

Biological and social reasons of child mortality in the Danzig District in the second part of the 19th century

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ABSTRACT The purpose of this work is to characterise the child mortality in urban and rural areas of the Danzig (Gdańsk) District and in the city of Danzig, in the second half of the 19th century. The study material encompassed the demographic data on mortality coming from the 19th century Prussian statistical yearbooks. The basic mortality measures such as infant death rates, neonatal and post-neonatal death rates and child death rates were computed for selected years of the second half of the 19th century. Life tables were constructed in accordance with Halley's method and based on the assumption the population was of stationary type. Further, the causes of child deaths and the occupational structure of the families of deceased children were discussed.

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Introduction

There is a well-known and well documented thesis referring to both contemporary and past populations saying that social stratification affects both their physical development and biological status [BIELICKI *et al.* 1981, 1988, 1994; ROGUCKA 1995]. The issue of mortality in both the 19th century and contemporary Poland has been a subject of a number of studies and analyses [BOROWSKI 1967, HOLZER 1960, KĘDELSKI 1980, 1985, SZULC 1956]. Among other things, researchers investigated the differences in the life-span and age structure of the deceased in the 19th century urban and rural

populations [BOROWSKI 1967, KĘDELSKI 1980, 1985, KOZAK 1998], as well as mortality in the so-called “medial” period of life, meaning the mortality of individuals at the prime of their occupational, procreative and social activity [BIELICKI *et al.* 1994]. In the past centuries child deaths accounted for a prominent part of the total mortality. Childhood mortality meant “dropping out” of a part of population that would participate in the creation of a new generation in the future. It has been proved in numerous studies that social diversification according to the place of residence or social status has its effect on the life-span and the age structure of the deceased within a population [KĘDELSKI 1980, 1985, KOZAK 1998].

Due to the availability of rich historical and demographic documentation, the 19th century Danzig District has been a

subject of many studies. Researchers delved into its history over a century ago [BRANDSFÄTER 1879, FRIEDRICH 1895, WALLENBERG 1880] and they are doing so nowadays [LABUDA 1996, BUDNIK, LICZBIŃSKA 1997].

The purpose of the present work is to show in what way the type of life environment (large city, small town, rural area) affected child mortality in the Danzig District in the second half of the nineteenth century.

Materials and methods

The data on child (0-14 years of age) mortality in the Danzig District were derived from the original Prussian statistical yearbooks from the second half of the nineteenth century [*Preussische Statistik...* 1869, 1870, 1874, 1876a, 1876b, 1878, 1879a, 1879b, 1880, 1881, 1882]. Taking into account the social diversification resulting from the fact of residence in either urban or rural area, biological and social factors influencing the level of the death rates in the child population of the Danzig District in the second half of the nineteenth century were studied. Both for boys and girls who died in the period from 1865 to 1880, child (for 1862-1875) and infant (for 1866-1880) death rates were computed. Similarly, neonatal and postneonatal death rates (for 1875-1880) were calculated. Primary causes of death were also described (for 1879-1880) and socio-economic characterisation of the families of the deceased children (for the years 1875-1879) was prepared. Life tables were built with the use of Halley's method [ACSÁDI, NÉMESKERI 1970]. Due to the lack of detailed data on the life population of the Danzig District in the second half of the nineteenth century

it was assumed that the population was of stationary type. Nomograms and standard-errors tables of values of life expectancy were used in the assessment of discrepancies in e_x^0 values [HENNEBERG, STRZAŁKO 1975]. Further the *u*-test was employed to test the significance of the differences in the frequency of deaths [OKTABA 1976, STRZAŁKO, ROŻNOWSKI 1992].

Results and discussion

According to some researchers a sort of selection takes place at the beginning of life [ROSSET 1975]. A very large numbers of children die in infancy and only healthy and strong individuals survive. Infant mortality has a great effect on the overall mortality level. In fact, the infant mortality is an indicator of its scale.

