

## THE IMPACT OF THE CLOSURE OF MINING PLANTS ON THE LOCAL ENVIRONMENT IN THE PERSPECTIVE OF DEMOGRAPHIC CHANGE AND PUBLIC HEALTH

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Nothing stays the same.  
The only thing you can be sure of in life is change.  
*Trudi Canavan*

**Purpose:** in the cognitive space of the article, an important and significant challenge arises, which is - in the perspective of the megatrends indicated in the article, demographic change and public health - the need to prepare a package of socio-economic activities dedicated primarily to the inhabitants of the areas where the process of closing down mining plants will take place. In this context, the issues of demographic change and health should be given priority in these areas in activities promoting social and economic activity in the transformation process.

**Methodology:** the theses presented in the article were verified using the following methods: literature review, critical analysis of literature, analysis and comparison of documents and an example of good practices.

**Resultat:** in the perspective of the next decades, numerous social and economic challenges and effects related to the transformation of mining plants in the space of local communities (commune, district) can be pointed out. While maintaining the hierarchy of objectives described in the European Green Deal Plan and clearly related to the plan for the transformation of mining plants, lasting cooperation of the three key stakeholders in this process, i.e., local communities (representation of local and territorial self-government), employers and representation of state policies, should be expected in their environment.

**Originality:** the conclusions and recommendations from the article may be important for researchers and practitioners involved in the implementation of activities aimed at limiting the marginalization, differentiation and social and economic exclusion of residents of areas where the process of closing mining plants will take place.

**Keywords:** mining, demographic change, public health.

## 1. Introduction

Economic transformation shapes numerous spheres of social life and economic. Its course results in numerous challenges of macro, meso and micro dimensions, which are particularly visible in the evolving social policy. The indicated field of social sciences clearly reveals the connections between economic transformation - including the closure of mining plants – and dynamically progressing demographic changes. It draws attention to the utilitarian dimension of the changes taking place - with particular emphasis on public health.

As Ewa Frątczak notes, the political and social transformation in the countries of Central and Eastern Europe, including Poland, related to, among others, with the closure of hard coal mines, transformed this region into a kind of "demographic laboratory" in which population processes are subject to significant, perhaps irreversible changes of a new quality and new dimension (Frątczak, 2008, Perspectives..., 2017). In this light, it is justified to claim that further transformation processes - including those related to the domestic hard coal mining sector - will include, among others: in the Silesian Voivodeship determine significant transformations of labor markets and the related quality of life - significantly emphasized in the transformation process. As noted in the transformation process, special attention will be paid to the availability of health care, participation in culture, public transport, schools and universities with an attractive educational offer, apartments for rent, senior services, sports facilities and recreational areas (What is..., 2020). It should therefore be recognized that anticipating the transformation process and its effects in the local surroundings of the closed mines without taking into account demographic changes will incompletely reveal the social and economic effects caused in the transformed areas. All the more so because Poland has entered the period of another demographic crisis (GUS..., 2020). Its result will be a process of systematic decline in labor supply and, above all, an increase in the demographic dependency ratio. According to forecasts, by 2060 the demographic burden will increase significantly - in relation to the base year, i.e., 2020, it may even more than double. In turn, as forecasts indicate, the dependency ratio for older people may increase more than three times (Demographic..., 2014).

In this area of projected changes, a special role in transformation processes is assigned to health, which is perceived not only as disability and disease, but also as a state of physical, mental and social well-being, defined as quality of life. In this perspective, Territorial Just Transition Plans should indicate how they influence the main areas of the quality of life, i.e., an individual's physical health, mental state, level of independence and social relationships, promoting high quality of health and life, and not only eliminating exposure to factors degrading health. Equally important is the elimination of all types of social inequalities, which should also remain the focus of attention of those responsible for carrying out the transformation process. There is ample evidence that social factors - including education, employment status, income level, gender and ethnicity - have a significant impact on a person's health. These factors

have even been shown to influence a number of specific health outcomes, such as the incidence of prematurity and low birth weight in children, heart disease, stroke and some cancers in adults.

