Causes of death in children of the Kvarner Bay area (western Croatia) in the 19th century

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Abstract. Aim: To analyze the rates and causes of death in children in four towns in the Kvarner Bay area (western Croatia) in the 19th century. Materials and sources: The analysis is based on data collected from the Death Register kept at the State Archives of Rijeka. Death records were translated into English and arranged according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). We analyzed a sample with a total of 5,462 death records, which included six age groups: newborns, infants, toddlers, preschoolers, schoolers, and adolescents. Results: In nearly all the age groups the leading causes of death were “Symptoms, signs and abnormal clinical findings, not elsewhere classified”, while the second leading cause of death was “Certain infectious and parasitic diseases”. Compared to the surrounding towns, Rijeka showed the most favorable trends in the death rate, which seems to reflect improvements in health care. Conclusion: Our results represent an original contribution to the historical study of child mortality, with the application of the ICD-10, enabling a more precise insight and comparison between historical and modern epidemiological data.

Key words: 19th century; child mortality; Croatia; History of medicine


Ključne riječi: 19. stoljeće; Hrvatska; povijest medicine; smrtnost djece

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INTRODUCTION

This study continues our long research of demographic changes in the Kvarner Bay area (western Croatia) in the 19th century. Tradition and our preliminary research suggest that this historical period saw high death rates among children. In fact, of all the deaths we recorded as part of our larger research, nearly 63% occurred in children. We felt that this outstanding information deserved to be further investigated. Our idea was to analyze and present relevant data related to the rates and causes of death by the age of 19 years.

Several local and national sources published incidental data in the mid and end 19th century, but without much of an impact. These were also times that saw the pioneering attempts in social medicine by two physicians of Rijeka, Giovanni Spagnolo and Antonio Felice Giacich. They published two booklets on health education of mothers and children as a way to combat high morbidity and death rates in children.

Dr. Giacich supported his arguments with devastating mortality data for infants of Rijeka, and compared them with several other localities in the region and across the Austrian Empire and other Central and Western European countries. Infant mortality in Rijeka was about 270‰ according to Giacich’s data, which is very similar to rates in neighbouring countries and major European cities. For example, the infant mortality in Hungary was 282‰, in Italy 217‰, and the capital Vienna 248‰.

In the towns of Kvarner, the share of infants in overall mortality was 24% for Bakar and up to 33% for Rijeka, and for children under five between 40% and 56%, which was also confirmed in this research. However, because of the inconsistencies in registration (under-registration), especially in smaller communities, it should not be taken for granted.

As no other sources speak about child mortality in Rijeka and the Kvarner region of the 19th century, or even in a wider area, we felt that our research was justified in filling that gap.

According to a similar, more recent research, generally speaking, child mortality in the general population ranged between 100 – 250‰ in most European cities during the nineteenth century, and the situation was similar in USA and Japan. The current studies treat the mortality of children in several ways. They show the circumstances in particular cities, compare urban with rural regions, compare groups of children in different religious communities, and highlight the negative effects of migration on illness and dying of children. However, they also record the preventive attempts to improve health care for children and the positive steps in reducing child mortality.

In nearly all the age groups the leading causes of death were “Symptoms, signs and abnormal clinical findings not elsewhere classified”, while the second leading cause of death was “Certain infectious and parasitic diseases.” Compared to the surrounding towns, Rijeka showed the most favourable trends in the death rate, which seems to reflect improvements in health care.

Today, these and similar researches are justified both from the classical historiographic, as well as the practical and scientific-medical point of view. The new insights of epidemiological and demographic conditions in the 19th century encourage to additional possibilities of evaluation of the progress of medicine and health care in the past and oblige to the continuation of search for new opportunities and ways of preservation and improvement of health, in this case, of children and youth.

MATERIALS AND SOURCES

We used registries of death of four parishes, now kept at the State Archive in Rijeka and Archive of the Parish of the Assumption (of the Virgin Mary), which covered nearly all of the Rijeka population of the time. The parishes include two relatively large harbors: Rijeka and Bakar and two smaller inland towns: Kastav and Grobnik. Data were collected for the first years of each decade of the 19th century. We relied on literature describing methodological approach to registries and on research covering periods.

