

LIFE EXPECTANCY AND MORTALITY RATES IN POLAND AND GERMANY - A COMPARATIVE ANALYSIS

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Abstract

In the modern world a prolongation of the duration of human life can be observed, especially in highly developed countries. It is the result of medical progress and the improvement of the quality of life. At the same time, there are large disparities in the mortality rates of the population in relation to women and men, as well as age. The causes of the mortality are the emergence of new diseases of the modern civilization, as well as the change of lifestyle and nutrition influenced by modern technologies and products. This paper is an interdisciplinary article and contains both strictly demographic and medical information. The paper presents selected aspects of the demographic situation in Poland and Germany. An important element of the research was to show the causes of mortality, i.e. diseases of the modern civilization and the possibilities of their prevention. The research results show that while the general life expectancy of the population in both Germany and Poland is extended, the mortality rate is particularly alarming in the younger age groups due to the incidence of modern civilization diseases such as type 2 diabetes mellitus, metabolic syndrome, hypertension and cardiovascular diseases.

Key words: life expectancy, mortality rates, civilization diseases, Poland, Germany

JEL Code: J11, J24, I10

Introduction

In the modern world, there is a prolongation of the duration of human life, especially in highly developed countries. Over the past 50 years, life expectancy at birth has increased on average by around 10 years across the European Union, mainly due to improved socio-economic conditions and the state of the environment, and due to the improvement of the quality of health care and treatment. This rapid change in the process of prolonging the duration of human life was described by the Nobel laureate Robert Fogel (1964) as a "technophysio-evolution" of the human species. In 1900, 13% of the people aged 65 lived to be 85 and in 2000 the number has reached up to 50%, because nowadays chronic complaints, i.e. conditions of the heart, lungs and arrhythmias, occur 10-12 years later than a few dozen years

ago. Currently, aging processes are caused more by external factors (environment) than genetic changes. Research results (Jeziarska-Thöle, 2016; Dotlačilová, 2013; Klenk et al. 2007) show that while the overall life expectancy of the population in Germany (83.2 - females and 78.4 - males) and Poland (81.6 and 76.3) is prolonged, an alarming attention is driven by the mortality among younger age groups (45-60 years) due to the incidence of modern civilization diseases (Nolte et al., 2002).

This paper is an interdisciplinary article and contains both strictly demographic and medical information. The paper presents selected aspects of the demographic situation in Poland and Germany, including changes in time and diversity of life expectancy, and the mortality rate by sex and age. An important element of the research was to show the causes of mortality, i.e. diseases of the modern civilization and their prevention.

1. Methodology

Life-length changes were assessed and analysed on the example of Poland and Germany in the years 1995-2015, which sets a spotlight on the years before Poland's accession to the European Union as well as the years after the reunification of Germany to modern times. The duration of life is one of the basic and most commonly used simple synthetic measures which is needed for the overall assessment of the health status of a population. However, this gauge does not show the health in which people live their lives. The presented mortality analysis of the inhabitants of Poland and Germany was based on data provided by the Central Statistical Office in Poland (Główny Urząd Statystyczny w Polsce) and the Statistische Bundesamt in Germany. Most of the presented results are the authors' own calculations and, moreover, the indicators published by the Central Statistical Office (GUS) and available indicators in international databases were used, primarily the European Regional Office of the World Health Organization in Copenhagen (HFA DB December 2015 and European mortality database HFA MDB July 2016) and the Eurostat database. Literature on the topic of demographical changes and medical diseases has been used in the paper.

