Demographic and Social Dimension of the COVID-19 Pandemic in Polish Cities: Excess Deaths and Residents’ Fears

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Abstract: The aim of this article is to present the impact of the COVID-19 pandemic on demographic facts and social opinions regarding life in Polish cities under conditions of an epidemic threat. We point out that the way of informing the public about the threat of the disease was conducive to causing moral panic, and the imposed top-down methods of protection against infection and treatment methods, which were uniform for all, brought negative effects in the form of increased mortality and excess deaths. In this article, we present statistical data on the deaths of city dwellers with more than 100,000 inhabitants and the results of public opinion polls on changes in the perception of satisfaction with life in the city and fears related to the risk of disease. The pandemic has contributed to a deterioration in both health (excess deaths, health debt) and the broader quality of life. Previously, living in a large city in Poland provided a number of economic, social, and health benefits. The period of the pandemic and the methods used to fight this threat, have created a situation of moral panic and change unfavorable for urban residents. Based on statistical data and survey research, we attempt to verify this thesis.

Keywords: COVID-19; Polish cities; excess deaths; life satisfaction; fears about pandemic

1. Introduction

The period of the COVID-19 pandemic has become a kind of social experiment, which has shown the reaction of society to the restriction of personal freedom and to changes to many existing rules in the name of health and security. The experiment began with the introduction of fairly radical sanitary regulations aimed at limiting the transmission of the virus. At the same time, the new sanitary regulations changed a number of fixed elements of everyday life, and shattered the rhythm and specificity of social life of many groups, especially those based on direct social interaction (face-to-face) [1]. Society under such conditions could function as an atomized collective rather than as a network of local, family, professional, or religious communities [2]. It should be taken into account that nowadays, social life takes place on two levels: real and virtual. The real world is life in real spaces, everyday and direct interactions. The virtual world is the world of mass media, the internet, and indirect interactions. It is likely that the COVID-19 pandemic as a social phenomenon would not have taken on a global character had it not been for the existence of virtual space and the world of mass media, which are an essential part of many people’s lives, and of almost all people in highly developed societies. It was in the media–virtual space that the first information about the pandemic appeared and was disseminated and reproduced. The pandemic became the number one topic, causing fear and anxiety about developments, including one’s own life and the lives of loved ones. Media coverage was often chaotic and said little about the actual state of the threat. For example, the number of new infections was systematically reported, with no information on how many infections there were relative to the population. The information thus provided implied that most infections were in large cities. That is,
the larger the city, the higher the population, so, the more infections there were, the more excess deaths. This way of communicating information was conducive to creating a moral panic in large cities. In reality, the situation in Poland’s largest cities (e.g., Warsaw, Wrocław, Cracow) was not worse, and sometimes even better, compared to smaller cities. Inherent in the accompanying manifestations of moral panic is an exaggeration of the significance of a given behavior or phenomenon. A crucial role in this process is played by mass media [3]. In the case of COVID-19, we can even speak about mass hysteria in this context [4].

Our paper will look at the early period of the pandemic, because the early period of the pandemic involved the introduction of regulations that shockingly and radically changed the rules of daily life and the way urban populations functioned. The list of subsequent restrictions in Poland is given, e.g., in [4]. Table 2. In this paper, we focus on analyzing this new situation comparatively from the perspective of the role of place of residence [5–7]. We are interested in how the reality of the pandemic was perceived and experienced mainly by the residents of Poland’s cities. The interest in cities stems from the assumption that, according to historical experience, epidemics most severely affect settlement units with high population densities, i.e., cities [8–11].

We will look at selected aspects of these changes from the perspective of the results of a public opinion poll conducted by the Center for Social Opinion Research (CBOS) and the demographic data available from the Polish Ministry of Health (MZ) and Statistics Poland, formerly known in English as Central Statistical Office (GUS).

The aim of the article is to present, on the one hand, the impact of the COVID-19 pandemic on the increase in the number of deaths in Polish cities. On the other hand, we want to show the changes in public mood and people’s fears resulting from the spread of the plague. We will focus on 38 centers with more than 100,000 residents. We will call them cities (in the Polish system of administration, there is no formal difference between a city and a town). About 28% of the country’s population lives in centers of this size. The analysis covered cities within their administrative boundaries for which it was possible to obtain GUS and MZ data. Only five of these cities—Warsaw, Kraków, Łódź, Wrocław, and Poznań—are centers with more than 500,000 inhabitants. The group of cities with a population of 300,000–500,000 inhabitants consists of Gdańsk, Szczecin, Bydgoszcz, and Lublin. The population of the remaining 29 cities ranges from 100,000 to 300,000 residents.

The analysis of available demographic data mainly concerned the number of deaths registered in cities in 2020 and 2021—these were both deaths due to COVID-19 and excess deaths. Given the availability of statistical data, the main attention related to COVID-19 mortality was focused on the year 2020. Three research problems are addressed in the study: (1) the rate of COVID-19 deaths, (2) the variation of COVID-19 deaths by sex and age, and (3) the impact of the pandemic, including deaths, on population growth.

We assume that the situation that has arisen due to the COVID-19 pandemic and the methods used to combat it has become the direct causes of the increase in urban deaths, which will adversely affect the sense of satisfaction with urban life and cause a further depopulation of cities. In addition to exacerbating the process of urban depopulation, the pandemic has led to a decline in the health status of the population, resulting directly in excess non-COVID deaths. Since health is invariably one of the basic goods that is highly valued in Polish society (see [12], p. 3), we expect that the feeling of being in danger in this area will translate into an increase in dissatisfaction with living in the city. From this point of view, it is obvious to say that the time of the pandemic is a period in which progress has been stalled in order to achieve sustainable development in the area of health and quality of life.

The COVID-19 pandemic has disrupted society in many areas, destabilizing the global economy and causing an economic crisis in many countries, see, e.g., [13–15]. It has had a negative impact on human health and life. It should be noted that this negative impact is not only due to the epidemic itself but also to the ways that were used to overcome it. The introduced rules of social isolation and physical distance limited interpersonal contacts and increased the intensity of negative emotions and the occurrence of mental illnesses.
Moreover, the system hindered access to medical care and thus the treatment of all diseases, including cancer, resulting in an increased risk of premature and excess deaths.

Research on living conditions in Poland shows that living in a city fosters a higher standard of living and reduces the risk of economic and social poverty [16]. However, the existing disparities may be eroded as cities become less safe in terms of sanitation during epidemic risks. Based on statistical and survey data, we attempt to verify this thesis. On the one hand, we show the costs of a pandemic as measured by the number of deaths, including excess deaths. On the other hand, we show the state of public awareness based on selected survey results. The structure of the article is adapted to such research tasks.

2. Materials and Methods

The article is based on the analysis of large sources of foundational data. The first is statistical data obtained from the website of the Central Statistical Office (www.stat.gov.pl, accessed on 14 May 2022) and the Ministry of Health (www.gov.pl, accessed on 17 May 2022). Information on the number of deaths in 2020 was taken from the Demography database of the Central Statistical Office. For the purposes of the study, information presenting deaths by cause (in this case COVID-19 deaths) was used. In Poland, approximately 3000 cause of death codes are used. Cause of death codes are assigned according to the International Statistical Classification of Diseases and Health Problems—10th Revision (ICD-10).