The geographic and chronological distribution of data justifies this sampling method, which covers 10% of the total data.
The application of ICD-10 has given a far more precise insight into the real causes of infant death and has made it possible to compare historical and modern epidemiological data. This may shed some light on the links between economic, social, and public health development on one side, and general demographic parameters on the other.

Table 1. Deaths per examined years in Rijeka, Bakar, Kastav and Grobnik

<table>
<thead>
<tr>
<th>Year</th>
<th>Rijeka</th>
<th>Bakar</th>
<th>Kastav</th>
<th>Grobnik</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800.</td>
<td>212</td>
<td>203</td>
<td>200</td>
<td>69</td>
</tr>
<tr>
<td>1810.</td>
<td>598</td>
<td>196</td>
<td>238</td>
<td>62</td>
</tr>
<tr>
<td>1820.</td>
<td>260</td>
<td>98</td>
<td>172</td>
<td>31</td>
</tr>
<tr>
<td>1830.</td>
<td>357</td>
<td>265</td>
<td>360</td>
<td>130</td>
</tr>
<tr>
<td>1840.</td>
<td>416</td>
<td>132</td>
<td>227</td>
<td>50</td>
</tr>
<tr>
<td>1850.</td>
<td>399</td>
<td>124</td>
<td>198</td>
<td>48</td>
</tr>
<tr>
<td>1860.</td>
<td>500</td>
<td>93</td>
<td>213</td>
<td>77</td>
</tr>
<tr>
<td>1870.</td>
<td>841</td>
<td>149</td>
<td>196</td>
<td>73</td>
</tr>
<tr>
<td>1880.</td>
<td>728</td>
<td>133</td>
<td>167</td>
<td>58</td>
</tr>
<tr>
<td>1890.</td>
<td>1,249</td>
<td>129</td>
<td>460</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>5,560</td>
<td>1,522</td>
<td>2,431</td>
<td>655</td>
</tr>
<tr>
<td>Children</td>
<td>3,104</td>
<td>747</td>
<td>1,276</td>
<td>335</td>
</tr>
</tbody>
</table>
ing to the block P07 “Disorders related to short gestation and low birth weight, not elsewhere classified”. Follow diagnoses of the block P95 “Foetal death of unspecified cause”, including natus mortus (stillborn, born dead), debilitas vitalis congenita (congenital vital weakness), and inanitio (inanition).

Of 1,347 infant deaths, most belong to the block R50-69 “General symptoms and signs”, and the most common descriptions coincide with those for newborns, including consumptio (consumption, wasting), convulsiones, eclampsia, inanitio, and spasmus (cramps). Follow the causes described in ICD-10 chapter I, including diptheria, morbilli (measles), and pertussis (whooping cough), then Chapter XI causes including gastro-enteritis, enteritis and diarrhoea as the most common. Bronchitis and pneumonia (chapter X) were the 4th leading cause. Debilitas vitalis (vital weakness, chapter XVI) and hydrocephalus (chapter XVII) were also reported.

In toddlers (1 to 3-year-olds), the most common diagnoses of the cause of death were similar to the previous two age groups and include spasms (cramps), eclampsia, consumptio, and tabes (wasting), accompanied by adjectives such as infantile, intestinale, or mesenterica. Follow chapter I causes such as diphteria, morbilli (measles), scarlatina (scarlet fever), pertussis (whooping cough), and new diagnoses, including scrophulosis (scrofula?) and tuberculosis. The third leading group of causes belong to chapter X and include bronchitis, croup, and pneumonia. The fourth group (chapter XI) includes enteritis, gastroenteritis, and gastromeningitis. Other relevant causes include “Endocrine, nutritional and metabolic diseases” (chapter IV), the most common of which was rachitis (rickets) in 59 cases. Unspecified meningitis was recorded in as many as 53 of the 57 chapter VI diagnoses.