2. Life expectancy in Poland and Germany

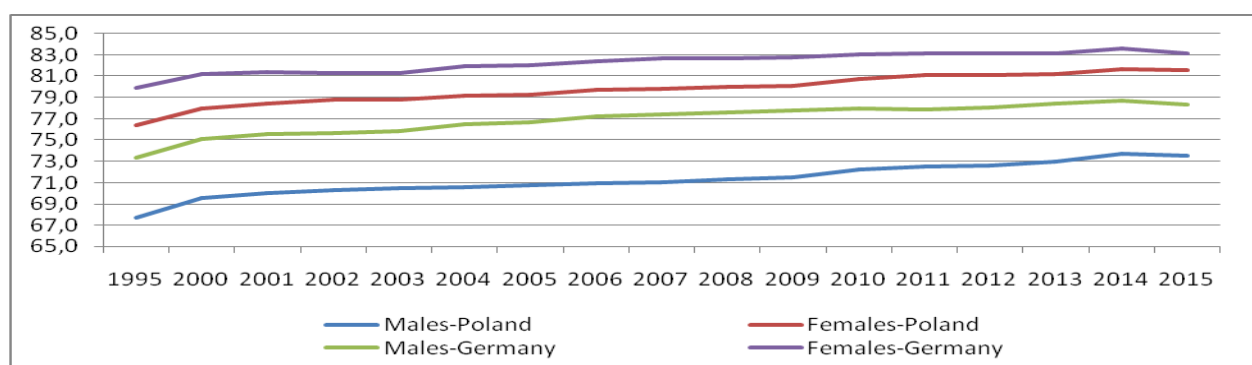
At the beginning of the 20th century, the life expectancy of people, even in highly developed countries, was usually lower than 50 years. The causes for such a low life expectancy can be found in the living circumstances and working conditions of the people during the industrial revolution. Poor sanitary conditions, malnutrition, unefficient or missing health insurance,

child labour and hard physical work led to early conditions, their deterioration and a high mortality rate. Many people used to die from infections, diseases of the respiratory system and the digestive system (e.g. diarrhea, the flu, pneumonia), malnutrition, heart failure, overexertion and fatigue. Poor sanitary conditions and overloaded small apartments for the majority of the urbanizing population cleared the way for pandemic waves such as the Spanish Flu in 1918/1919 causing millions of deaths. Moreover, the birth rate in the early 20th century used to be very high as well as the child mortality which is an important factor in calculation of the life expectancy (Steckel; Floud, 2008). Due to insufficient birth circumstances such as giving birth at home, intervention during complications at birth used to be more difficult to deal with. Many genetic disorders weren't known, inadequate sanitary conditions that led to infections caused death, malnutrition and child labour used to weaken children at a young age, the reduction of drugs during pregnancy didn't take place and newborns' and childrens' conditions were mostly difficult to treat resulting in a low success rate. All those factors led to a high mortality rate amongst children. However, in the 1950s, the life expectancy in Europe already increased up to 66 years (63 years for men and 68 years for women). In the mid-nineteenth century, the mortality rate in Poland used to be very high (Steckel,1999). In 1950, the Polish average life expectancy of women was 62 years and men 56 years. The difference between the average life expectancy of women and men used to be 13 years. Explanations to those phenomenons are that after World War II many soldiers returned home injured or being disabled, many civilians had to deal with losses and the primitive living conditions caused by the destruction during the war. Many people died by the complications of their injuries and their consequences. In the following period of time in the 1950's, a rapid increase in the economy took place, resulting in improving medical, sanitary, living and environmental circumstances by releasing new products and standards for a sufficient nutrition and better hygiene. In the years 1991-2006, the foreseen life expectancy has increased by about 5 years for both sexes. In Poland in 2015, the average life expectancy of women was 81.6 years, which was higher than the life expectancy of men (73.6), due to the excess mortality in men. The difference between both sexes decreased to about 8 years. In Poland, the phenomenon of excess mortality among men occurs. According to the latest available WHO appraisals, in the coming years no significant decline in the level of deaths among men is expected despite the popularisation of a healthy lifestyle, the increasement of the availability of medical services and the improvement of the quality of these services. The main reasons for this phenomenon are the rapid aging of the population after 2020, long

queues for specialist services as well as disproportions in the distribution of centers of intensive cardiac care and the increased mortality rates due to cancer in older aged groups (Wilkin, 2012). But also many other factors lead to the excess mortality in men, such as the genetic predisposition of men to live shorter than women, the high motorway accident rate of men in their young 20s and 30s, the higher risk of men consuming drugs, drinking alcohol, smoking and a higher rate of physically demanding work than women.