In order to have the ability to code death due to COVID-19, a code U07.1 was introduced by the World Health Organization with priority in the sequence of events. An additional code U07.2 is recommended for use in the patient’s medical record when COVID-19 is suspected (probable case) pending molecular testing results. This means that it is critical when physicians are coding causes of death that the chronological description of the chain of causes/diseases responsible for the patient’s death is maintained and correctly presented, resulting in an accurate or precise initial cause of death.

In Poland, for COVID-19, according to the guidelines for coding deaths related to the epidemic of coronavirus causing COVID-19 (as of 1 April 2020), two codes are provided—U07.1 and U07.2 [17]. According to the Polish death coding guidelines, infectious diseases as the underlying causes of death take precedence over non-infectious diseases. Moreover, when diagnosing an infectious disease from the list of mandatory notifiable and registerable infectious diseases, the physician diagnosing death due to such a cause is obliged to fill in the Notification of Infectious Disease form and send it to the District Sanitary and Epidemiological Station. The physician pronouncing the cause of death is responsible for the proper completion of the death card.

The availability and resources of source materials for COVID-19 deaths in 2020 were sufficient for the purpose of this study. The situation is different for the year 2021, for which the only available source of information was the Ministry of Health website, where files (in the form of a Microsoft Excel spreadsheet) in the form of daily reports on the number of infections, deaths and tests were posted [18]. This made it possible to obtain data only for deaths by COVID-19 for large cities in Poland, and it was the only source of information for the year 2021. According to information obtained from the Department of Demographic Research of the Central Statistical Office, adding annual data to the Demography database will not be possible before the third quarter of 2022, and it is not possible to obtain them earlier, despite attempts made by the authors of the study. According to the information from the Central Statistical Office, interesting materials are under development.

The authors are aware of the inaccuracy and imprecision of the COVID-19 death statistics, which was pointed out by the medical community in Poland and other countries, but information obtained from the abovementioned sources was the only one available. Therefore, conclusions based on available data should be made with some reservations.

An OECD report highlights that, although the number of COVID-19-related deaths is crucial in examining the health impact of the pandemic, the comparability of this indicator has been limited by differences in recording, registration, and coding practices across
countries [19]. In addition, factors such as the low availability of diagnostic tests at the beginning of the pandemic likely contributed to an inaccurate determination of causes of death. Surprisingly large discrepancies in regional data have also been noticed in Poland. As explained by Rafał Halik, a public health expert and epidemiologist, when a doctor writes out a death card according to the so-called ICD-10 classification, he/she provides the initial cause of death and the direct cause of death, i.e., what ultimately happened to account for the death, and the indirect cause of death, i.e., what gave rise to the direct cause. If someone has COVID-19 listed as the initial cause of death, it means that if this disease was not present, there would not have been a death either. On the other hand, the physician also has the option of entering in the death certificate other (coexisting) diseases, which may have influenced the “dying process” [20].

In this study, simple measures—crude and partial coefficients—were used to analyze changes in the level and rate of mortality due to COVID-19. To determine the level of mortality, we use crude death rate and cause-specific death rate (deaths due to COVID-19), for the total population and for population 65+ (people over 65 years of age).

1. Crude death rate

\[
CDR = \frac{D}{P} \times 1000, \tag{1}
\]

where \(D\) — total number of deaths during the calendar year, \(P\) — total mid-year estimated population or the total population of the middle of the year (as of 30 June). The constant 1000 means that \(CDR\) is the number of deaths per 1000 inhabitants.

2. Death rate due to COVID-19

\[
DR_{cov19} = \frac{D_{cov19}}{P} \times 1000, \tag{2}
\]

where \(D_{cov19}\) — number of deaths due to COVID-19 during the calendar year, and \(P\) — the total mid-year estimated population or the total population of the middle of the year (i.e., as of 30 June).

3. Death rate for population 65+

\[
DR_{65+} = \frac{D_{65+}}{P_{65+}} \times 1000, \tag{3}
\]

where \(D_{65+}\) — number of deaths in population 65+, \(P_{65+}\) — the mid-year estimated population 65+.

4. Death rate due to COVID-19 for population 65+

\[
DR_{65+ cov19} = \frac{D_{65+ cov19}}{P_{65+}} \times 1000, \tag{4}
\]

where \(D_{65+ cov19}\) — number of deaths due to COVID-19 in population 65+, and \(P_{65+}\) — the mid-year estimated population 65+.

Analysis of the collected source materials showed that nearly 86% of deaths in Poland caused by COVID-19 were in people over 65 years of age. Bearing in mind that mortality among the elderly is higher than in younger age groups (due to degenerative and age-related diseases), however, it is important to note the 8-percentage-point higher mortality among the elderly for COVID-19 relative to their overall mortality. Considering other causes of death, only for cardiovascular and genitourinary diseases was the proportion of deaths among those aged 65 and over slightly higher than for COVID-19. For example, for influenza, deaths among the elderly accounted for 71% of total deaths. The implication is that the measures taken by authorities in many countries to protect the elderly during a pandemic were justified because of the higher risk of illness for the elderly [21].

This gave rise to a comparative analysis of the number of deaths among the elderly with the rate of their deaths due to COVID-19. For this purpose, measures of demographic
old age depicting the level of urban population aging—the old age rate and the old to child ratio—were used.

The old age rate \((OAG)\) expresses the ratio of the population \(65+\) to the total population,

\[
OAG = \frac{P_{65+}}{P} \times 100, \tag{5}
\]

where \(P_{65+}\) — population \(65+\), \(P\) — total population.

The old to child ratio \((OCR)\) compares the number of old people (persons \(65\) years of age or older) to the number of children (less than \(15\) years of age),

\[
OCR = \frac{P_{65+}}{P_{0-14}} \times 100, \tag{6}
\]

where \(P_{65+}\) — population \(65+\), \(P_{0-14}\) — share of population aged \(0-14\).

The sex ratio \((SR)\), expressing the relationship between the number of men and women, was used to illustrate the disturbed pattern of COVID-19 deaths by sex,

\[
SR = \frac{P_m}{P_f} \times 100, \tag{7}
\]

where \(P_m\) — number of males, \(P_f\) — number of females.

Another source of information for our research were surveys conducted on nationwide random samples by the Public Opinion Research Center (CBOS), www.cbos.pl. The results in the form of a “research report” with an appendix presenting the distribution of answers according to the respondents’ characteristics (age, sex, place of residence, etc.) were made available (for a fee) after placing the order. The quality of CBOS surveys is guaranteed by methodological accuracy and many years of experience in conducting national random sample surveys. For the preparation of the article, selected results of surveys published from 2018–2022 were used [12,22–27]. We focused on the analysis of surveys in terms of the place of residence of the respondent, which we consider to be crucial in describing and understanding social attitudes and demographic facts in relation to the COVID-19 pandemic. The CBOS analyses distinguish five categories of places of residence: 1. rural; 2. town of below \(19,999\) inhabitants; 3. town of \(20,000–99,999\) inhabitants; 4. city of \(100,000–499,999\) inhabitants; and 5. city of over \(500,000\) inhabitants. We confine ourselves to the last two categories.