Given the above conditions, we cannot give up on perceiving the process of economic change - the key determinant of which is transformation - in the area of public health. As the authors of the study note: Just Transition for the protection of public health, an important aspect of the ongoing transformation is that it takes place in a thoughtful and fair way for everyone. We should think about people working in the coal sectors, the health well-being of residents exposed to breathing polluted air and/or the effects of climate change, the development of cities that will be friendly to residents and meet their needs in a sustainable way, and representatives of local communities and companies. In their opinion, a just transition is the process of changing the type of economy from high-emission to zero-emission, with particular emphasis on the well-being of local people in terms of continuity of employment and the environment in which they live. It involves creating alternative branches of the economy and providing jobs to people who will lose them as a result of the gradual closure of enterprises such as mines or power plants. It must take place in accordance with a previously planned schedule and with the participation of the community concerned (Territorial..., 2022).

## 2. Discussion

Today, the dynamically changing world is determined by new, previously unknown phenomena, such as globalization, demographic, technological and climate change. The world of the early 21st century is looking for new ways of development. The progress of civilization is omnipresent and determines the behavior of humans and human communities and the institutions they create. However, the modern world is very diverse, not everyone benefits from development equally, societies differ in cultural heritage, wealth and vision of the future. The above-mentioned phenomena pose numerous new challenges to modern civilization aimed at maintaining its safe life. One of them - certainly - is the need to build a new perspective in the sphere of public health at each of its spatial levels - in the phase of demographic changes and the transformation processes accompanying these changes.

As stated by the authors of the above-mentioned document entitled Just Transition to protect public health A just transition must take into account the health perspective in achieving climate neutrality. This is necessary to maintain good quality public health of residents of the transformation area and beyond. In this process, people from the region's most dependent on coal should be supported and they should be helped to combat the inequalities that may arise in this process, including: energy poverty, food poverty, lifestyle diseases, stress and mental health problems (Michalak, Karaczun, 2021).

In the light of the above-mentioned conditions - especially taking into account the transformation processes in the EU countries - it should be emphasized that good health is a serious challenge for the European Union. The Union shall pursue better health protection in all policies and actions in accordance with Article 168 of the Treaty on the Functioning of the European Union. EU action on health aims to improve public health, prevent disease and health risks (including lifestyle-related), and promote research. The EU does not determine health policies or the organization and delivery of health services and medical care. Instead, its activities serve to complement national policies and support cooperation between Member States in the field of public health (<https://eur-lex.europa...>, 2022).

In turn, at the national level, the Strategy for Responsible Development states that one of the most important challenges for the country's development are unfavorable demographic trends, which are manifested by negative natural growth, a decline in the share of people of working age and a rapid increase in the share of older people in the entire population. This means a significant increase in the demographic burden, which threatens to increase the fiscal burden borne by working people and limits the country's investment and development opportunities, (...) A smaller number of young people may also affect the level of creativity of society, and therefore the innovativeness of the economy. Today, in some areas, there is a shortage of qualified staff, which increases the importance of migration processes and the need to prepare an effective strategy for managing human capital flows (Strategy..., 2017).

Another important document in the area of transformation processes is the Polish Energy Policy. In this document, one of the primary goals is to eliminate the so-called low emission of pollutants. For the sake of the health and quality of life of society, the use of solid fuels in individual heating will be gradually reduced. The above will involve moving away from coal burning in households in cities by 2030, and in rural areas by 2040. However, until 2040 - also in cities - the possibility of using smokeless fuel will be maintained, unless this is contrary to from the so-called anti-smog resolutions (Poland's Energy Policy, 2021).

At the regional level, it is a key strategic document in the area of transformation processes - taking into account demographic changes and public health is the Development Strategy of the Silesian Voivodeship "Śląskie 2030". This document clearly states that demographic trends and the aging of society are important factors that will significantly influence the development of the region in the future. An increase in the demographic burden of people of working age with older people; will either result in a significant increase in taxes and contributions financing pension and health care expenses, or in a significant reduction in the scope of security provided to older people (lower pensions, worse access to benefits, faster increase in prices of goods they prefer); changes in the ratio of pensions to wages (the so-called replacement rate) will be much lower in the future than currently, especially in the case of women (Development..., 2020).