When analysing infant death rates we will notice that their values in the material under study decrease systematically with time (Tab. 1). It is also evident that they were the highest in the city of Danzig and the lowest in rural areas of the studied region. This very high infant death rate in the 19th century cities, higher than that in rural areas, was a common phenomenon [ROSSET 1975]. We may presume that one of the factors responsible for this high urban mortality was high incidence of contagious diseases in cities. Danzig being a large seaport suffered from numerous epidemics brought to the city mainly by sea. These outbreaks of disease were the main factor regulating the size of the city's population. Poor hygiene and very high population density promoted the high incidence of disease. It is true that epidemics reduced also rural populations, but as they spread to rural areas from Danzig their impact usually weakened gradually with time.

Table 1. Infant death rates values (%) in the Danzig District in the second half of the nineteenth century

| | 1866 | | 1867 | | 1868 | | 1869 | | 1870 | | 1871 | | 1872 | | 1873 | | 1874 | | 1875 | | 1878 | | 1879 | | 1880 | |
|-------------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|------|------|------|------|------|-------|-------|-------|-------|-------|------|-------|------|------|
| | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G | B | G |
| Small towns | 23.5● | 21.4● | 22.1● | 20.3● | 26.9● | 25.1● | 20.6 | 16.9 | 23.5● | 21.8● | 25.0● | 25.5● | 25.9 | 24.2 | 21.1 | 19.2 | 20.6 | 20.1 | 20.1 | 18.3 | 23.9● | 19.2 | 19.3 | 19.2● | 22.5 | 18.8 |
| Rural areas | 18.0■ | 15.5■ | 17.2■ | 15.2■ | 21.6■ | 19.2■ | 18.8■ | 16.0 | 19.1■ | 15.6■ | 17.5■ | 16.9■ | 22.9 | 20.9 | 19.0 | 16.3 | 18.8 | 16.6■ | 17.0■ | 14.0■ | 17.1 | 15.6■ | 16.3 | 15.1■ | 19.6 | 17.0 |
| Danzig | 24.7 | 23.2 | 24.1 | 22.5 | 29.4 | 26.8 | 23.9 | 20.0 | 26.0 | 23.8 | 27.5 | 29.2 | 25.6 | 22.6 | 21.9 | 20.5 | 21.9 | 22.2 | 22.3 | 20.1 | 26.7 | 20.5 | 19.8 | 20.3 | 22.4 | 18.3 |

- – statistically significant differences ($\alpha = 0.05$) between Danzig and rural areas
- – statistically significant differences ($\alpha = 0.05$) between small towns and rural areas
- B – boys G – girls

Table 2. Neonatal and postneonatal death rates values (%) in the Danzig District in the second half of the nineteenth century

| | 1875 | | | | 1877 | | | | 1878 | | | | 1879 | | | | 1880 | | | |
|-------------|------|-------|--------|--------|------|-------|--------|--------|------|-------|--------|--------|------|-------|--------|--------|------|-------|--------|--------|
| | NM | | PNM | | NM | | PNM | | NM | | PNM | | NM | | PNM | | NM | | PNM | |
| | Boys | Girls | Boys | Girls |
| Small towns | 7.90 | 7.29 | 19.42● | 18.05● | 7.33 | 6.33 | 19.47● | 18.37● | 7.95 | 7.72 | 21.30● | 19.30● | 7.62 | 8.16 | 20.31● | 17.67● | 8.94 | 6.87 | 23.01● | 20.79● |
| Rural areas | 8.66 | 6.55 | 13.57■ | 11.95■ | 8.35 | 6.90 | 14.31■ | 13.47■ | 8.20 | 7.29 | 15.73■ | 13.41■ | 8.61 | 7.38 | 13.93■ | 12.29■ | 8.63 | 7.64 | 16.97■ | 15.43■ |
| Danzig | 7.73 | 7.21 | 22.61 | 20.17 | 7.85 | 6.26 | 20.26 | 19.75 | 8.05 | 7.86 | 22.63 | 21.27 | 7.54 | 8.37 | 21.04 | 18.63 | 9.41 | 6.07 | 22.37 | 19.75 |