3. Results: COVID-19 Pandemic in Polish Cities 2020–2021

The bulk of the analysis, as noted in the introduction, is for the year 2020, and this is related to the availability of statistical data.

3.1. COVID-19 Deaths in Cities

The COVID-19 pandemic reached Poland in March 2020, with the first fatal case reported on 12 March. A number of restrictions and a state of epidemic emergency were introduced in the country. Since the outbreak of the pandemic in Poland, \(116,400\) people have died from COVID-19 (as of \(17\) June \(2021\)), resulting in nearly \(307\) deaths per \(100,000\) inhabitants. The level of mortality from COVID-19 among European countries clearly varies. Poland, along with other Central and Eastern European countries, is characterized by the highest values of COVID deaths per \(100,000\) inhabitants. It should be noted, however, that the value for Poland is significantly lower than those for Bulgaria (535), Hungary (477), or the Czech Republic (377). Western European countries have lower COVID-19 mortality rates (e.g., Netherlands—128; France—224), and Northern European countries have the lowest (Norway—61, Finland—86) [28].

Between 2020 and 2021, \(29,810\) people (28.8% of the total COVID-19 deaths in the country) died as a result of the COVID-19 pandemic in major cities in Poland. In the first year of the pandemic (2020), less than \(12,000\) deaths from COVID-19 were reported in large
The increase in these deaths can be seen in the significantly higher values of the rate of deaths from COVID-19 per 1000 inhabitants (Figure 1). This situation applied to almost all large Polish cities, only in four of them (Bytom, Tarnów, Gliwice, and Wrocław) was the dynamic of deaths between 2020 and 2021 lower than 100% (Figure 2). As a result of the pandemic in cities in 2020, nearly one in ten deaths was due to COVID-19, as in the country as a whole.

Figure 1. COVID-19 deaths in cities in Poland: (a) in 2020, (b) in 2021. Source: own elaboration, based on GUS.

The proportion of these deaths varied across cities, from 6.3% in Sosnowiec to 12.6% in Tarnów (Figure 3). The spatial distribution of the rate of deaths from COVID-19 was not correlated with the size of the population of cities in Poland, as high rates of deaths from COVID-19 were recorded both in the largest urban centers (e.g., Łódź) and in those with smaller populations (e.g., Włocławek).

It is also difficult to directly link high COVID-19 mortality to the availability of health care facilities and medical personnel. This is because the ratios of the number of beds and physicians per 10,000 inhabitants in cities with high COVID mortality rates varied widely. Generally, the highest rates of access to health care are observed in Poland’s largest cities functioning as academic centers, while in smaller towns with populations of 100,00–300,000, they are much lower. However, as noted above, high rates of death from COVID-19 were also recorded in cities with theoretically good (by national standards) access to health care. The SARS-CoV-2 pandemic has intensified and exposed the scale of problems with which Polish hospitals have been struggling for many years. These are primarily organizational chaos, staff shortages, and a generally difficult financial situation [29].
Figure 2. COVID-19 death rate growth indexes in cities in Poland in 2021 (2020 = 100). Source: own elaboration, based on GUS.

According to Eurostat, Poland is the country with the lowest number of physicians in the European Union (2.4 physicians per 1000 inhabitants, with the EU average being 3.9) and nurses (5.2 per 1000 inhabitants, with the EU average being 8.4). In the first year of the COVID-19 pandemic, the Eurofund survey found that more than a quarter of Poles (28 percent) reported an unmet need for medical examination or treatment [30].

3.2. Structure of Deaths by Sex and Age

The rate of mortality varies by gender and age. For a number of years, Poland has been witnessing the phenomenon of high male excess mortality, i.e., death rates for men are higher than for women, which is already evident among boys (0–14 years). In the total number of persons who died over the past years, men accounted for 52.8%. A gradual decrease in the proportion of men in the number of deceased can be observed. At the beginning of the 21st century, men accounted for more than 53% (53.6% in 2004, 2006–2007), while today, the proportion is 52.3% (2020).

Analysis of the statistical data clearly indicated a high male skew in COVID-19 deaths, both in Poland as a whole (137) and its cities (130). The prevalence of COVID-19 deaths in the male subpopulation occurred in 2020 in all cities in the country. In some of them, the skew in rates of deaths from COVID-19 towards males was very high, in 23 centers above the urban average value (SR = 139). The maximum value was recorded in Tarnów, where the number of deaths from COVID-19 among men was almost twice as high as among women (Figure 4). The lowest males skew for COVID-19 deaths occurred in cities with a high level of female inhabitants, e.g., Łódź, Warsaw, Lublin.
During the COVID-19 pandemic, the elderly were at increased risk of contracting the virus. This is because, according to the WHO, people over 61 years of age have weakened immune systems, making seniors more likely to struggle with chronic diseases. As a result, pneumonia and cardiovascular diseases are among the leading causes of death, while younger people over the age of 65 die mainly from cardiovascular diseases. Consequently, the elderly are characterized by greater susceptibility to viral and bacterial infections, weaker post-vaccination immunity, and less effective processes that oversee antigen-specific responses or limit damaged and susceptible cells [33].

Diseases that can foster the multiplication of the virus include diabetes, ischemic heart disease, lung disease and asthma [32]. The rate of mortality varies by gender and age. For a number of years, Poland has been witnessing the phenomenon of high male excess mortality, i.e., death rates for men are higher than for women, which is already evident among boys (0–14 years). In the total population—over 20% (cf. Figures 5a and 6a). The coefficient of deaths from COVID-19 of people 65+ ($DR_{cov65+}$) does not show a simple dependence on the level of old age rate ($OAG$) and ageing ($OCR$) indexes, e.g., Elbląg and Płock (cf. Figures 5b and 6a,b).

An important element of the health situation is the aging of populations in developed countries, a positive effect of effective health care measures [31]. Population aging is the process of increasing the proportion of older people (65+), i.e., the increase of old people living in these cities. High values of $OAG$ and $OCR$ indexes, e.g., Elbląg and Płock (cf. Figures 5b and 6a,b).

Among the people who died from COVID-19 in 2020, the population of ages 65+ is clearly dominant, accounting for 86% of all deaths, both nationally and in cities. Deaths from COVID-19 in the age group 15–64 accounted for less than 14% of all deaths, and less than 1% of deaths were among children and adolescents up to 14 years of age. Given the age structure of deaths by age, the analysis of variation in deaths from COVID-19 was highly correlated with the percentage of old people living in these cities. In urban centers with lower old age (OAG) and ageing (OCR) indexes, e.g., Elbląg and Płock (cf. Figures 5b and 6a,b).

The rate of mortality varies by gender and age. For a number of years, Poland has seen a high male skew in COVID-19 deaths, both in Poland as a whole (137) and its cities (130). The prevalence of COVID-19 male-to-female ratio of deaths in cities in Poland in 2020. Source: own elaboration based on GUS.