New directions and challenges are outlined in the Regional Innovation Strategy of the Silesian Voivodeship 2030. The strategy clearly indicates that the demographic situation of the region, and specifically the progressive aging of the population, favors the adoption of

technology-related topics to support seniors. Historically, the region was the first in Poland to successfully attempt to digitally manage patient data in publicly financed health care. Although in subsequent years other national solutions diminished the importance of this system, its implementation at that time had a strong impact on the understanding of digitalization throughout society. In the longer term, 2021-2030, due to the aging of society, lifestyle diseases and other crisis events (pandemics, effects of climate change, economic transformation) affecting the health of the population, the demand for new solutions in the field of medical biotechnology and medical engineering technologies will be the basis smart specialization of the region, which is medicine (Regional Innovation Strategy..., 2021).

The key programs with an operational dimension in the area of transformation processes are the Regional Plan for the Just Transformation of the Silesian Voivodeship 2030 (Territorial..., 2021) and the Fund for Just Transformation. In the Regional Plan, expert attention in the area of demographic changes and public health was focused on investments. In this perspective, it is stated that investments will contribute to improving the quality of life of the region's inhabitants, including improving access to health and social services, the right to clean and healthy air and the need to raise awareness and make decisions in this regard. The above will contribute to the reversal of negative demographic phenomena, such as population depopulation, and will allow the creation of a system of incentives covering the entirety of people's actual living conditions in terms of the degree to which their health, social, cultural, etc. needs are met within the stream of services, including in order to maintain cultural identity (Territorial..., 2021). The plan further emphasizes that an essential element of the just transformation process is also the improvement of the quality of life of the inhabitants of the transformation areas, which will mitigate negative effects, including in the social and health areas. In connection with the above, support will be provided for health protection, including mental health, addressed to residents of communes undergoing mining transformation, in particular to employees employed in mining and mining-related enterprises. The scope of support will include activities related to medical rehabilitation, including post-traumatic rehabilitation facilitating return to work and maintaining employment, in cooperation with employers, increasing access to diagnostics and health prevention (in the field of, among others, occupational, cancer, lifestyle and mental diseases that are a significant problem region) and health education (Territorial..., 2021).

The second of the documents mentioned, the Just Transition Fund in the Silesian Voivodeship, will serve to achieve the main goal, i.e., mitigating the social, economic and environmental effects of the transition to a climate-neutral economy. In conjunction with other sources of financing, in particular funds from the Cohesion Policy 2021-2027, funds from the remaining pillars of the Just Transition Mechanism and other public and private funds dedicated to complementary activities and projects, this Fund will give a new impetus to the region's economy and open better development prospects for its inhabitants, especially those most affected by the negative consequences of the inevitable transformation process (Fund..., 2020).

To conclude, the demographic development in the Silesian Voivodeship has undergone significant transformations compared to previous years (Skibiński, 2012). From the perspective of transformation processes - following Anna Runge - it should be stated that a retrospective study of population changes as well as their broader socio-economic background allows for appropriate generalizations. Thus, in the trend of demographic work, especially in recent years, the thesis about a qualitative change in population trends draws attention. It begins in 1982, when for the last time other voivodeships significantly contributed to the regional labor market of the Katowice Voivodeship. The closing of this market has nationwide caused, i.e., the crisis of the 1980s. In addition to growing economic problems, the dynamics of population transformation has decreased (Runge, 2010). Silesia is therefore an example of a dramatic demographic situation and weakening human and social capital with profound social consequences until 2035. These consequences concern the depopulation of numerous cities and communes, mass foreign emigration, disturbances in natural movement, lack of generation replacement and the aging process of the population. Demographic changes in Silesia reflect economic conditions. They occur with different dynamics in spatial systems (Rauziński, Zagórowska, 2014). It seems that the transformation processes in the demographic space and the related sphere of public health will not only confirm the theses expressed above, but will be important determinants of their further dynamic development.