- NM – neonatal mortality
- PNM – postneonatal mortality
- – statistically significant differences ($\alpha = 0.05$) between Danzig and rural areas
- – statistically significant differences ($\alpha = 0.05$) between small towns and rural areas

Figures 1 & 2 show infant death rates in three different environments: large city, small town and rural areas. Occurrences of epidemics have been reflected in the shape of the curves. Three distinct peaks reflect a dramatic increase in infant death rates as a result of the outbreaks of the epidemic of scarlet fever (1868), smallpox (1871), and diphtheria (1875) [WALLENBERG 1880]. As evident, the increase in child mortality occurred in all these three environments, but in rural areas it was definitely the lowest (significantly lower than in Danzig and small town areas).

Infant deaths can be divided into two groups: neonatal and postneonatal one. By neonatal mortality we understand the number of neonates deaths to the annual total number of live births ratio. Postneonatal mortality, on the other hand, reflects the ratio of deaths of infants over 28 days to 1 year old to the total number of live births in the population [HOLZER 1980].

Postneonatal mortality is very sensitive to environmental factors. Low economic status of the families affected with child deaths and resulting difficult living conditions, famine and lack of hygiene were one of the causes of a high infant death rate. While neonatal mortality was

similar in all three environments under study, postneonatal mortality was significantly lower in rural areas than in small towns and in the city of Danzig. In fact, the latter had the highest postneonatal death rate. In the 19th century Danzig District (in all three environments under analysis) neonatal death rates were lower than postneonatal death rates, meaning that infants died more frequently than neonates. This is probably a reflection of the poor knowledge on how to prevent these deaths at that time (Table 2, Figs. 3, 4, 5). The actual level of overall mortality resulting from the operation of all the factors having influence on it is illustrated by the death rate [HOLZER 1980].

Death rates values for children from the entire Danzig District in the beginning of the second half of the 19th century reflect an upward trend (Table 3, Fig. 6). This trend developed till 1871. Death rates values calculated for the period from 1872 to 1875 are decreasing. For the explanation of this phenomenon we should look in the causes of deaths, among which epidemics were the most important ones. Other factors contributing to high child mortality were overpopulation, childhood infections and poor hygiene. In 1872 the first water-supply and sewerage system was made operatio-

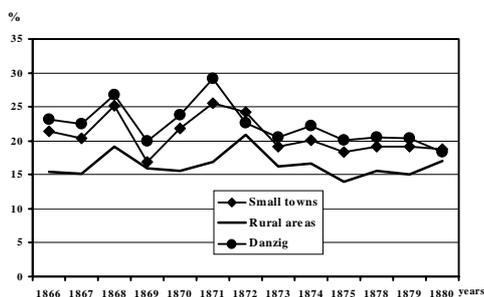


Fig. 1. Infant death rates (girls) in the Danzig District in the second half of the 19th century

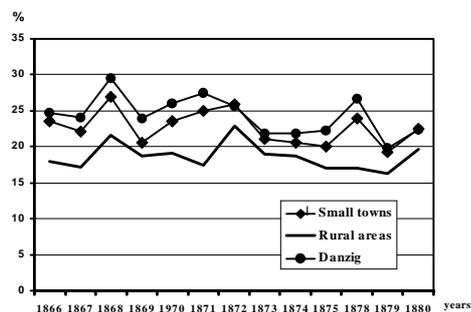


Fig. 2. Infant death rates (boys) in the Danzig District in the second half of the 19th century

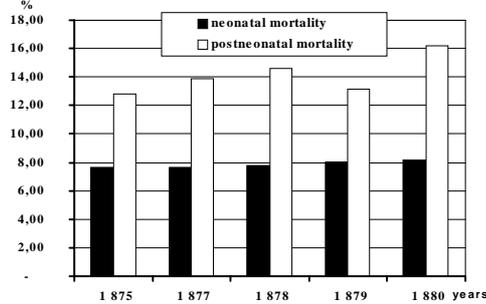


Fig. 3. Neonatal and postneonatal death rates in rural areas of the Danzig District in the second half of the 19th century