The urban centers with the highest mortality rates among seniors (e.g., Łódź, Warsaw, Lublin) from COVID-19 of people 65+ ($DR_{65+}$) were also noted in urban centers above the urban average value (SR = 139). The maximum value was recorded in Tarnów, where the number of deaths from COVID-19 among men was almost twice as high as among women (Figure 4). The lowest males skew for COVID-19 deaths occurred in Katowice, where the number of persons who died over the past years, men accounted for 52.8%. A gradual decrease in the proportion of men in the number of deceased can be observed. At the beginning of the 21st century, men accounted for more than 53% (53.6% in 2004, 2006–2007), while today, the proportion is 52.3% (2020).

The immune system of the elderly works less effectively, which is reflected in the high prevalence of cancers and infections, such as pneumonia and chronic lung disease [34]. The prevalence of COVID-19 male-to-female ratio of deaths in cities in Poland in 2020. Source: own elaboration based on GUS.

The urban centers with the highest mortality rates among seniors (e.g., Łódź, Warsaw, Lublin) among COVID-19 deaths in cities in 2020. Source: own elaboration based on GUS.
An important element of the health situation is the aging of populations in developed countries, a positive effect of effective health care measures [31]. Population aging is the process of increasing the proportion of older people (65+), i.e., the increase of OAG, defined by Formula (5).

During the COVID-19 pandemic, the elderly were at increased risk of contracting coronavirus. This is because, according to the WHO, people over 61 years of age have weakened immune systems, making seniors more likely to struggle with chronic diseases. Diseases that can foster the multiplication of the virus include diabetes, ischemic heart disease, lung disease and asthma [32].

The immune system of the elderly works less effectively, which is reflected in epidemiological data. In the age group of 85 and older, infections and cancers are the leading causes of death, while younger people over the age of 65 die mainly from cardiovascular diseases. Consequently, the elderly are characterized by greater susceptibility to viral and bacterial infections, weaker post-vaccination immunity, and less effective processes that oversee antigen-specific responses or limit damaged and abnormal cells [33].

Among the people who died from COVID-19 in 2020, the population of ages 65+ is clearly dominant, accounting for 86% of all deaths, both nationally and in cities. Deaths from COVID-19 in the age group 15–64 accounted for less than 14% of all deaths, and less than 1% of deaths were among children and adolescents up to 14 years of age. Given the structure of deaths by age, the analysis of variation in deaths from COVID-19 was extended to include mortality among the elderly, i.e., people of 65 years and older. Simple measures like $DR_{65+}$ and $DR_{COVID65+}$ (defined by Formulae (3) and (4), respectively) were used—cf. Figure 5. In the case of $DR_{65+}$, the spatial distribution of the coefficient values is highly correlated with the percentage of old people living in these cities.

The urban centers with the highest mortality rates among seniors (e.g., Łódź and Wałbrzych with $DR_{65+} > 50$) are at the same time the cities with the highest shares of elderly people in the total population—over 20% (cf. Figures 5a and 6a). The coefficient of deaths from COVID-19 of people 65+ ($DR_{COVID65+}$) does not show a simple dependence on

![Figure 5](image-url)
the level of old age rate (OAG) in cities. High values of DR_{65+} were also noted in urban centers with lower old age (OAG) and ageing (OCR) indexes, e.g., Elblag and Płock (cf. Figures 5b and 6a,b).

An interesting aspect from a cognitive point of view is the age of the deceased—in this case, the median age was considered. In cities, the median age of the deceased in 2020 increased slightly compared to previous years (77.8 years—2019; 78.2 years—2020) and was one year higher than the median for the country, which was 77.1 years (Figure 7). A comparison of the median age of all urban deaths (78.2 years) and COVID-19 deaths (78.6 years) indicates that slightly younger people had died from causes other than COVID-19. This may be a result of inadequate care and availability of health services during the pandemic period for other patients. The health situation of the population in Poland, including cities with more than 100,000 inhabitants, has worsened.

In the analysis of the age of the deceased in individual cities, it was observed that in most of them (26 urban centers), the median age of all deceased was higher than the median age of the deceased due to COVID-19 (Figure 8). In the remaining cities, people who died from COVID-19 were slightly older relative to all deceased, but these age differences were not very large. Only in a few cities (like Szczecin and Zielona Góra) these differences exceeded three years.
3.3. Demographic Consequences of the COVID-19 Pandemic—Selected Aspects

In the search for mechanisms that describe mortality from infectious diseases, including COVID-19, one can turn to the concept of epidemiological transition. This theory is a concept that explains the underlying causes of mortality. The process described by the theory of epidemiological transition involves the replacement of mortality that results from infectious disease pandemics with mortality from degenerative and human-activity-induced diseases. This transition is parallel to the demographic transition and is also caused by the modernization of society. Just as the demographic transition theory explains population growth on the basis of changes in fertility and mortality, the epidemiological transition theory seeks to explain changes in mortality by referring to changes in health status and

Figure 7. Median age of persons who died in cities between 2010 and 2020. Source: own elaboration on the basis of the LDB.

Figure 8. Median age of persons who died from all causes (a) and from COVID-19 (b) in 2020. Source: own elaboration on the basis of the LDB.
disease profile and their socioeconomic determinants. One of the bases of this theory was the assumption of the fundamental role of mortality for demographic transitions, as well as for socio-economic development in general.

The theory of epidemiological transition was formulated in 1971 by A. R. Omran based on an analysis of changes in mortality and disease profiles, as well as advances in health care and socioeconomic development in industrialized countries since the 18th century. According to this theory, populations experience three successive phases in the modernization process: epidemics and famines, when mortality remains very high, a reduction in infectious disease incidence, when life expectancy increases to nearly 50 years, and a phase of degenerative disease, during which the rate of decline in mortality wanes and the reduction in mortality due to infectious disease is accompanied by an increase in mortality due to chronic disease. In subsequent years, the theory of epidemiological transition was expanded and modified. In 1986, a fourth phase of the epidemiological transition was added—the phase of delayed degenerative diseases [34]. A hybrid era was also distinguished [35] (and, as another possible era, that of returning infectious diseases [36]. Omran also modified his theory by adding phases four and five to the classical model [37]. In recent years, a new concept of health transition has emerged [38].

In 1998, almost 30 years after the first publication on epidemiological transition, Omran modified his theory, adding a fourth and a fifth phase to the classical model [37]. The fourth phase according to Omran is characterized by:

- a systematic increase in life expectancy values, reaching 80–85 years, and even higher for women;
- a decline in mortality due to cardiovascular diseases, which is mainly associated with medical progress and changes in lifestyle, although cardiovascular diseases and cancer remain the main causes of death;
- a large share of elderly people in the population structure;
- the emergence of new diseases, including those caused by viruses, e.g., HIV/AIDS, hepatitis B and C, Ebola virus, various types of hemorrhagic fever, as well as new bacterial diseases or the re-emergence of already existing diseases, e.g., cholera, malaria, dengue fever, diphtheria, and tuberculosis.