In the perspective described and the megatrend recognized many times in the literature, demographic change is important to be analyzed in a narrower scope, focusing on public health. The indicated demographic trend will have a strong impact on changes in health care in Poland. Public health - i.e., activities aimed at preventing diseases, extending life and increasing its quality by influencing lifestyle (e.g., diet, exercise, fitness, addictions) along with introducing pro-efficiency changes to health care systems using IT and mobile techniques - these will certainly be the most frequently appearing slogans in health care system reforms in the area of transformation processes (Institute of Public Health, 2022).

Given the above regularities - in the context of transformation processes - the human right to health protection grows from the root of social rights. From a social perspective, a person's ability to have the right to health is manifested on the bodily level, consisting in maintaining and protecting good health using all available material resources, including reproductive health, adequate nutrition and shelter. A comprehensive approach to health and its connection with economic and even cultural rights is becoming more and more common. The deepest connections link the right to health with the right to obtain and enjoy a decent standard of life. According to some theories, health is an essential attribute of "life in dignity" and quality of life. The material determinants of this level are, in particular, access to safe drinking water, adequate food and employment. They determine individual health and, in the long run, affect the health of the entire society. The right to health is also linked to the rights enabling the individual's needs to be met in terms of access to housing and clothing. Guaranteeing the right to health care is possible by creating a mechanism of basic health services provided under the

so-called social security system. Another group of rights related to health concerns property and the ability to access basic resources enabling survival. The right to own and obtain property includes the human right to water, food, medicines and vaccinations. The sum of the material components ensuring a healthy life, including satisfaction at the physical, mental and spiritual levels, constitutes the right to happiness. Therefore, the right to health has profound implications in the field of social security. In particular, this concerns the introduction of hygienic and healthy working conditions, as well as the right to leave, sleep and rest. In turn, the circumstances triggering the use of social security instruments include: unemployment, disability, age, helplessness in life, the need to personally care for a loved one, as well as motherhood and widowhood. The last group of social rights with which the right to health care is closely related is the so-called human development rights, enabling the satisfaction of individual aspirations. In this approach, the right to health is associated with ensuring the right to education, i.e., the ability to implement the current state of medical knowledge in relation to maintaining the health status quo of the individual and his or her unrestricted (without excessive effects and costs) access to such resources, including the use and use of modern technologies. Along with economic development and the progress of civilization, medicine is developing and natural and technical sciences are developing, constituting the basis for preventive activities (Relationships..., 2016).

In the above perspective - which should be particularly emphasized - the aging of societies will continue dynamically in parallel with the transformation process. This process will certainly determine numerous changes in public health that should be prepared for. In the indicated perspective, it is worth developing issues related to public health through the topic of aging. As noted in the report on the situation of older people in Poland, the concepts of old age and aging can be considered in two ways, in the individual aspect and as phenomena relating to the collective of these individuals, i.e., the society of a given region, country, part of the world (Report..., 2012). In the individual aspect, old age is a biological phenomenon that constitutes the human life cycle (Colloca et al., 2020). According to another approach, aging is perceived as a process of progressive impairment of the body's vital functions and loss of the ability to adapt to environmental changes along with the increasing probability of death (Kirkwood, 1996).

A generally inevitable stage of the aging process is a condition known as old age. In turn, aging, as defined in the psychogerontological literature, means a certain process and is dynamic, while old age as a state is static (Porzych, Kędziora-Kornatowska, Porzych, 2004). According to D.J. Levinson's life cycle theory (Levinson, 1986), old age is one of the phases, which, however, is not homogeneous and can be divided into subsequent periods. The life cycle theory describes changes in the psyche and behavior that occur at subsequent stages of an individual's life - progressing with age. The first phase of life is the phase of learning and gaining experience (covers childhood and youth). The next phase covers adulthood and is the period of implementing the acquired knowledge. The last phase - old age - is the phase of regression.