In preschoolers (4 to 6-year-olds), again the most common diagnoses were those of chapter XVIII, Table 2. Causes of child death in the 19th century according to the 10th revision of the International Statistical Classification of Diseases (ICD-10) by age groups

<table>
<thead>
<tr>
<th>Causes of death according to ICD-10</th>
<th>&lt; 1 month</th>
<th>1 – 11 months</th>
<th>1 – 3 years</th>
<th>4 – 6 years</th>
<th>7 – 12 years</th>
<th>13 – 19 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Certain infectious and parasitic diseases</td>
<td>11</td>
<td>122</td>
<td>381</td>
<td>187</td>
<td>125</td>
<td>102</td>
<td>928</td>
</tr>
<tr>
<td>II. Neoplasms</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>III. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>IV. Endocrine, nutritional and metabolic diseases</td>
<td>-</td>
<td>10</td>
<td>77</td>
<td>17</td>
<td>4</td>
<td>3</td>
<td>113</td>
</tr>
<tr>
<td>V. Mental and behavioural disorders</td>
<td>8</td>
<td>22</td>
<td>19</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>54</td>
</tr>
<tr>
<td>VI. Diseases of the nervous system</td>
<td>2</td>
<td>22</td>
<td>57</td>
<td>27</td>
<td>17</td>
<td>11</td>
<td>136</td>
</tr>
<tr>
<td>VII. Diseases of the circulatory system</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>VIII. Diseases of the respiratory system</td>
<td>6</td>
<td>110</td>
<td>310</td>
<td>79</td>
<td>42</td>
<td>33</td>
<td>580</td>
</tr>
<tr>
<td>IX. Diseases of the digestive system</td>
<td>7</td>
<td>120</td>
<td>134</td>
<td>19</td>
<td>18</td>
<td>12</td>
<td>310</td>
</tr>
<tr>
<td>X. Diseases of the skin and subcutaneous tissue</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>XI. Diseases of the musculoskeletal system and connective tissue</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>XII. Diseases of the genitourinary system</td>
<td>326</td>
<td>16</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>XIII. Diseases of the perinatal period</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>XIV. Congenital malformations, deformations and chromosomal abnormalities</td>
<td>3</td>
<td>14</td>
<td>31</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>XV. Certain conditions originating in the perinatal period</td>
<td>539</td>
<td>905</td>
<td>946</td>
<td>230</td>
<td>121</td>
<td>122</td>
<td>2.866</td>
</tr>
<tr>
<td>XVI. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>XVII. Injury, poisoning and certain other consequences of external causes</td>
<td>910</td>
<td>1.347</td>
<td>1.977</td>
<td>583</td>
<td>347</td>
<td>298</td>
<td>5.462</td>
</tr>
</tbody>
</table>

I. Certain infectious and parasitic diseases; II. Neoplasms; III. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism; IV. Endocrine, nutritional and metabolic diseases; V. Mental and behavioural disorders; VI. Diseases of the nervous system; VII. Diseases of the circulatory system; VIII. Diseases of the respiratory system; IX. Diseases of the digestive system; X. Diseases of the skin and subcutaneous tissue; XI. Diseases of the musculoskeletal system and connective tissue; XII. Diseases of the genitourinary system; XIII. Pregnancy, childbirth and the puerperium; XIV. Certain conditions originating in the perinatal period; XV. Congenital malformations, deformations and chromosomal abnormalities; XVI. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified; XVII. Injury, poisoning and certain other consequences of external causes; XVIII. External causes of morbidity and mortality; XIX. Factors influencing health status and contact with health services.
including *consumptio*, *eclampsia*, *spasmus*, and *tabes mesenterica*. Followed chapter I diseases, including *diphteria*, *scarlet fever*, *measles*, and *tuberculosis*. Of respiratory diseases (chapter X), the leading causes of death were *angina* (quincy, *cytanche tonsillaris*), *bronchitis*, and *croup*, and of the “Diseases of the nervous system” (chapter VI) nearly all descriptions fit meningeal syndrome. All 17 chapter IV cases were described as *rickets*.