According to Omran, not all countries that have entered phase three of the epidemiological transition have already moved into phase four. As an example, he cites Eastern European countries and Russia and the reported increase in mortality during the 1990s [37]. The fifth phase of the epidemiological transition, occurring in the 21st century, will be a time of further increases in life expectancy and quality of life aspirations, with large social inequalities. Life expectancy in the fifth phase may increase to about 90 years as a result of increasing life expectancy of the elderly and decreasing mortality among at-risk and lower class individuals [39].

In the same year as Omran’s article, there was an article written by Olshansky and co-authors that raised the dramatic question of whether the next phase of the epidemiological transition would prove to be a return to the first phase of the transition, that of infectious disease dominance [36]. The paper refers to the observed prevalence of viral and bacterial infectious diseases worldwide, especially in developing countries. In addition, many of the diseases that are recorded today have been absent for several decades, or if they did occur, they were endemic, that is, in specific areas and affecting only local populations [34–39].

Since the 1990s, Poland’s largest cities have undergone intensive demographic transformations, the most important of which are depopulation and population ageing. According to the demographic forecast of the GUS prepared in 2014, only two cities—Warsaw and Rzeszów—will slightly increase their population potential by 2050 [40]. In the case of Poland’s capital city, the expected population growth results from the preponderance of a positive migration balance over natural losses. The forecasts look slightly different for Rzeszów, for which a natural increase is expected until the beginning of the 2030s and then a decrease compensated by positive migration growth. However, in the vast majority of
cities in the country, the depopulation processes will result from the excess of deaths over births, which will be strengthened by the negative migration balance.

The pandemic has strongly affected the course of demographic phenomena in 2020, exacerbating the adverse trends observed in cities over the last decade. Population changes in recent years are mainly influenced by the natural increase, which has remained negative since 2010 (Figure 9). The bad mortality situation together with a very low birth rate in 2020 contributed to the record low in natural increase in cities. Its negative value was more than three times higher than in 2019.

One consequence of the increased number of deaths during the pandemic was an increasing rate of natural loss in cities (Figure 10). Even before the pandemic, eight cities had a surplus of births over deaths, and after the first year of the pandemic, only two cities recorded positive values of natural population growth, Rzeszów and Bialystok.

The demographic situation was particularly difficult in this respect in: Wałbrzych (−9.9‰), Bytom (−8.2‰), Częstochowa (−8.0‰), Łódź (−7.7‰), Sosnowiec (−7.7‰) and Chorzów (−7.3‰). These cities are dominated by centers where industry is, or was, the basis of economic development. In addition, it should be noted that a high population concentration favored the development of SARS-CoV-2 infections, which occurred, for example, in the Upper Silesian Conurbation.

The intensity of deaths in cities did not change significantly until 2019—it was increasing, but the rate of increase was small and fairly uniform. In 2020, there was a sharp increase in the number of deaths—more than 138,000 people died (the average number of deaths in 2015–2019 was 118,500). The pandemic caused by the SARS-CoV-2 virus is most responsible for the higher mortality rate. Direct victims of COVID-19 account for about 60% of the recorded increase in mortality. The death rate in 2020 was 12.9, 1.7 p.p. higher than in 2019.

In the analyzed group of cities, the mortality rate just before the onset of the pandemic varied from 8.2‰ in Rzeszów to 15.1‰ in Wałbrzych (Figure 11). The group of cities with the highest mortality rates included, apart from the already mentioned Wałbrzych, such cities as Łódź (14.2‰) and Chorzów (14‰). An attempt to identify common factors which determined similar crude mortality rates in the above-mentioned cities points to the influence of the level of population ageing in those centers. Moreover, the highest total mortality rates (both crude and age-standardized) were observed in the cities which
were centers of old industrial districts (Łódź, Katowice). Changes in the intensity and structure of mortality in the population of cities, as in Poland as a whole, will continue, which is a consequence of the expected further ageing of the population of cities, including voivodeships [41–43].

Figure 9. Births, deaths and natural increase in cities, 2010–2020. Source: own elaboration based on GUS.

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Figure 10. Natural increase in 2019 and 2020. Source: own elaboration on the basis of the LDB.

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The first year of the pandemic saw a significant increase of 15% in deaths in cities compared to 2019 (from 120,088 to 138,362). High mortality values, which were recorded in Walbrzych and Łódź before the pandemic, were magnified in the first year of the pandemic—the death rate reached values of 17‰ (Walbrzych) and 16.2‰ (Łódź), respectively. It should be noted that all analyzed cities recorded increases in mortality from 1 to 3 p.p. (Figure 10).

The increased number of urban deaths in 2020 compared to the previous year was due to the COVID-19 pandemic, but also to excess mortality, which involved “non-COVID” patients with chronic diseases or sudden health incidents who were not diagnosed and did not start treatment on time or whose treatment was stopped. Excess deaths represent the difference between the number of deaths in a given period and the average number of deaths for similar periods in the last few years. According to the President of the Polish Society of Civilization Diseases, Professor Filip Szymański, the excess of deaths in relation to previous years, referred to as health debt, represents not only the effect of a pandemic but also the suboptimal treatment of civilization diseases [44].

The pandemic has presented the health care system with a new challenge—to recognize the areas of greatest health debt that have been created by focusing attention on fighting the coronavirus at the expense of other health problems. Health debt is the neglect of health, postponing or even failing to initiate disease diagnosis, follow-up appointments, scheduled treatments, or other important medical procedures. Many people have avoided health
services not only for fear of the COVID-19 infection, but also because it was difficult to access outpatient facilities and hospitals [45].

Factors that have further led to an increase in excess deaths include staff shortages (one of the lowest rates in Europe per 1000 inhabitants), low health care financing in Poland, low quality of care as perceived by patients, and a paternalistic approach to the patient. Other reasons include: redundant and inadequate isolation procedures implemented to eliminate the risk of SARS-CoV-2 transmission; visitation bans and the hermetic isolation of patients (not only COVID-19 but also non-COVID-19); the closure of wards; a division of the health care system, including transport, into two independent circuits, for COVID-19 patients and for non-COVID-19 patients; mass quarantine and isolation of staff, often without symptoms or with light symptoms; recommendations by scientific societies to maximize patient time; extreme restraint in planning and performing diagnostic and therapeutic procedures; mass PCR testing that did not accurately identify the sick and infecting person; and mass quarantining of families, making it impossible for them to function normally or get help. Surplus deaths should be viewed as a very high interest rate on health debt [46].

According to the methodology used by the Ministry of Health, excess deaths in the year 2020 represent the difference between the number of deaths for that year and the average number of deaths for similar periods in the last few years (2015–2020) [47]. Compared to the 2015–2019 average, Poland recorded over 79,000 additional deaths. In this grim ranking of excess deaths, it is second in Europe (first place goes to Bulgaria). Poland experienced more than 2000 additional deaths per one million inhabitants compared to the 2015–2019 average; Sweden recorded just over 500 additional deaths per one million inhabitants and Germany about 400 additional deaths per one million inhabitants [46].