Individual phases may occur in different individuals at different times, and there are no rigid limits on the age at which individual phases of the life cycle end or begin. However, the psychological concept of the life cycle - created by E. Erikson - divides an individual's life into eight stages (Erikson, 2002). The final stage is late adulthood and begins at the age of 60-65. It should be noted that the division of the last stage of human life changes as life lengthens and its quality improves in the elderly population. Currently, the English literature divides old age into three phases: – young old – people aged 60/65-74, – old old – people aged 75-84, – the oldest old (the oldest old) – people aged 85 and over. Young and old people are most often still fully functional, both physically and mentally. People included in the elderly category are people who require help in performing some everyday activities, such as shopping, cleaning, and washing underwear. The oldest old need constant assistance in performing most activities, people of this age are potential clients of institutional forms of assistance. In turn, Simone de Beauvoir did not perceive old age as a uniform period and distinguished two stages of the last phase of life, taking as one of the criteria functional age, i.e., the psychophysical capabilities of an older person: in the first phase, older people are functionally independent and economically dependent (the so-called third age), in the second phase, older people are dependent, both functionally, as well as economically (the so-called fourth century) (Beauvoir, 1996).

Based on the above theses, the following conclusions and recommendations were formulated, focusing on the indicated area, i.e., demographic change in the perspective of the impact of the closure of mining plants on the local environment.

In the area of demographic changes, a clearly unfavorable process - unfriendly to social and economic development - is the age structure of the population. As a result of the processes taking place in the age structure, further dynamic stratification of labor demand and labor supply streams should be expected. The stratification will be primarily implied by a clear increase in the population in age groups approaching retirement age (professional inactivity) with a simultaneous decline in the population in age groups characterized by demographic youth and the highest professional activity and mobility. The key source of these unfavorable trends for the labor market is the lack of simple replacement of labor resources at the age of peak professional activity by a significantly smaller population of the youngest people. As a result of the indicated processes on labor markets, a significant increase in the economically inactive population should be expected. This is confirmed by the forecasts of the Central Statistical Office, which clearly indicates that in the perspective of 2050, the burden of the working-age population with economically inactive people, e.g., in the commune of Siemianowice Śląskie, may increase from 48 in 2018 to an extremely high number of 103 people in 2050. The source shaping the indicated forecasts will primarily be the dynamic growth of the population of non-working age, i.e., people aged 60/65 and over. This process, in turn, will result in a very high rate of increase in the aging of the population in the so-called old-old group, i.e., in the oldest categories, aged 75 and over (Population Forecast..., 2014).



All the outlined changes, processes and forecasts indicate that in order to limit stratifications in labor markets, which are the main source of structural mismatches, actions should be taken to build a future-oriented policy that minimizes the effects of aging societies. Failure to take this type of action may delay preparation for the seemingly inevitable changes in the age structure of the population in the perspective of transformation processes. As already noted, these are changes in many aspects, starting from changes in the structure of consumption, through changes in "production" (labor force, GDP), and ending with the consequences for public finance systems. The mentioned need to prepare for the effects of an aging population will also be determined by further - as has already been signaled - expected effects, such as: mismatches in the labor market in terms of sectors or occupations (for example, due to the increased demand for health care and social care workers, related to the increase in the population aged 65+ and, above all, 80+) and the need to fill gaps in labor supply related to the possible inflow of immigrants (Janicka, Kaczmarczyk, Anacka, 2015).

As E. Trafiałek notes, modern civilization guarantees an increasingly longer average life expectancy. This is accompanied by the phenomenon of an increase in the number of the elderly population and a simultaneous decline in birth rate. As a result, this results in the strengthening of the so-called model on a global scale. the inverted demographic pyramid (Phenomenon..., 2010), which is characterized by, among others, in the social sphere, the lack of generational replacement on the labor market and raises the problem of securing decent conditions for those leaving the labor market. In turn, in the sphere of economic effects, it causes the so-called devastating labor markets (Trafiałek, 2006). Hence, despite the passage of several years since its formulation, L. Frąckiewicz's postulate is still valid, which states that the economic, social, social, medical and cultural effects of the phenomenon of demographic old age cover various spheres of behavior, needs and tendencies, creating an extensive catalog of tasks, the implementation of which requires the activation of appropriate entities and instruments of social policy (Frąckiewicz, 2003).