In 2015, the foreseen life expectancy at birth used to be 77.5 years in Poland and 80.7 years in Germany, with an average of 80.9 years in the European Union. In 2015, Polish women lived by 1.5 years and Polish men by 4.8 years shorter than the average of German residents. The current life expectancy of men in Poland is equal to the one of German men in 1995 (24 years ago), and for Polish women to the one of German women in 2010 (5 years ago). Reasons for these differences can be found in the historical development of both countries before the 1990s. During the period of socialism in Polish People's Republic (1947-1989) and a centrally planned economy with a smaller global market, many goods were limited, i.e.: hygiene products and nutritional products such as tomatoes, butter, meat and tropical fruits, as well as medical techniques and medications. These aspects may have an impact on the development of the Polish life expectancy compared to the German. The German political system was based on the idea of capitalism and an open social market resulting in a large access to all needed and wanted supplies in the population, which exists until today. Since 1990, there has been an open market in Poland resulting in economic growth and a rapid change in the development of Polish life expectancy due to improved life quality and better living circumstances. According to the method applied by the WHO (Hryniewicz et al., 2018), if the growth rate of the life expectancy of the Polish population will continue to be as in recent years, the current life expectancy of women and men in Germany will be reached by Polish women in 5 years and men in 10 years (Fig. 1).

Fig. 1: Life expectancy in years 1995-2016 by sex in Poland (P) and Germany (G)



Source: Eurostat, World Bank Date, GUS

On the basis of the graph (Fig. 2), it may be noticed that the difference in life expectancy in Poland compared to Germany decreased for both women (from 4.0 to 1.1 years) and men (from 6.8 to 3.9 years). The globalization and modern development in both countries concerning medicine, prevention of secondary risk factors and diseases as well as improved diagnosing methods lead to this development.

Fig. 2: Dynamics of changes of life expectancy in years by sex in Poland and Germany



Source: Eurostat, World Bank Date, GUS

Demographers (Hryniewicz et al., 2018; Dotlačilová, 2013; Wilkin, 2012) predict that the average duration of life in Poland in 2035 will be close to the life duration achieved in developed countries 17 years earlier.

2.1. The causes of the prolongation of the duration of human life

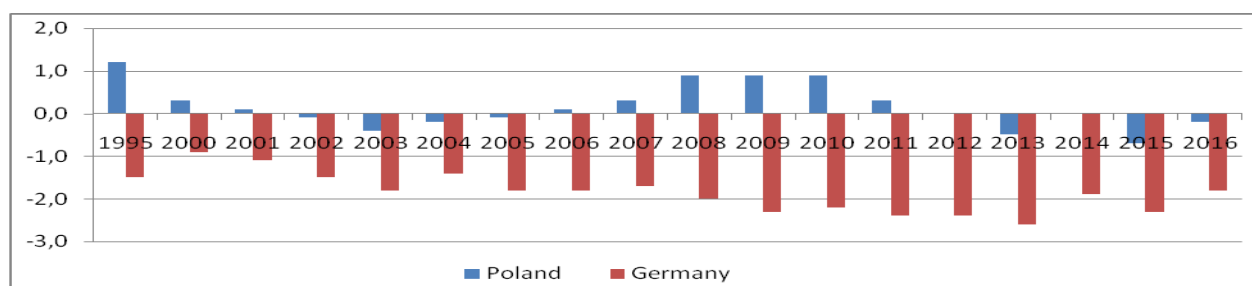
Nowadays, many different factors lead to the prolongation of the duration of human life. The effective reduction of infectious diseases, vaccination programmes and offers to patients to participate in condition preventing programmes, the screening of newborns for medical conditions, the idea of proposing individual therapy schemes to patients and combining physical therapies with psychological and social support groups lead to an effective improvement of life quality, even when dealing with medical conditions. Furthermore, modern campaigns on the topic of healthy diets and sports activities reach the younger as well as the older population, creating a health-conscious population. A healthy diet consists of 40-60% carbohydrates, 20-30% fats, 10-20% of proteins and at least 2L of water every day to provide the organism with enough energy and liquid. It is also recommended to do at least 30min of exercise every day. The amelioration of sanitary conditions and hygiene standards,

the larger access to disinfectants in health care institutions and at home, better living conditions such as access to a variety of food, schooling, working, free time and housing facilities reduce the possibility of getting a condition. Due to the rise of the education level in Poland and Germany with the help of digital media, medical information can be found and spread more easily. In recent years, there has been a steady and improving progress in medical care and medical techniques and therapies. The aging population, a lower infant mortality and less deaths caused by infectious diseases, all these and other factors, lead to a higher life expectancy in both Poland and Germany.