Figure 11. Death rate per 1000 inhabitants in 2019 and 2020. Source: own elaboration based on GUS.
In Polish cities, almost 20,000 excess deaths were recorded, that is, 188 excess deaths per 100,000 inhabitants (Table 1). Among the cities, the highest rates of excess deaths per 100,000 inhabitants were observed in Kielce (300), Bytom (298), and Tarnów (290). The lowest excess mortality was recorded in Gdynia and Olsztyn—113 and 114 deaths per 100,000 inhabitants, respectively. The excess deaths were not only deaths from COVID-19 but also deaths of non-COVID-19 patients. COVID-19 deaths accounted for over 60% of excess deaths in the cities. This phenomenon varied widely among cities, from 97% in Łódź to 40% in Dąbrowa Górnicza (Table 1).

Table 1. Excess deaths (with respect to the 2015–2019 average) in Polish cities in 2020. Source: Own elaboration based on GUS.

| City                | Number of Excess Deaths | Share of COVID-19 Deaths in All Excess Deaths (%) | Excess Deaths per 100,000 |
|---------------------|-------------------------|---------------------------------------------------|--------------------------|
| Warsaw              | 3185                    | 49                                                | 178                      |
| Bialystok           | 562                     | 50                                                | 189                      |
| Bielsko-Biała       | 296                     | 63                                                | 174                      |
| Bydgoszcz           | 791                     | 53                                                | 230                      |
| Bytom               | 486                     | 41                                                | 298                      |
| Chorzów             | 179                     | 79                                                | 167                      |
| Częstochowa         | 457                     | 68                                                | 210                      |
| Dąbrowa Górnicza    | 263                     | 40                                                | 223                      |
| Elblag              | 201                     | 84                                                | 169                      |
| Gdańsk              | 670                     | 66                                                | 142                      |
| Gdynia              | 277                     | 76                                                | 113                      |
| Gliwice             | 388                     | 67                                                | 219                      |
| Gorzów Wielkopolski| 314                     | 46                                                | 255                      |
| Kalisz              | 211                     | 73                                                | 214                      |
| Katowice            | 688                     | 54                                                | 236                      |
| Kielce              | 579                     | 50                                                | 300                      |
| Koszalin            | 244                     | 44                                                | 231                      |
| Krakow              | 1484                    | 50                                                | 190                      |
| Lublin              | 783                     | 57                                                | 231                      |
| Łódź                | 1063                    | 97                                                | 158                      |
| Olsztyn             | 194                     | 91                                                | 114                      |
| Opole               | 246                     | 70                                                | 192                      |
| Płock               | 383                     | 45                                                | 325                      |
| Poznan              | 872                     | 67                                                | 164                      |
| Radom               | 518                     | 51                                                | 248                      |
| Ruda Śląska         | 242                     | 69                                                | 178                      |
| Rybnik              | 287                     | 67                                                | 209                      |
| Rzeszów             | 453                     | 47                                                | 230                      |
| Sosnowiec           | 295                     | 61                                                | 149                      |
| Szczecin            | 744                     | 60                                                | 187                      |
| Tarnów              | 310                     | 52                                                | 290                      |
| Toruń               | 471                     | 53                                                | 237                      |
| Tychy               | 259                     | 53                                                | 204                      |
| Wałbrzych           | 259                     | 47                                                | 235                      |
| Włocławek           | 279                     | 54                                                | 256                      |
| Wrocław             | 1026                    | 68                                                | 160                      |
| Zabrze              | 217                     | 67                                                | 127                      |
| Zielona Góra        | 382                     | 42                                                | 271                      |

Such a large disparity between Covid-related and non-Covid-related mortality in additional deaths obliges us to once again question the reliability of the available data. In many discussions around the pandemic, it was emphasized that data on deaths due to COVID-19 were overestimated in official statistics in many countries.
Undoubtedly, this was the result of additional funding for health care facilities and medical staff serving patients with COVID-19. In addition, during the pandemic, the organizational system of hospital services in Poland changed; some specialized facilities were converted into COVID hospitals that treated only patients infected with SARS-CoV-2. These reasons may explain the very large discrepancies in the structure of excess deaths. As previously reported, in Łódź and Olsztyn, more than 90% of all excess deaths were COVID deaths. This would indicate that in these cities, practically all the additional deaths during the pandemic were due to COVID-19 alone, which seems unlikely.

4. Perceptions of the COVID-19 Pandemic among Residents of Cities in Poland

4.1. Life Satisfaction by Place of Residence

Sanitation restrictions due to COVID-19, introduced with vigor since early March 2020 and tightened in the weeks that followed (see [48]: Table 2), showed that life in major cities can suddenly change in ways previously unimaginable:

“On 24 March 2020 Poland’s government announced further restrictions on people leaving their homes and on public gatherings. The new limits constrained gatherings by default to a maximum of two people (with an exception for families); an exception for religious gatherings, such as mass in the Catholic Church, funerals and marriages in which five participants and the person conducting the ceremony were allowed to gather; and an exception for work places. Non-essential travel was prohibited, with the exception of travelling to work or home ( . . . ) On 31 March 2020 the prime minister announced that Poland would strengthen the restrictions ( . . . ) According to the regulation, minors were prohibited from leaving their homes unaccompanied by a legal guardian. Parks, boulevards and beaches were closed, as well as all hairdressers, beauty parlors and tattoo and piercing salons. Hotels were allowed to operate only if they had residents in quarantine, in another form of isolation, on an obligatory work delegation for services such as building construction or medical purposes. Individuals walking in public were obliged to be separated by at least two meters, with the exception of guardians of children under 13 and disabled persons.” [49]

The dynamism of metropolitan life has been significantly slowed down (see, e.g., [50,51]) and, at the same time, social control has developed, enforcing new sanitary rules (such as distancing, wearing masks, and disinfecting hands). The introduction and spread of the practice of remote working and learning strongly undermined the mobility of urban residents. A number of its participants disappeared from the urban public space overnight: pupils, students, and workers, who no longer had to leave their homes to get to schools, universities, or work. Moreover, the closure or restriction of access to a number of public places (cinemas, shopping malls, restaurants, churches, etc.) contributed to the desolation of these usually overcrowded and bustling places. The emptying of public spaces was actively supported by the mass media, promoting a new model of citizenship that boiled down to the slogan “stay at home”. For many residents, the first period of the pandemic meant being confined to the household, to the small space of their own apartments and houses.

CBOS surveys conducted before the pandemic (2018) and during the pandemic (2021) show that the vast majority of respondents (more than 80%), including residents of cities, were satisfied with their place of residence [22,26]. During the pandemic, there were slight changes in the distribution of responses by place of residence (Table 2).
Table 2. Satisfaction with place of residence in 2018 and 2021. Source: compiled on the basis of CBOS reports [22] (p. 19) and [26] (p. 20).

| Place of Residence (Number of Inhabitants) | Are You Generally Satisfied with Your Place of Residence? | Number of Respondents |
|-------------------------------------------|----------------------------------------------------------|-----------------------|
|                                           | Satisfied (%) | Moderately Satisfied (%) | Dissatisfied (%) | 2018 | 2021 | 2018 | 2021 | 2018 | 2021 |
| Village                                   | 85            | 12                       | 4             | 367  | 434  |
| Town below 20,000                         | 84            | 12                       | 4             | 130  | 116  |
| 20,000–99,999                              | 77            | 17                       | 5             | 198  | 237  |
| 100,000–499,999                            | 75            | 15                       | 10            | 136  | 186  |
| 500,000 or more                           | 84            | 13                       | 2             | 93   | 89   |
| Total                                     | 81            | 14                       | 5             | 924  | 1062 |

Among respondents from the largest cities (over 500,000 population) in 2018 (i.e., just before the pandemic) only 2% were dissatisfied with where they lived, rising to 8% in 2021. Respondents from the largest cities also showed a decrease in satisfaction with their place of residence, from 84 percent in 2018 to 81 percent in 2021. Surprisingly enough, similar tendencies can be observed among residents of small towns (with population less than 20,000), see Table 2.