Noting this challenge from the perspective of conditions related to transformation processes, attention should be paid to numerous further consequences that may emerge in connection with demographic changes, including:

- clearly imbalanced feminization rate,
- serious shortages of women aged 20-29 (the age of highest matrimonial activity),
- unnatural numerical predominance of women in the oldest age groups,
- a significant decline in the number of marriages,
- significant decline in the number of births,
- negative birth rate,
- extremely low fertility rate,
- extremely low gross reproduction rate,
- low demographic dynamics,
- dynamically growing demographic dependency ratio.

In this context, the need to undertake the following activities in the perspective of social and economic transformation can be recommended:

- development of guidelines for programs preparing municipal and district policies for the phenomenon of old age,
- giving public employment services a primary role in the work on preparing a thematic proposal for social and professional activation of the increasing number of seniors,
- developing proposals for activities strengthening the participation of seniors in making local decisions shaping their present and future (Senior Council at the commune head, mayor, president, etc.),
- preparation of guidelines for an intergenerational integration program, in particular based on the diversity management method and limiting the intergenerational information gap,
- attempting to develop an educational program presenting the economic and social effects resulting from demographic change,
- preparation of a package of activities dedicated primarily to women in senior age,
- giving the issues of education and health a priority in activities promoting the social and professional activity of seniors.

Based on the above conclusions and recommendations, it seems that the greatest contemporary challenges for the communities, institutions and people creating the future - apart from preparing for the just transformation process - may be the need to secure decent living conditions for people transitioning from economic activity to professional inactivity as a result of the demographic change referred to as. Secondly, maintaining the professional activity of the aging population by building a modern, active social and labor market policy - corresponding to the economic structure of the transformed areas, in particular based on their social and economic advantages.

In the space described above - as has already been noted - the context related to public health is equally important. It is emphasized very clearly in the work entitled Territorial just transformation plan and health care. In the above-mentioned expert opinion, its authors clearly indicate that health care experts, doctors, nurses, scientists and patient groups can bring to the debate on the Just Transition in Europe the perspective of public health protection, which has long been neglected in the discussion. Just transition activities should be based on the involvement of local communities, and this must also include the health community. In the discussion about transformation, it is necessary to include and amplify voices related to health. Professionals from many areas of public health can make an important contribution to the transformation. They can achieve this by sharing knowledge about the links between various forms of energy production and public health or highlighting the health risks arising from the climate change process. Additionally, they can participate in consulting assessments of the impact of the transformation on health, as well as conduct educational activities aimed at the

general public. In the light of the directions of changes and forecasts outlined above, public health becomes a universal goal. This is noted by Zsuzsanna Jakab and Agis D. Tsouros - representing the World Health Organization Regional Office for Europe - who emphasize that good health and well-being are two universal goals of humanity that are currently recognized as fundamental human rights and important components of the equitable development of human potential, economic and social, and for the resources used in everyday life. Both goals are increasingly considered to be the main premises of human development and security. Health is no longer treated as an item on the list of expenses that must be financed, but as an important good that must be taken care of and improved in a fair manner. Health is a positive concept that emphasizes the importance of social and individual resources and physical potential (...) There is a need for a new health management system tailored to the needs of the 21st century, which will take into account the social factors determining health, act in a fair and sustainable manner and implement global and social goals, using new, interconnected forms of formal and informal management and new strategic relationships developed taking into account people's opinions and involvement. This is both an opportunity and a challenge for us (Jakab, Tsouros, 2020).

In the light of the indicated challenges, changes caused by transformation are taking place in the civilizational, cultural and socio-economic dimensions. Therefore, it is becoming quite certain that areas undergoing transformation must be equipped with strategic solutions that respond to very extensive, diversified, unstable and comprehensive socio-economic changes in their area and surroundings.

