differences in interpretation because of varying practices used by the census takers. Detailed explanation of this topic: Óri and Pakot Residence patterns, 14–15; Óri and Pakot, “Háztartásszerkezet,” 169–71. In our analysis, we use the notion of Wohnpartei in the sense of households adjusting to the practices of census takers.
16 Óri, “Család és háztartás,” 75. The difference can be caused by the abovementioned diversity of the practices of census takers, but in all likelihood it shows real disparity.
18 Almost two hundred different occupations were identified in this column.
19 Van Leeuwen and Maas, HISCLASS.
We do not endeavor or claim to offer any detailed examination of demographic characteristics like marital customs or the number of children in a family without the use of parish registers. We cannot arrive at reliable conclusions concerning demographic phenomena exclusively on the basis of census data, because census data provide detailed information on the population on a particular date. We know how many people lived in the town on December 31, 1869, but we have no information concerning the total number of children who were born in the family or the number of those who left their homes. Likewise, we do not know how many children were born after this day in the same family. The census material makes possible the analysis of the spatial pattern of the distribution of the household-types using Laslett’s categories. Laslett’s method introduced categories based on the relationships among the household-members, not the number of the inhabitants, so the uncertainty caused by the lack of all the life events can be solved by drawing on his work. Using the census data, we also can analyze the spatial distribution of the age-groups, but neither the age-distribution nor the Laslett classification showed characteristic spatial arrangement, so we decided to exclude these aspects in what follows.

We also examined household members who were not blood-related to the family, like servants or apprentices, and we compared them to their employers from the perspective of their religion or place of birth. Although there is a column for residence in the census sheet, in our opinion it’s not suitable to distinguish so-called foreigners from the resident population, because this distinction only refers to the period during which these people lived in the same place, not their origin (place of birth). The numbers of these columns confirm our assumption. 87 percent of the population belonged to the resident category according to which division, but only 75 percent had been born in Bonyhád.

In the second half of the nineteenth century cadastral surveys were carried out in the Crownlands of Hungary, beginning in 1856 in the western part of the country and heading eastward. The survey of Tolna county was completed in the mid-1860s. Thus, we have a cadastral map from Bonyhád which is contemporary with the census. A historical map includes valuable information about the geographical situation of the town, but on the homepage of Mapire digitalized maps are available with coordinates. The webpage combined the historical maps with OpenStreetMap and Google Maps.

By analyzing the spatial structure based on census data, we aimed to use free and/or open source software solutions that are also capable of performing transformations of raw data and proper statistical analysis. This approach makes this research much more reproducible and could help researchers conduct similar studies in the future. Steps followed in creating the maps are to be found at the end of our study in the annex.

Spatial Distribution

Housing statistics

Data from the census enable us to investigate housing circumstances of the inhabitants of Bonyhád. The differences are best shown by the population density (mean number of residents in a room). This value is 2.64 people/room on average in Bonyhád according to the 1869 census. However, there are differences among the houses in this respect, as shown on figure 1.

As the map shows, most of the houses had a population density around the mean of 2.64, but there are some houses where more than four inhabitants shared one room. In the southern and southeastern parts of the town, we see buildings with low population densities. These bigger houses were owned by the Perczels and other landowning nobles. According to the map, in several cases, there were parks or large gardens on these properties behind the house. Of the 763 houses of the settlement, only 20 were two-story houses. The largest number of rooms was 23 in one house, but there were 20 households sharing the edifice, so number of rooms alone does not mean that the inhabitants were wealthy. That is why we decided to put the population density on the map, and based on the result, we can conclude that Bonyhád was more an agricultural settlement than urban.

---

21 Laslett, *Introduction*, 1–89.
22 “filling in the column of ‘citizenship’ notice, according to which everyone who has been settled in the community for a year now and has lived there permanently and has no residence in another village at the time of the census is a resident.” *Népszámlálás 1869*, 4.
25 https://mapire.eu/hu/
26 Demeter and Bagdi did a similar analysis of the spatial patterns of settlement in Sátoráljaújhely. Our study attempts to reflect their aims. Demeter and Bagdi, *A társadalom differenciáltsága.*
27 The same indicator in Sátoráljaújhely in 1869 is 2.9 people/room (1.5 room/family), which means that in Bonyhád less residents were living in one room on average. Demeter and Bagdi, *A társadalom differenciáltsága*, 19.
Spatial distribution of denomination