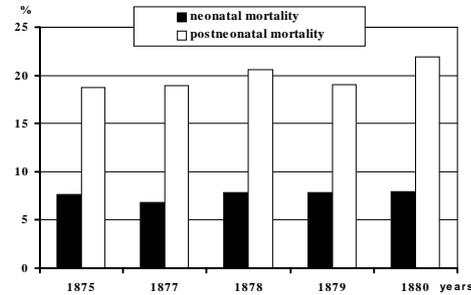


Fig. 4. Neonatal and postneonatal death rates in small towns of the Danzig District in the second half of the 19th century



Fig. 5. Neonatal and postneonatal death rates in the city of Danzig in the second half of the 19th century

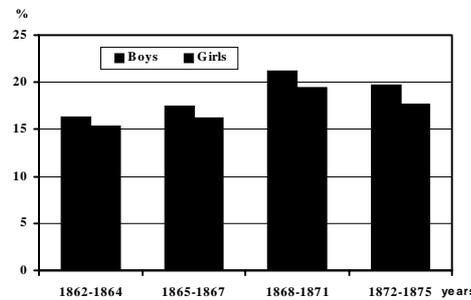


Fig. 6. Child death rates in the Danzig District in the second half of the 19th century

nal in the city of Danzig [WALLENBERG 1880]. This resulted in considerable improvement of sanitary conditions and probably contributed to the decrease of the death rates values. For comparison, Table 3 contains death rates values computed for the Poznań and Berlin Districts. As expected, the highest values refer to the Berlin District, since population density, particularly high in Berlin and Potsdam, was a factor additionally promoting the increase of the death rate.

From among the parameters shown in life tables, life expectancy e_x^0 (Table 4) and order of death dx (Table 5) were selected. Parameter e_x^0 (life expectancy) is a measure reflecting the mortality factors people are exposed to in the course of his entire life [ROSSET 1975]. In Danzig and small towns it assumes hi-

gher values, with the low in the rural areas of the Danzig District. As evident from the above-presented mortality measures such as infant death rate and neonatal and postneonatal death rate, the infant mortality was very high in Danzig, hence the unusually high e_x^0 value in Danzig resulted probably from the lower than anywhere else mortality of children over 1 year of age (Figs. 7 & 8). It is worth noting that unlike in the villages of the Danzig District in the second half of the 19th century, in Danzig and small town communities overmortality of boys occurred. This high mortality rate can be ascribed to the social and economic situation of the population. Thus, we can assume that a gross majority of deceased children came from families with low economic status. Due to the lack of data

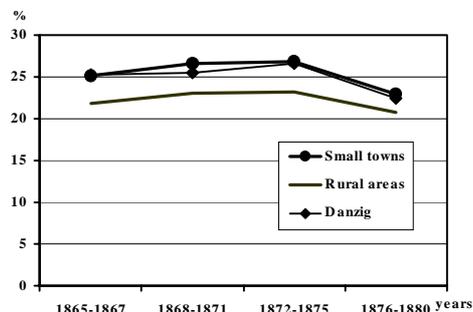


Fig. 7. Life expectancy e^0_0 (girls) in the Danzig District in the second half of the 19th century

on the structure of live population, the study was restricted to showing what was the ratio of child deaths to births in specific occupational groups.