2.2. Diversification of the natural increase

In the years 1995-2015, the natural increase rate in Poland decreased from +1.2 to -0.2 %. There was a positive natural increase in the years 2006-2010, then it fell again below zero. Meanwhile, in Germany in the same period of time, the lowest natural increase occurred from -1.8 to 2.6 %. The negative natural increase was associated with a low number of births and a high number of deaths (Jeziarska-Thöle, Janzen, 2016). The reduction in the rates of natural increase both in Poland and Germany is the result of previous depopulation processes and the consequences of population aging processes, which results in a lower number of potential fertile women in both countries. It is a pan-European phenomenon that is also characteristic for the countries of Central and Eastern Europe (Fig. 3). Other important aspects causing low rates of natural increase are the currently single-oriented economy and a career-oriented life style for both men and women.

Fig. 3: Natural increase in Poland and Germany in 1995-2016



Source: Eurostat, World Bank Data, GUS

2.3. Diversification of the mortality rate

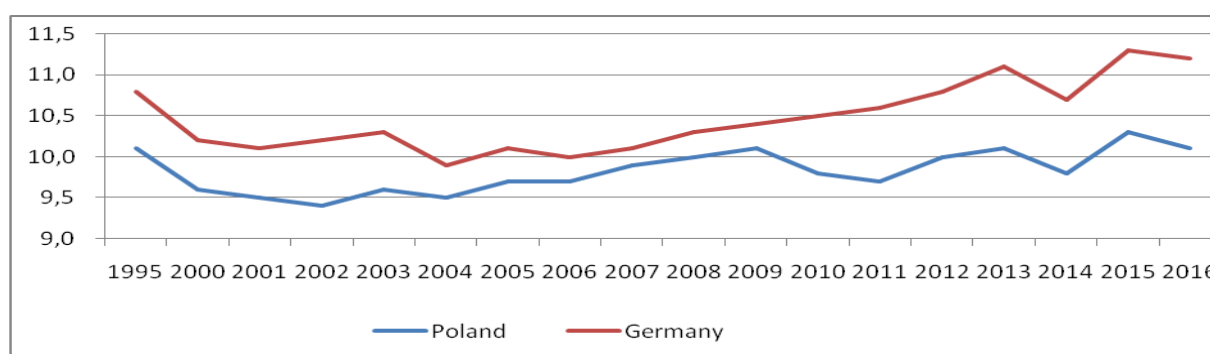
Beginning in 1900, the decrease in mortality in Poland and in Germany accelerated and was caused primarily by the decrease in infant mortality (children before the age of 1) due to

hygienic improvements in child care promoted by Nobel laureate in Medicine and Physiology and father of bacteriology Robert Koch. Currently, the decrease in mortality is a consequence of introducing vaccinations, advances in medical knowledge, access to new hospitals and medical care and raising the standard of living as a result of economic growth. In 1995-2016, the health expenditure increased from 6.9 to 8.7% in Poland, and in Germany from 9.0 to 9.8% of the Gross Domestic Product, which shows that the aging population as well as the modern life style of people have an effect on the attraction of certain modern civilization diseases. On the basis of figure 4, it may be noticed that in the years 1995-2016 the death rate increased and decreased. Since 2010, the mortality rate in Germany has gradually increased from 10.5 to 11.2 deaths per 1,000 inhabitants. This phenomenon is associated with an increase in deaths and the "aging" of the society. In Poland, however, a swinging increase and decrease in the mortality rate may be observed. In 2016, the rate made a total of 10.1 ‰. The high mortality rate reflects the age structure of the population (higher probability of death in the post-working and aged population), as well as the likelihood of contracting certain diseases and having a certain disease. The aging population shows a higher risk in attracting certain conditions: chronic diseases and suffering from gastrointestinal or cardiovascular conditions, psychological suffering such as Alzheimer's Disease, dementia or depression and conditions that lead to care dependency. An important care model for the future is the recently established Chronic Care Model. Nowadays, a medical phenomenon among a younger age group of people between the age of 45 and 60 years can be observed in Europe, the occurrence of modern civilization diseases. They have a huge impact on the development of multimorbidity in the aging population by contracting several life-restricting conditions. The following conditions are known to be modern civilization conditions: cancer, coronary heart disease, cardiovascular conditions, diabetes type 2, hypercholesterolemia, dyslipidemia, arteriosclerosis, hypertension and obesity. A diagnosis that is recently rendered very often is the metabolic syndrome that consists of at least three of the aspects of obesity, dyslipidemia, diabetes type 2 and hypertension. Type 2 diabetes may occur because of many reasons and is mainly influenced by a genetic predisposition, an unhealthy diet and obesity. Dyslipidemia with high triglyceride values may interfere with the release of insulin in the human pancreas. Insulin is an important peptide hormone that assists body cells as myocytes and adipocytes to absorb glucose. Consequences are the use of antidiabetic medication such as metformin or the supply of insulin. Furthermore, secondary complications such as myopathys, retinopathys, angiopathys and neuropathys may occur. To limit the risk of the occurrence of diabetes type