Based on census data, Bonyhád had 2,463 Roman Catholic (40.8 percent), 1,890 Lutheran (31.3 percent), 1,359 Jewish (22.5 percent), 317 Calvinist (5.3 percent), and seven Orthodox (0.1 percent) inhabitants in 1869. In the literature, we find statements about the spatial patterns which agree in part with these figures. One source indicates that Hungarians settled down in the southern part of the town, while Germans chose the northern part. Others call the eastern line of houses the “Hungarian Bonyhád,” while the western line of houses was referred to as “German Bonyhád.” These two approaches were synthesized by Wilhelm Knabel, according to whom the two landholders of Bonyhád (baron Schilson and Ferenc Kun) split the settlement in 1729. To south and west of the main square, the “German village” developed, with the tavern, butchery, and three mills which belonged to the baron. Ferenc Kun gained the northern and eastern part of the settlement, the so-called “Hungarian village,” with the wine shop and the brewery. The part of the town inhabited primarily by German speakers tended to prefer Roman Catholic settlers, while the Hungarian-speaking community preferred Calvinists. Several Lutherans moved into the Hungarian part of the town from the surrounding settlements.

This statement is underpinned by the map showing the spatial distribution of denominations. Protestants are found in the northern part of the settlement, and Roman Catholics populated the south. Religion seems to have had a stronger effect on spatial patterns than nationality. Many sources also state that Lutheran and Calvinist settlers did not live in the German village, and both villages had inhabitants belonging to both nationalities. The contention that denominational belonging was the most important single factor in determining settlement patterns within the town is also supported by the placement of cemeteries and churches, which reflects the spatial distribution observable on our map. This confirms the sources cited and also shows that the religiously differentiated structure which evolved at the time of resettlement remained stable one century later.

Figure 1. Population density (people/room), Bonyhád, 1869
Jews formed their own closed community in the city center between the German and Hungarian villages. Their activities turned Bonyhád into the trading center of the region in this era.  

Spatial distribution of occupation

The census registered the occupation and occupational status of the inhabitants, and on the basis of this, we categorized the inhabitants of the settlement into the abovementioned five groups. These columns are usually left blank in the cases of women and small children, but data were available concerning household heads, older children, and other residents. Thanks to this data, we know the sources of income for 2,155 inhabitants of Bonyhád. Broken down into occupational groups, 99 of these people belonged to a stratum which had a higher status (they performed non-manual labor), 462 were artisans and merchants, 228 were landowners, and 1,302 were members of lower strata (i.e. unskilled laborers). 64 people couldn't be categorized into the abovementioned classes (e.g. almsmen).

As over half of the inhabitants belonged to the unskilled category, which is in line with the agricultural characteristics of Bonyhád, we decided to create two subcategories. One of them includes unskilled agricultural workers only (e.g. unskilled farm workers, farm servants), while the other consists of unskilled workers who worked together with artisans (e.g. apprentices, journeymen) and other servants and maids.

As can be observed on the map, most of the merchants and artisans lived in the center of the settlement, while the northern and southern parts of the settlement were populated by landowners, especially the Protestant parts. Using our subcategories, we acquire a more detailed picture of the spatial pattern of the unskilled stratum: the distribution of unskilled workers reflects that of the artisans and landowners (agricultural unskilled workers lived outside the center of town, while apprentices and journeymen in the center). The inhabitants who did non-manual labor and therefore belonged to a higher social stratum also tended to live in the middle of the settlement.

The spatial distribution of different occupations is quite different. In some cases, artisans with the same profession lived throughout the settlement (e.g. masons), while most of the merchants were concentrated in the center, as were tailors. Weavers were only found on the periphery. Innkeepers and tavern
owners opened shops both in the center and next to commercial routes in the southeastern area.

Occupation and religion

The settlement pattern according to denominational belonging shows similarities to that of occupation shown on the previous maps. We further analyzed this relationship between occupational class and denomination (leaving out Orthodox inhabitants due to their small number, we had information concerning the denominational belonging of 2,150 residents of the town). The resulting cross table shows a significant association between the two variables (p<0.001).

Table 1 shows the distribution of occupational groups within each of the four big denominations. The higher status group comprised 4.5 percent of the total population. This figure is somewhat less among Lutherans and higher in the case of Calvinists and Roman Catholics. The proportion of artisans is clearly highest among inhabitants belonging to the Jewish community (around 40 percent). It is close to 20 percent in the case of Roman Catholics and remains below 15 percent in the case of Protestants. Farmers made up almost 20 percent of the Lutheran and 15 percent of the Calvinist communities, while the ratio is below nine percent for Roman Catholics and under one percent in case of Jewish inhabitants. As we have already seen, the largest group was comprised of unskilled workers. Their proportion of the population remained under 50 percent in the case of Jews, but for people belonging to Christian denominations, it is between 60 and 66 percent. The last (Other) group has a low percentage of unskilled laborers, with minor differences between denominations.