A comparison of responses to questions about life satisfaction among surveyed Poles shows that, in recent years, both 2020 and 2021 were rated significantly worse than the years before the COVID-19 pandemic (see Table 3). Quality of life, measured by satisfaction in particular areas of life, decreased during the pandemic. However, the group of satisfied respondents remained quite large: most of the respondents reported satisfaction with many areas of life. The exception was the financial situation and income. Here, only one in three respondents was satisfied, on average, with the percentage satisfied with their financial situation falling from 35% in 2018 to 30% in 2021. Other researchers reported an even more significant drop in life satisfaction in Poland at the beginning of the pandemic [52,53].

Table 3. Satisfaction with various aspects of life in 2018–2021. Source: [26] (p. 5).

| Are You Generally Satisfied with:          | Percentage of Positive Answers by Survey Date |
|--------------------------------------------|-----------------------------------------------|
|                                            | XII 2018 | XII 2019 | XII 2020 | XII 2021 |
| career                                    | 71       | 71       | 70       | 65       |
| material conditions (housing, equipment, etc.) | 67       | 67       | 65       | 62       |
| education, qualifications                  | 64       | 63       | 65       | 64       |
| state of your health                       | 60       | 60       | 61       | 58       |
| future prospects                           | 52       | 51       | 49       | 46       |
| income and financial situation             | 35       | 36       | 37       | 30       |

An important determinant of the attractiveness of a place to live is the evaluation of one’s life prospects (Table 4). A pre-pandemic survey (2018) shows that, over the course of the pandemic, nearly every category of resident saw a decrease in their sense of satisfaction with their own life prospects and an increase in their sense of dissatisfaction. The exception were respondents from cities (population 100,000 to 499,999), who were more likely to report being satisfied with their life prospects in 2021 compared to 2018 (Table 4). However, for respondents from the largest cities (population over 500,000), there was not only a decrease in satisfaction with their own future prospects from 54% in 2018 to 48% in 2021, but also an increase in dissatisfaction from 8% to 13% of declared responses.
Table 4. Satisfaction with your future prospects in 2018 and 2021. Source: own compilation based on CBOS reports [22] (p. 19) and [26] (p. 20). The answer “hard to say” (given by 7% and 9% of respondents, respectively) is omitted.

| Place of Residence (Number of Inhabitants) | Are You Generally Satisfied with Your Prospects for the Future? | Number of Respondents |
|-------------------------------------------|---------------------------------------------------------------|-----------------------|
|                                           | Satisfied (%) | Moderately Satisfied (%) | Dissatisfied (%) | 2018 | 2021 | 2018 | 2021 | 2018 | 2021 |
| Village                                  | 50            | 47                        | 32               | 29   | 10   | 14   | 365  | 433  |
| Town below 20,000                       | 48            | 34                        | 29               | 29   | 17   | 21   | 128  | 115  |
| 20,000–99,999                            | 46            | 47                        | 29               | 30   | 18   | 15   | 196  | 237  |
| 100,000–499,999                          | 44            | 51                        | 37               | 29   | 16   | 14   | 134  | 184  |
| 500,000 or more                          | 54            | 48                        | 31               | 32   | 8    | 13   | 92   | 86   |
| Total                                    | 48            | 46                        | 32               | 30   | 13   | 15   | 916  | 1054 |

4.2. Fear and Concerns about the Pandemic

The outbreak of the COVID-19 pandemic divided Polish society into two unequal parts: the larger and the smaller. Those belonging to the larger part feared infection with the coronavirus, while the smaller part included those who had no such fears. In 2020, CBOS conducted systematic monitoring of public sentiment in this regard (Figure 12). Regardless of the place of residence in 2020, the majority of respondents (69%) were afraid of coronavirus infection (Table 5).

![Figure 12](image_url)  
*Are you personally afraid of contracting coronavirus?* (asterisk in IV* 2020 denotes survey during lockdown). Source: CBOS report [24] (p. 1).

Table 5. Concerns about coronavirus infection by place of residence, in 2020 and 2022. Source: own compilation based on CBOS reports [23] (annex, p. 15) and [24].

| Place of Residence (Number of Inhabitants) | Are You Personally Afraid of Coronavirus Infection? | Number of Respondents |
|-------------------------------------------|-----------------------------------------------------|-----------------------|
|                                           | Yes, I Am Afraid (%) | No, I Am not Afraid (%) | 2018 | 2021 | 2018 | 2021 | 2018 | 2021 |
| Village                                  | 69            | 57                        | 28   | 41   | 408  | 460  |
| Town below 20,000                        | 78            | 62                        | 20   | 39   | 91   | 126  |
| 20,000–99,999                            | 65            | 59                        | 31   | 40   | 200  | 269  |
| 100,000–499,999                          | 67            | 60                        | 31   | 40   | 172  | 174  |
| 500,000 or more                          | 74            | 54                        | 24   | 46   | 128  | 95   |
| Total                                    | 69            | 58                        | 28   | 41   | 999  | 1125 |
Respondents from the smallest cities (up to 19,999 population) and respondents from the largest cities (over 500,000 population) were most often afraid of infection. In contrast, residents of medium-size cities (with populations between 20,000 and 499,999) were least likely to fear coronavirus infection. It is not clear what the reasons were for this greater sense of epidemic safety in medium-sized cities. On the other hand, the concerns of respondents from the largest cities seem understandable: due to their large population and population density, infection with the virus was most likely. According to CBOS analysts, the following reactions of the population to the pandemic depending on the place of residence were additionally noted:

“residents of the largest cities are worse off than rural residents about not being able to move freely and having to stay at home (51% vs. 44%). They are also more frustrated by lack of physical activity (30% vs. 25%). They are more likely to feel lonely than residents of rural areas (43% vs. 33% among residents of rural areas), which they may compensate for by eating more often (24% in major cities vs. 18% in rural areas) and drinking alcohol (15% vs. 8% in rural areas). At the same time, residents of the largest cities, compared to residents of rural areas, spend more time sleeping and resting (33% vs. 21% in rural areas) and also read more books than before (31% vs. 20%).” ([23], pp. 13–14).

Comparing the results of the surveys in 2020 and 2022, we see that the percentage of respondents who are not afraid of coronavirus infection has increased from 28% in 2020 to 41% in 2022. The highest increase occurred in the largest cities, which is probably related to greater compliance with sanitary restrictions and higher vaccination rates. According to the Ministry of Health website [54], the highest proportion of vaccinated persons (data as of 20.03.2022) occurred in the largest cities in Poland, that is, Warsaw (76%), Poznan (75.7%), Wroclaw (73.2%), Gdansk (71.6%) and Krakow (71.2%).