### **3. Summary**

The regularities, phenomena and changes mentioned in the above article cause transformations in the labor markets, in the education system, within economic organizations and other institutions in the vicinity of the closed mining plants. Many of them are directly or indirectly related to the areas of employment, education, health, social security, etc. As noted in numerous works, three key global changes, which are the already mentioned climate, technological and demographic changes, result in the process of adapting the environment of closed mining plants in the areas of operating principles, information methods and organizational models in order to build sensitive activities based on innovations. that shape modern (intelligent) solutions of the future. It seems that in view of the directions of change outlined in this way, the greatest challenge for intelligent and innovative environments and entities representative of the environment of the closed mining plants is the need to predict the future, improve and build solutions that respond to possible challenges and increase their competitiveness. It is worth noting here that the liquidation of mines is a serious challenge due

to the comprehensive nature of social relations centered around the mine (Mrzygłocka-Chojnacka, 2012) and the economic identity of communities built around mining (Bell, York, 2010). A particular challenge is therefore to fill the institutional void created after the liquidation of the mine, around which the life of the community was centered so far, and to counteract the identity crisis of the entire community. Alienation of mine workers after their liquidation may lead to the disintegration of the social fabric in mining communities (Nawrocki, 2006; Wódz, 2013). The complexity of these spheres indicates primarily the qualitative nature of changes that may occur in the hard coal mining environment, and also determines the need to build multidisciplinary programs, which should be used as part of the intervention for the duration of the closure of mining plants. The key goal of the programs would be to strengthen cooperation in the indicated areas of liquidated mining plants with the local environment. It seems that in the transformed areas, this may be a fundamental determinant shaping the effectiveness of closing mining plants from a demographic and public health perspective.

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## References

1. Beauvoir de, S. (1996). *The Coming of Age*, 7. New York: WW Norton & Company.
2. Bell, S.E., York, R. (2010). Community economic identity: the coal industry and ideology construction in West Virginia. *Rural Sociology*, vol. 75.
3. *Central Statistical Office on Poland's demographic situation: It will be even worse*, <https://www.mp.pl/pacjent/ciaza/aktualnosci/214436,gus-o-sytuacji-demografi-j-polski-bedzie-jeszcze-gorzej>, 15.09.2023.
4. CODED%3D29& locale=pl, 17.04.2022.
5. Colloca, G., Capua, B., Bellieni, A., Fusco, D., Ciciarello, F., Tagliaferri, L., Valentini, V., Balducci, L. (2020). *Biological and Functional Biomarkers of Aging: Definition*,

- Characteristics, and How They Can Impact Everyday Cancer Treatment*. Current Oncology Reports 2020.
6. *Development Strategy of the Silesian Voivodeship "Śląskie 2030"* (2020). Katowice: Zielone Śląskie, p. 113.
  7. Erikson, E.H. (ed.) (2002). *The Completed Life Cycle*. Warsaw: Rebis.
  8. Frąckiewicz, L. (2003). Poland's demographic problems. *Problemy Polityki Społecznej. Studies and Discussions, No. 5*, p. 11, passim.
  9. Frątczak, E. (2008). Demographic situation in Poland during the transformation period. In: B. Chyrowicz (ed.), *Life extension as a moral problem* (pp. 77-150). Lublin: Towarzystwo Naukowe KUL.
  10. [https://eur-lex.europa.eu/summary/chapter/public\\_health.html?root\\_default =SUM\\_1\\_](https://eur-lex.europa.eu/summary/chapter/public_health.html?root_default =SUM_1_)
  11. Institute of Public Health of the Jagiellonian University, <https://izp.wnz.cm.uj.edu.pl/pl/blog/czem-jest-zdrowie-publiczne/>
  12. Jakab, Z., Tsouros, A.D. (2015). Health 2020 – achieving health and development in today's Europe. In: *Przegląd Epidemiologiczny*. Warszawa.
  13. Janicka, A., Kaczmarczyk, P., Anacka, M. (2015). *Changes in labor resources and their economic consequences and other economic consequences of population aging*. Warsaw: University of Warsaw.
  14. Just Transition Fund. Policy Department for Budget Directorate-General for Internal Policies of the European Union PE 651.444 – April 2020.
  15. Kirkwood, T.B. (1996). Human Senescence. *BioEssay, No. 18*.
  16. Levinson, D.J. (1986). A Conception of Adult Development. *American Psychologist, vol. 41(1)*.
  17. Michalak, W., Karaczun, J. (2021). Just Transition for the protection of public health and Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO.
  18. Mrzygłocka-Chojnacka, J. (2012). Transformations of local mining communities. Theoretical foundations of analyses. *Oppuscula Sociologica, No. 2*.
  19. *National Spatial Development Concept 2030*. Ministry of Development Poland.
  20. Nawrocki, T. (2006). *Persistence and change of the local mining community in Upper Silesia*. Katowice: Publishing House of the University of Silesia.
  21. *Perspectives on transitions to sustainability* (2018). Luxembourg: Publications Office of the European Union.
  22. Poland's energy policy until 2040 – Summary (2021). Warsaw: Ministry of Climate and Environment, p. 74.
  23. Population forecast for 2014-2050 (2014). Warsaw: Central Statistical Office.
  24. Porzych, K., Kędziora-Kornatowska, K., Porzych, M. (2004). Psychological aspects of aging and old age. *Gerontologia Polska, No. 12*.
  25. Rauziński, R., Zagórska, A. (2014). Socio-demographic changes in Silesia in 2002-2011 and their prognostic implications. *Studia Ekonomiczne, No. 197. Education in the light of*