<table>
<thead>
<tr>
<th></th>
<th>Lutheran (percent)</th>
<th>Calvinist (percent)</th>
<th>Roman Catholic (percent)</th>
<th>Jewish (percent)</th>
<th>Total (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>1.21</td>
<td>6.62</td>
<td>6.54</td>
<td>4.50</td>
<td>4.51</td>
</tr>
<tr>
<td>Artisan</td>
<td>14.42</td>
<td>11.03</td>
<td>19.61</td>
<td>40.05</td>
<td>21.49</td>
</tr>
<tr>
<td>Farmer</td>
<td>18.82</td>
<td>14.70</td>
<td>8.68</td>
<td>0.71</td>
<td>10.60</td>
</tr>
<tr>
<td>Unskilled laborer</td>
<td>64.34</td>
<td>66.18</td>
<td>61.74</td>
<td>49.53</td>
<td>60.42</td>
</tr>
<tr>
<td>Other</td>
<td>1.21</td>
<td>1.47</td>
<td>3.43</td>
<td>5.21</td>
<td>2.98</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Nearly 200 different occupations are mentioned in the census data. Most professions had only a few representatives in the settlement. However, there are quite different occupational patterns in the case of the four denominations. We conducted a correspondence analysis which revealed that the main difference was between members of the Jewish community and people who belonged to the three Christian denominations. Most of the professions were avoided by Jews, while some were dominated by them. In some cases, however, the denominational distribution reflects the proportions of the population. Examples of each case are presented in Table 2.

Table 2. Denominational patterns in selected occupations, Bonyhád, 1869

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Lutheran</th>
<th>Calvinist</th>
<th>Roman Catholic</th>
<th>Jewish</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenter</td>
<td>23</td>
<td>4</td>
<td>31</td>
<td>0</td>
<td>58</td>
</tr>
<tr>
<td>Furrier</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Mason</td>
<td>11</td>
<td>3</td>
<td>26</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Merchant</td>
<td>0</td>
<td>0</td>
<td>17</td>
<td>60</td>
<td>77</td>
</tr>
<tr>
<td>Shoemaker</td>
<td>1</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Tailor</td>
<td>26</td>
<td>3</td>
<td>41</td>
<td>16</td>
<td>84</td>
</tr>
<tr>
<td>Tanner</td>
<td>24</td>
<td>3</td>
<td>42</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>Weaver</td>
<td>20</td>
<td>4</td>
<td>15</td>
<td>0</td>
<td>39</td>
</tr>
</tbody>
</table>

The relationship between denominations and occupations in itself is not novel, but the spatial analysis in this case of a resettled eighteenth-century town raises several questions. Sources and the map of the spatial pattern of denominations both underpin that the eighteenth-century separation of religions still strongly affected structure of society in the nineteenth century.

The relationship between Jews living in the settlement center and the concentration of artisans here seems obvious. For a long time, Jews were not allowed to own land.33 It is easy to see why they settled in the dense central parts of the town, where they could be more successful. But is the relationship between Protestants (in this case mainly Lutherans) and the class of farmers also that univocal? One simple explanation might be that the main goal of recruiting German settlers was to find farmers to (re)cultivate abandoned lands. However, sources and contemporary laws show evidence that allowances were given not only for agricultural workers, but also to artisans.34 New settlers arriving to Bonyhád were not only agricultural workers but also artisans. It seems clear that the settlement patterns in the eighteenth century were based on denomination, but the question remains: did this also cause the occupational differences, or did inhabitants adapt to this spatial structure and chose their occupation accordingly? In other words, the direction of the possible causal relationship between denomination and occupation is still unclear and requires further investigation.

Non-relatives – cooperation and separation

According to the census data, the denominations of servants and maids corresponded to the denomination of their employers. We also analyzed the birthplace of this group of non-relatives living together with a family, which was the most mobile stratum of the population of Bonyhád. Regarding the presence/absence columns, 498 people were absent (five people only temporarily), who were listed mainly as children in the households. Their occupations were not given in every case, but otherwise they were servants, maids, apprentices, journeymen, or people serving in the military, which demonstrates the extent of the mobility of these groups.

Table 3 presents the denominational or religious belonging of servants and maids alongside the denominational or religious belonging of their employers.

---

33 Jews only began to be permitted to settle freely, engage in a trade freely, and purchase land in the 1840s. Katus, Modern Magyarország, 107.