Another issue examined by CBOS was the adequacy of introduced restrictions and limitations (Table 6). The results show that respondents from the largest cities (with a population over 500,000) were most critical of the introduced restrictions. Only one in three (34 percent) respondents from these cities felt that the restrictions and limitations in place were appropriate for the situation, 27% found restrictions excessive and 16 percent considered them too small. One in five respondents (22%) chose the answer “hard to say” which can be interpreted as confusion on the issue.

Table 6. Assessment of pandemic-related restrictions by place of residence. Source: [24].

| Place of Residence (Number of Inhabitants) | Are the Current Restrictions: | Number of Respondents |
|-------------------------------------------|-------------------------------|------------------------|
|                                           | Too Much | suitable | Too Small | Hard to Say |
| Village                                  | 24       | 45       | 22        | 9           | 417 |
| Town below 20,000 20,000–99,999          | 22       | 44       | 25        | 9           | 141 |
| 100,000–499,999                           | 23       | 45       | 21        | 11          | 168 |
| 500,000 or more                           | 27       | 34       | 16        | 22          | 99  |
| Total                                     | 23       | 45       | 22        | 10          | 1029 |

The lifting of restrictions introduced due to the COVID-19 pandemic occurred suddenly in Poland. The immediate cause was not so much the end of the threat of disease as the outbreak of war in Ukraine on 24 February 2022.

From that day, there was a massive influx of hundreds of thousands of immigrants and refugees from Ukraine to Poland (especially to the largest cities), uncontrolled in terms of epidemics. The features of this influx of people are consistent with the ideal type of refugee [55]. Hundreds of thousands of people arriving every day required a great commitment on the part of Poland in organizing social assistance and providing accommodation. First, this resulted in an informal suspension of earlier sanitary restrictions and then (at the end of March 2022) an official cancellation of the obligation to wear masks.
in public spaces, population testing for the presence of COVID-19, isolation and quarantine of infected people, and withdrawal of the so-called “COVID wards” in hospitals. In other words, an attempt has been made to restore the pre-pandemic situation in terms of treatment and sanitary security. However, the expected “return to normal” is not taking place in an atmosphere of optimism and satisfaction with overcoming the epidemic threat and ending this social experiment. New challenges resulting from the ongoing war in Ukraine, a neighboring country, and the large inflow of refugees to Poland generate further concerns about the present and the future. The sense of threat and heightened stress continues, adversely affecting the health and lives of many Poles.

5. Discussion and Conclusions

The observed socio-demographic changes associated with the COVID-19 pandemic are in line with one of the 17 goals of the UN Agenda for a 2030 Agenda for Sustainable Development, namely, to improve health and quality of life [56]. The pandemic has contributed to the deterioration of the situation both in the area of health (excess deaths, health debt) and in the wider quality of life. The negative changes brought about by the pandemic require government intervention in social policies, including population policy. Undoubtedly, in the near future, measures should be taken to improve the level of health of the region’s population. Given the narrowed reproduction (as a result of the increase in COVID-19 and excess deaths), the second important area of intervention is fertility. But since demographic transitions are complex and long-term processes, it is important to be aware that the interventions undertaken (even if effective) have limited potency and their effects will be deferred over time.

The epidemic has taken place during a time when there has been a paradigm shift in public health in developed countries—from hygiene and prevention of infectious diseases to health promotion aimed at extending healthy life expectancy through healthy lifestyles and improved living conditions as major factors in the prevention of noncommunicable diseases (NCDs). It seemed that being equipped with modern knowledge, organizational skills, new medical technologies, growing prosperity, and health consciousness would be effective enough to protect against epidemic infectious diseases. Optimism went so far that infectious disease issues retreated to the background and spending on traditional public health gave way to spectacularly effective restorative medicine. Declining public health funding was also a consequence.

The COVID-19 pandemic had an overwhelmingly negative impact on the lives of the residents of the cities studied. The study identified selected aspects of the transformation of urban societies in the demographic and social areas. An analysis of available statistical data revealed the adverse impact of the pandemic on selected demographic characteristics of cities, including deepening depopulation processes and deterioration of the health status of city dwellers.

During the pandemic, the health status of the inhabitants of large cities in Poland has been affected not only by the coronavirus, which directly threatens physical health, but also by fears and anxieties about becoming infected, social isolation, and restrictions which negatively affected the quality of social and individual life.

The analysis of the statistical materials carried out shows unequivocally that, in the overwhelming number of urban centers, there was a deepening of urban shrinkage, which is very unfavorable from the demographic point of view. In the long run, those processes may be a threat to the basis of economic existence of the cities, e.g., through a decreasing potential of workforce resources. They also result in a progressive aging of the population. The pandemic and the related challenges facing the health care system have definitely worsened the situation as regards the level of health, as evidenced by the increase in deaths, especially excess deaths not related to COVID-19. As a consequence of these events, a growing health debt has been observed, which is the result of the obstruction of the public health system, making it difficult for citizens to access effective medical care and treatment.
From a cognitive point of view, it will be important to continue observing how the health debt affecting the health level of the adult and elderly population in particular will evolve. The pandemic has contributed to a deterioration in the level of health of the Polish population, lowering the life expectancy and healthy life expectancy of Polish women and men. It is possible that the situation created by the COVID-19 pandemic and the methods used to combat it may have caused an additional increase in urban deaths.

Jesus Huerta de Soto and his collaborators, analyzing the consequences of a pandemic from the perspective of the Austrian school, note that state-controlled ways of fighting a pandemic often lead to the opposite of the declared effects [57].

“Instead, all authorities are doomed to failure when they insist on coordinating society through the use of power and coercive commands. And this is perhaps the most important message that economic theory has to send to society: problems invariably arise from the use of coercive state power, no matter how well a given politician performs.” [58]

The urban pandemic has accelerated the process of urban depopulation and reduced the health of the population, with the direct result of excess non-COVID deaths. The fight against the effects of the pandemic will be long and will take place in many areas. One of them will be as actions aimed at improving the level of health of the urban population, where the key role will be played by social policy, in this case health policy. It will be the national and municipal policies that will determine the solutions adopted to rebuild the health potential of city dwellers. No less important are population policy instruments which should be dedicated to different groups of beneficiaries (young people, seniors). Recognized demographic problems of cities, i.e., depopulation and population aging, require a wide range of solutions, whereby the roles of institutions and people creating and implementing solution guidelines are crucial [59]. However, it should be remembered that population processes by their very nature are inertial and that the effects of rational social policy will be deferred in time.

It would be better to change information policy in the pandemic situation. It should not be conducive to the spread of moral panic. People should not be frightened, but rather mobilized to actively fight the threat, including using professional medical care. Health care facilities should intensify their work and extend working hours so that everyone in need has easier access to medical care than before the pandemic. Each country should support research on COVID-19 and effective methods. Identical protection measures should not be imposed top-down for everyone. People should be encouraged to do their best to protect themselves, hoping that human ingenuity and the will to survive will yield better results than self-protection measures imposed by authority.

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