In the city of Danzig, like in small towns, the highest numbers of children were born in two occupational groups. As many as 34% of neonates came from families of industrial workers and 19% from families of day-labourers. In turn,

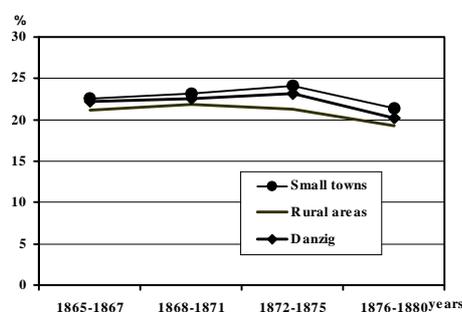


Fig. 8. Life expectancy e^0_0 (boys) in the Danzig District in the second half of the 19th century

deaths of children in labourers' families accounted for 24–26% of all child deaths, while deaths of children of day-labourers for 21% of all child deaths. In the rural areas 40% of all children born in the years 1875–1879 came from farmers' families, and the child death frequency in this group accounted for 34% of the total number of child deaths. From day-labourers' families came 26% of the total

Table 3. Child death rates values (%) in the Danzig District in the second half of the nineteenth century

| | 1862-1864 | | 1865-1867 | | 1868-1871 | | 1872-1875 | |
|-----------------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|
| | Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls |
| Danzig District | 16.33 | 15.30 | 17.49 | 16.23 | 21.17 | 19.43 | 19.70 | 17.67 |
| Berlin District | 17.89 | 16.09 | 21.79 | 19.55 | 31.74 | 28.37 | 32.34 | 28.21 |
| Poznań District | 15.16 | 13.45 | 16.57 | 14.70 | 19.41 | 17.56 | 20.65 | 17.85 |

Table 4. Life expectancy e^0_0 in the Danzig District in the second half of the nineteenth century

| | 1865-1867 | | 1868-1871 | | 1872-1875 | | 1876-1880 | |
|-------------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|
| | Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls |
| Small towns | 22.51 | 25.17 | 23.19 | 26.54 | 24.12 | 26.82 | 21.33 | 22.92 |
| Rural areas | 21.16 | 21.81 | 21.88 | 23.03 | 21.23 | 23.12 | 19.30 | 20.77 |
| Danzig | 22.15 | 25.25 | 22.58 | 25.45 | 23.10 | 26.58 | 20.22 | 22.43 |

Table 5. Order of death d of children in the Danzig District in the second half of the nineteenth century

| | 1865-1867 | | 1868-1871 | | 1872-1875 | | 1876-1880 | |
|-------------|-----------|-------|-----------|-------|-----------|-------|-----------|-------|
| | Boys | Girls | Boys | Girls | Boys | Girls | Boys | Girls |
| Rural areas | | | | | | | | |
| 0-5 | 55.73 | 53.18 | 55.17 | 53.00 | 57.90 | 53.46 | 62.42 | 60.16 |
| 6-14 | 7.18 | 8.03 | 7.46 | 7.64 | 6.31 | 6.83 | 7.49 | 7.29 |
| Small towns | | | | | | | | |
| 0-5 | 50.98 | 49.50 | 50.68 | 47.98 | 50.01 | 48.73 | 56.94 | 56.89 |
| 6-14 | 6.00 | 6.65 | 6.32 | 6.17 | 5.27 | 5.31 | 4.69 | 5.65 |
| Danzig | | | | | | | | |
| 0-5 | 51.13 | 48.87 | 52.39 | 50.41 | 52.09 | 50.58 | 58.25 | 57.88 |
| 6-14 | 5.57 | 6.35 | 5.70 | 5.17 | 3.81 | 3.48 | 4.85 | 5.05 |

number of children born, and the deceased children in this group constituted 30% of the total number of child deaths. For the purpose of comparison, the frequencies of born and deceased children that occurred in the group of private owners being, as one may presume, a group enjoying a higher social status was shown. In the nineteenth century the term "private owners" was used to refer to all entrepreneurs, that is people owning factories. The group included also people giving employment to skilled or unskilled labourers [BURZYŃSKI 1984]. It is obvious that higher social status guaranteed better economic conditions. Hence, in the case of owners, regardless of the type of environment, we observe a surplus of the born over the deceased. And thus, in the city of Danzig, the neonates from this group account for 7% of the total births, while the death frequency accounted for 4% of the total deaths. In small town localities 15% of all children were born in owners' families, in rural localities – 10%. In turn, the death rate among children in this group was 10% in towns and 7% in villages.