34 The laws of Charles III encouraging resettlement with “1723. évi CIII. türelmési az ország béntételezéséről” [law of populating the country] (promising 6 years of tax exemption for every free person). In the same year, another law arranged for the “support for the arrival of various craftsmen to the country” (1723. évi CXVII. türelmési), promising 15 years of tax exemption for them. Landlords also wanted to find workers to work on their estates, so in the early eighteenth century, they began to offer three years of tax exempt-status for the arable lands and mills and six years for the vineyards. Szilágyi, “Újratelepülő Tolna,” 35.
Table 3. Religion or denomination of servants and their employers, Bonyhád, 1869

<table>
<thead>
<tr>
<th>Servant’s denominational belonging</th>
<th>Lutheran (18)</th>
<th>Calvinist (7)</th>
<th>Roman Catholic (44)</th>
<th>Jewish (37)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lutheran</td>
<td>15</td>
<td>2</td>
<td>10</td>
<td>5</td>
<td>32</td>
</tr>
<tr>
<td>Calvinist</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Roman Catholic</td>
<td>4</td>
<td>8</td>
<td>54</td>
<td>18</td>
<td>84</td>
</tr>
<tr>
<td>Jewish</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>11</td>
<td>70</td>
<td>39</td>
<td>140</td>
</tr>
<tr>
<td>Born in Bonyhád</td>
<td>5</td>
<td>1</td>
<td>11</td>
<td>7</td>
<td>24</td>
</tr>
</tbody>
</table>

Of these 140 servants, 28 were males and 112 were females. Therefore, in all cases the number of females was always higher than the number of males. All of the servants employed by Jewish households were female, including 13 Jewish maids. Jewish servants only served in Jewish households. We can observe a more open pattern among Roman Catholics and Protestants, and not only in the case of servants and maids, but also in the case of the craftsman-apprentice relationship (Table 4).³⁵

Table 4. Religion of apprentices and their employers, Bonyhád, 1869

<table>
<thead>
<tr>
<th>Apprentice’s denominational belonging</th>
<th>Lutheran (28)</th>
<th>Calvinist (1)</th>
<th>Roman Catholic (42)</th>
<th>Jewish (19)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lutheran</td>
<td>12</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Calvinist</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Roman Catholic</td>
<td>24</td>
<td>2</td>
<td>67</td>
<td>5</td>
<td>98</td>
</tr>
<tr>
<td>Jewish</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>2</td>
<td>80</td>
<td>23</td>
<td>142</td>
</tr>
<tr>
<td>Born in Bonyhád</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>15</td>
</tr>
</tbody>
</table>

On average, Roman Catholic heads of household employed the most servants (77 servants for 44 households) and apprentices (80 apprentices for 42 craftsmen). The most frequent number of servants/apprentices was one, but

³⁵ The isolation among denominational and occupational groups is observed in the case of marital customs. Roman Catholics and people belonging to the Orthodox Church were more closed in this respect than Lutherans and Calvinists. Marriage between Catholics and Jews was not allowed until the end of the nineteenth century. Lippényi et al., “Social status,” 8.
there were some exceptions. In Tables 2 and 3, the number of servants and apprentices who were born in Bonyhád is also presented. In all cases, we can see that the proportion of local born employees is quite low. This suggests that mobility was relatively high among members of this group.

Summary

Based on the census of 1869, we examined the socio-economic spatial structure of the agricultural settlement of Bonyhád using the cadastral map from the 1860s as a visualization tool. After a short introduction of housing data in general, the study focused on settlement patterns according to denomination and occupation. We verified that resettlement still had a strong influence on the denominational structure of the community in the nineteenth century. We demonstrated a statistically significant relationship between religion and occupation. Further analysis was completed about the denomination of non-relatives and households living together. As a result, we offered statistical evidence in support of contentions found in qualitative secondary literature and earlier studies according to which Jewish society in the town was much more closed than the Christian denominations. They only worked in houses belonging to people of their own religion and they lived in a well-separable place in the town center. Spatial patterns were investigated for every profession and some of them were represented on maps. In some cases, a particular occupation seemed to predominate among the community which belonged to a particular denomination, while other occupations seemed to have been less connected to a given religion or denomination. The study also indicated the complexity of the society under study and concluded that resettlement was an important factor which influenced the socio-economic and denominational structure of the town even a century later.

Our results underpin the strong relationship between denomination and occupation and settlement patterns within the town. However, the direction of the causation needs further investigation, as an important question remains unanswered: did the settlement patterns influence occupation, and if so, to what extent, or did settlers find their homes based on their profession.

Annex

Four steps were taken to complete the maps presented later in our paper:

1. based on the historical map, polygons were defined which represent houses, and they were used to connect data concerning inhabitants and their houses to the map;
2. the file containing the historical map was read into R and GPS coordinates were added;
3. polygons were read into R;
4. statistical calculations were made and the final maps were created based on previous results.