In schoolers (7 to 12-year-olds), the most common causes of death were infectious (chapter I) diseases such as tuberculosis, *diphtheria* and *scarlet fever* followed by *consumptio*, *febris*, *spasmus*, and *eclampsia* (chapter XVIII). Of respiratory (chapter X) diseases, the most common were *bronchitis* and *croup*. These were followed by gastrointestinal and nervous system diseases.

In adolescents (13 to 19-year-olds), chapter XVIII diseases resume the leading position with *consumptio*, *spasmus*, *eclampsia* or other febrile conditions, followed by infectious (chapter I) diseases of which tuberculosis accounted for 40 deaths, while other, mostly children’s infections were far less common. The third leading cause of death were respiratory (chapter X) diseases with a similar distribution of bronchitis, pneumonia, and cold. Nervous and gastrointestinal system diseases were less notable but still relevant, while other diseases were rare.

Comparing causes of death in Rijeka and the other three cities we have got the following sequence and ratios: In the first place, equally in all four cities, as the leading causes of death are registered “Symptoms, signs and abnormal clinical findings not elsewhere classified” (between 26.1%, i 26.4%). While the second leading cause of death were respiratory (chapter X) diseases with a similar distribution of bronchitis, pneumonia, and cold. Nervous and gastrointestinal system diseases were less notable but still relevant, while other diseases were rare.

**DISCUSSION**

Before discussion of our results we will discuss the circumstances in the other areas of Croatia and compare them with today’s situation.

Due to these and similar shortcomings, the analysis of causes of death, especially in the early nineteenth century is still not possible from modern medical aspects. Therefore, this analysis should be accepted only as an effort to gain insight into the structure of dying.

Since 1815 the recording of infant mortality has gradually introduced in all parishes, and the official statistical data for Croatia are available since the 1874. During this period of time, a tremendous decline was recorded from 295.2 ‰ live births in 1874 to 7.0 ‰ live births in period from 2002 to 201255,56. All of this was achieved by long-lasting and successful implementation of appropriate prevention programs as part of a well-organized public health service57.

Among the latest researches in which are the deaths of children and youth especially treated, in the context of demographic transition in Croatia in the second half of the 19th century, most comprehensive project was conducted as part of doctoral study “Population History” at the University of Dubrovnik, from 2006 to 2008. The study was conducted on a sample of 12 selected parishes from all Croatian historical lands. By analysis of total mortality by age group and sex, and percent mortality of some groups in overall mortality in the
parishes it is found that traditionalism, isolation and varying degrees of involvement in the new development trends has significantly influenced mortality trends, most destructive in infant and child age, in the second half of the 19th century. There are very few contemporary studies of birth and death registries of the 19th century in western Croatia. One that stands out is by Avelin Baretić, who investigated records of baptism and death of the Mošćenice parish. However, his detailed analysis of the causes of death sticks to the nomenclature of those times. There are several differences between his study and our own. The most common cause of death in the Mošćenice parish (27%) in Baretić’s study is described as ordinary, a natural cause. This description has not been recorded in any of the records of the four towns in our study. Another striking difference is that as many as 17% of the death cases in Rijeka recorded 21 times more deaths in newborns due to congenital malformations and deformations than the remaining three towns, but this reflects the difference in who made the diagnosis.

**CONCLUSION**

Despite difficulties encountered while collecting, systematizing and evaluating primary data, we consider the presented results an original contribution to the study of local and general history of public health. Moreover, the application of ICD-10 has given a far more precise insight into the real causes of infant death and has made it possible to compare historical and modern epidemiological data. This may shed some light on the links between economic, social, and public health development on one side, and general demographic parameters on the other side.

**Conflicts of interest statement:** The authors report no conflicts of interest.

**REFERENCES**

5. Egidio L. La mortalità a Fiume. La Varietà 1886;5:51-3.
23. Alebić-Juretić A. Sanitary conditions in the city of Fiume Assumption (of the Virgin Mary).
50. Škrobonja A. Neke karakteristike mortaliteta u Župi Kvarner, 1815–1858. Rijeka: State Archive.