From the 14th to 19th century, epidemics were a major factor regulating population size [KĘDELSKI 1980]. In the second half of the 19th century they were the principal cause of the mortality of children in the Danzig District. As many as 38% of cases of illness were caused by epidemics of contagious diseases such as smallpox, scarlet fever, measles and rubella. At the same time, a very high rate of proneness to "convulsions" was noted (16.9%) as well as a high incidence of diarrhoea (5.2%) related to the poor level of hygiene prevalent at that time. Some 19th century authors quote another factor responsible for as many as 10.5% of all

deaths in the child population, which they describe as innate frailty (Fig. 9).

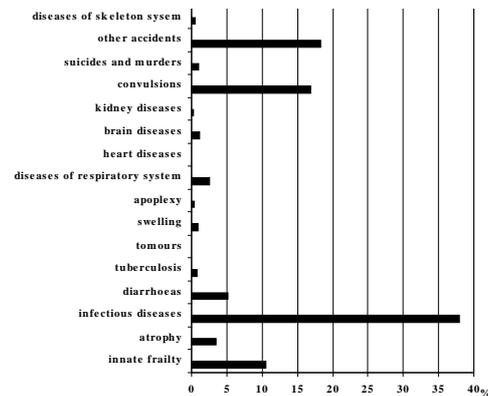


Fig. 9. Causes of child deaths in the Danzig District in the second half of the 19th century

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Streszczenie

Celem pracy jest wykazanie, jak wielkość ośrodka urbanistycznego wpływała na poziom umieralności dzieci w rejencji gdańskiej w II połowie XIX wieku.

Dane o umieralności dzieci (0–14 lat) w rejencji gdańskiej pochodzą z oryginalnych pruskich roczników statystycznych z II połowy XIX wieku. Na ich podstawie wyliczono, zarówno dla chłopców, jak i dla dziewcząt, z gmin miejskich i wiejskich rejencji gdańskiej oraz miasta Gdańska współczynniki umieralności niemowląt (dla lat 1866–1880), współczynniki umieralności neonatalnej i postneonatalnej (dla lat 1875–1880), surowe współczynniki zgonów (dla lat 1862–1875). Następnie, korzystając z metody Halleya, zbudowano tablice wymieralności (osobno dla chłopców i dziewcząt dla lat 1865–1880). Ze względu na brak danych o strukturze ludności żyjącej w II połowie XIX wieku założono istnienie zastojowego stanu populacji. W dalszej kolejności przedstawiono dla wybranych lat (1879–1880) najważniejsze przyczyny zgonów oraz dokonano charakterystyki społeczno-zawodowej rodzin zmarłych dzieci (1875–1879).

Uzyskane wyniki można zinterpretować następująco:

Na poziom umieralności dzieci w II połowie XIX wieku miała wpływ wielkość ośrodka urbanistycznego. Wyliczone miary umieralności takie jak: współczynnik umieralności niemowląt (tabela 1, rys.1, 2), współczynnik umieralności neonatalnej i postneonatalnej (tabela 2, rys.3, 4, 5) dla Gdańska przyjmują istotnie wyższe wartości w porównaniu z takimi samymi parametrami wyliczonymi dla gmin miejskich i wsi.

Wartości e^0 są wyższe w Gdańsku i gminach miejskich aniżeli w gminach wiejskich (tabela 4, rys.7, 8).

Główną przyczyną umieralności dzieci w omawianym rejonie były choroby zakaźne (38%), „konwulsje” (16.9%), wrodzona wątłość (10.5%) oraz biegunki (5.2%) (rys. 9).

Znakomita większość zmarłych dzieci z Gdańska i gmin miejskich wywodziła się z rodzin robotników zatrudnionych w zakładach przemysłowych (24–26%) i robotników dniówkowych (21%). W gminach wiejskich aż 34% zmarłych pochodziło z rodzin rolniczych, 30% z rodzin robotników dniówkowych.