The first step was done in Inkscape, a free open source vector graphics editor. Inkscape uses the open standard SVG (Scalable Vector Graphics), which enables us to create small but scalable graphics. All other steps were performed in R, which is a free and open source software environment for statistical computing and graphics. The open source status makes it possible for users to contribute their own code to a central repository (CRAN). These contributions are called packages, and the number of packages grows rapidly. There are over 13,000 packages at the moment, and we use some of them for data manipulation and to create maps.

The resolution of the base map is 3080 x 6925 pixels. We read the base map into Inkscape and then used the appropriate tool to draw linear polygons on another layer to represent houses. The so-called Draw Bezier curves and straight lines tool seemed to be the best choice, as it is able to snap nodes to polygons which have already been defined, which means we could easily draw polygons which are perfectly matching and which cover the entire map. One property

---

36 The results of analysis of employees partly correspond to the conclusions in case of Sátoraljaújhely (e.g. Jewish servants/maids served in Jewish households), but some issue was different according to the data of Bonyhád. The phenomenon of Calvinists preferring employees from the same denomination was not confirmed by our data, but the reason behind this could be the small number of Calvinists in Bonyhád.
37 The employees emerged from younger age-groups than the average (the mean age of the total population in Bonyhád was 26.75, while in the case of servants it was 25.84 years and in the case of apprentices it was 25.91 years. Most of them were single, which fits the lifecycle-servant part of Hajnal’s theory (Hajnal, “European marriage patterns”). Hajnal thought this was a West European phenomenon, but more research has shown that this statement should perhaps be reconsidered. This topic is discussed in Faragó, “Különböző háztartás-keletkezési rendszerek.”
of all objects in Inkscape is their ID, where we used the house numbers of the census to make it easier to connect polygons to census data later on. Filling the polygons which had already been drawn with a somewhat transparent color makes the manual process even simpler.

As a result, we created a vector graphic map of nineteenth-century Bonyhád which is zoomable, small, and easy to read. There are several format options available to store polygon data. We chose the so-called absolute coordinates (instead of relative coordinates), which are easier to process in R as an XML file. Once we finished drawing all the polygons, we could remove the base map and save the final vector graphic map of the settlement.

In the R environment, there are several plotting packages. We used ggplot2\textsuperscript{41} and its extension for maps called ggmap.\textsuperscript{42} This latter package is applied to create visual renderings of spatial data on top of static maps from various online sources (Google Maps, OpenStreetMap, Stamen Maps or CloudMade). The package assumes that one is plotting on a map which comes from the abovementioned online sources. However, we can convert our png file to a ggmap object by adding the bounding box data (lower left und upper right corner GPS coordinates). As a result of several lines of code in R, we now have a high resolution ggmap object which contains a raster and its place in the GPS coordinate system. As this is the basis of all the maps, we saved this into the native R datafile (RDa).

The next step was to read and convert the polygon dataset in R. As already mentioned, the svg file we created in the first step is basically an xml file which contains all polygons in nodes called path. All paths have multiple attributes, but we only need the ones named “d,” which contain the coordinates (in pixels), and the ones named “id,” which contain the house numbers. Reading and converting polygons to the GPS coordinate system enables us to produce different types of maps. On one side, we can draw the polygons with different colors representing various characteristics of the given house (e.g. population density, meaning people/room). On the other side, in several cases we plotted characteristics of the inhabitants of a given house. For instance, we put (equal size) pie charts in the center of the polygon (this approach seemed appropriate as the religion or denominational belonging of the inhabitants of a given building was usually not the same). We drew this type of map using the scatterpie package.\textsuperscript{43}

\textsuperscript{41} Wickham, ggplot2.
\textsuperscript{42} Kahle and Wickham, ggmap.
\textsuperscript{43} Guangchuang, scatterpie.
Archival Sources

Tolna Megyei Levéltár [Tolna County Archives] (TML)

V. 709./c Közigazgatási iratok 1850–1949 [Administrational Documents, 1850–1949].

Bonyhád nagyközség iratai, 1869. évi népesség és háziállatok összeírása [Documents of Bonyhád, Census of 1869 and the Enumeration of Domestic Animals]. 512–513. box

Bibliography

Printed sources

A Magyar Korona Országaiban az 1870. év elején végrehajtott népszámlálás eredményei a hasznos házi állatok kimutatásával együtt [Census 1870 in the Crownlands of Hungary, together with the numbers of farm animals], edited by Országos Magyar Királyi Statisztikai Hivatal. Pest: Athenaeum, 1871.


Secondary literature