- changes in the modern labor market: selected problems*. University of Economics in Katowice, 21-33.
26. *Regional Innovation Strategy of the Silesian Voivodeship 2030* (2021). Katowice: Intelligent Śląskie, pp. 48, 76.
  27. Relationships of the right to health with economic, social and cultural rights (2016). In: R. Tobaszewski, *The right to health in human rights protection systems* (p. 51). Lublin: John Paul II Catholic University of Lublin, Faculty of Law, Canon Law and Administration.
  28. *Report on the situation of older people in Poland* (2012). Warsaw: IPiSS, pp. 15-18.
  29. Runge, A. (2010). Population processes and structures in the Silesian Voivodeship. In: *Demographic and social processes and structures in the Silesian Voivodeship in the years 1988-2008*. Katowice: Statistical Office in Katowice, p. 35.
  30. Skibiński, A. (2012). Development of the population of the Silesian Voivodeship in the period of systemic transformation, in: *Demographic conditions of economic development. Faculty Scientific Journals of the University of Economics in Katowice*. Katowice, pp. 144-55.
  31. *Strategy for Responsible Development until 2020 with a perspective until 2030* (2017). Warsaw, p. 12.
  32. Sztando, A. (2011). The essence and functions of local government strategic planning in the region. *Scientific Works of the Wrocław University of Economics, No. 180*, pp. 45-55.
  33. *Territorial Just Transition Plan and Health Care. HEAL guide*. [http://healpolka.pl/wp-content/uploads/2021/11/HEAL-Just-transition\\_scorecard\\_PL-2021-11-25.pdf](http://healpolka.pl/wp-content/uploads/2021/11/HEAL-Just-transition_scorecard_PL-2021-11-25.pdf).
  34. *Territorial plan for the just transformation of the Silesian Voivodeship 2030* (2021). Katowice.
  35. *The demographic situation of older people and the consequences of the aging of the Polish population in the light of the forecast for 2014-2050* (2014). Warsaw: Central Statistical Office.
  36. Strzelecki, Y. (2010). The phenomenon of demographic change was discussed at length. In: J. Osiński (ed.), *Contemporary and future demographic situation of Western civilization. Contemporary Western Civilization. Strengths and weaknesses*. Warszawa: SGH, pasimm.
  37. Trafiałek, E. (2006). *Aging and old age*. Wydawnictwo Uczelniane Wszechnica Świętokrzyska, p. 246.
  38. *What is a just transformation and why do we need it in Poland?* <http://sprawedliwa-transformacja.pl/o-sprawedliwyj-transformacji/>, 27.09.2023.
  39. Wiatrak, A.P. (ed.) (2011). Development strategies of rural communes. Theoretical foundations, assessment of usefulness and importance in structural changes in rural areas. Warszawa: IRWiR PAN, pp. 25-76.
  40. Wódz K. (ed.) (2013). *Forgotten places, forgotten people. Economic restructuring and cultural change*. Wydawnictwo Śląsk.