2, obesity and a dyslipidemia a healthy diet, work out and control visits at the general practitioner's office concerning the blood sugar (HbA1c) may be recommended. A healthy diet can include nuts, canola oil with a large amount of unsaturated healthy fats and important saturated fats, a daily handful of fruit and two handfuls of vegetables.

Other conditions such as cardiovascular diseases are influenced by smoking, alcohol abuse as well as an unhealthy diet containing lots of fats and lacking physical exercise. Especially arteriosclerosis is affected by those factors, leading to coronary artery diseases, strokes, myocardial infarction and other cardiovascular phenomena that often end in death. The main problem of arteriosclerosis is that the blood vessels become weaker and less elastic through the development of plaques and white thrombus with the risk of vein or artery-clogging. The clogging stops the blood, oxygen and glucose flow to important tissues and causes it's perishing. Depending on men or women, different symptoms may be observed that lead to the same cardiovascular condition. There are many physical differences between men and women such as the body fat accumulation areas. Men tend to have bigger arteries, a larger heart and a generally higher blood pressure than women. During myocardial infarction women have a tender cardiac fibrosis, and a tender hypertrophy and apoptosis of the cardiomyocytes. Their mitochondria tend to work better in the stressful cardiac situation than in men, but there are more established therapies for men that work against the cause of the cardiovascular event. Men tend to develop a cardiac inflammation more often than women. Whilst men have a higher risk on developing cardiovascular diseases, premenopausal women are protected from cardiac events by a higher estrogen level and more estrogen receptors than men. That's why a high androgen rate in the blood and an irregular period may be important risk factors of cardiovascular events.

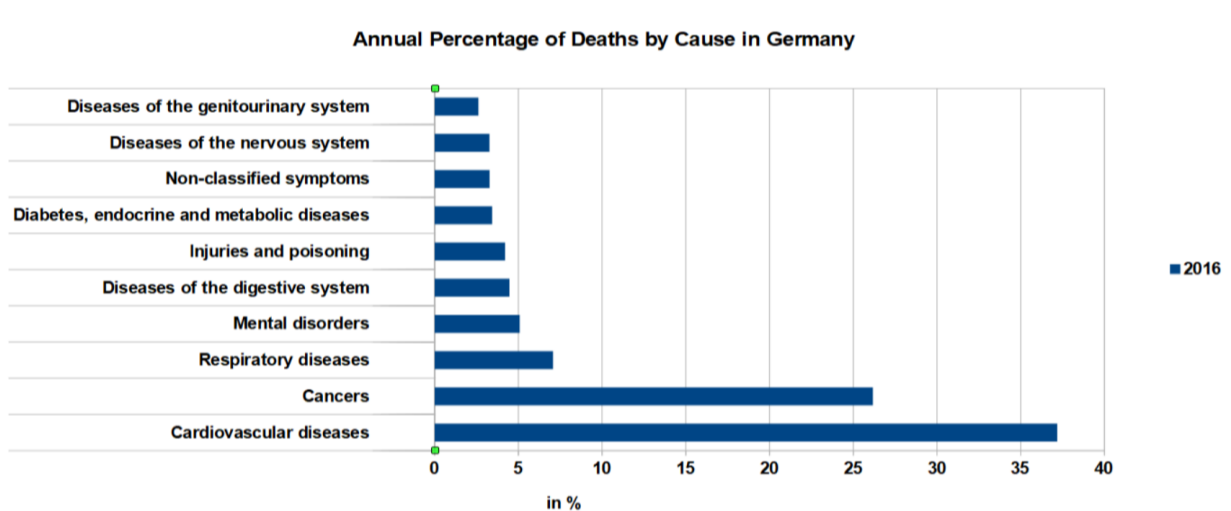
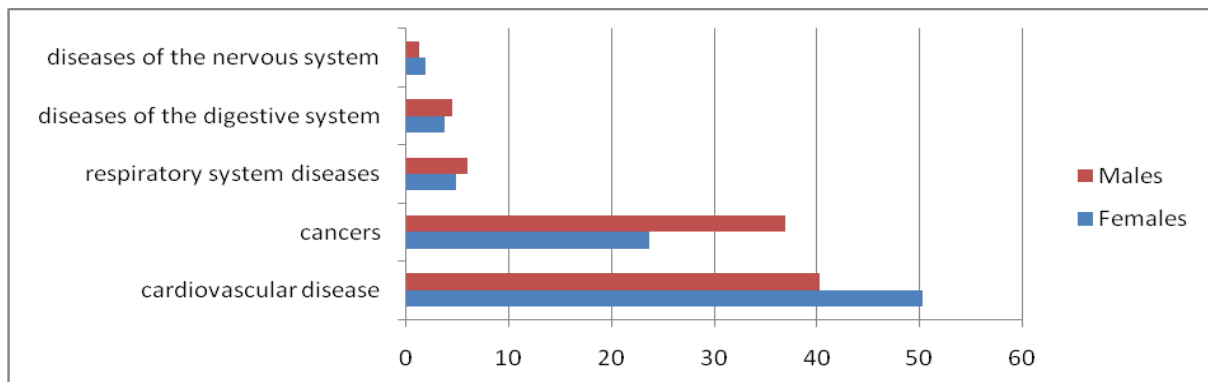
Fig. 4: Deaths total per 1,000 inhabitants in Poland and Germany in 1995-2016, %



Source: Eurostat, World Bank Data, GUS

A lower mortality rate (decrease from 40 ‰ to 20 ‰) and a still high level of births implied a rise in the amount of the natural increase. Figures 5 and 6 show that cardiac diseases, cancers and the diseases of the respiratory system are the main causes of death in both Poland and Germany. Moreover, in Poland more women than men die by the cause of cardiovascular diseases and more men than women die by the cause of cancers. In Poland, nearly 45% of the population die by cardiovascular events and 30% die by cancers. In Germany, 37% of deaths are caused by cardiovascular diseases and 26% by cancers. Generally, specific diseases are more likely to affect women such as depression, Alzheimer's Disease, autoimmune conditions, osteoporosis, coronary artery disease, diastolic heart insufficiency and diabetes. Men are more likely to suffer from renal conditions, lung carcinoma, coronary artery disease with death before turning 60 years old and systolic heart insufficiency.

Fig. 5 and 6 Annual Percentage of Deaths by Cause in Poland and Germany



Source: Statista, Statistisches Bundesamt, Germany, 2019

Conclusion

The demographic situation of Poland and Germany basically reflects the European tendency to extend life expectancy and population aging. The analysis of life expectancy and mortality of the Polish population allows us to state that the health conditions of the population are gradually improving, but this situation should be considered still unsatisfactory. The decrease in the natural increase and the progressive aging of the population are typical for the most developed European countries, and the forecasts predict a further increase in the percentage of older people. Demographic change is an unstoppable process. Extending life expectancy brings a whole series of problems with it, two of which are the most important: the burden on health systems and social security. In the social dimension, the consequence of demographic changes is social stratification (young-old). Aging processes of the population will resume in both quantitative and structural terms. As a result of the prolonging life expectancy, the number of elderly and aged people (over 80 years old) and the demand for specialist medical services, hospital places, medical infrastructure, Social Care Homes and qualified staff in the care of the elderly and disabled will increase. In the medical dimension, the aspects of multimorbidity of patients and their chronic complains and the appearances of modern civilization diseases will lead to the specializing on patient-individual therapy schemes, interdisciplinary medical work and Chronic Care Models for the aging population. A healthy diet and physical exercise will stay important aspects of standardized prevention methods against cardiac and metabolic risk factors. The steady population aging may lead to more deaths caused by cancer than cardiac events in the future.

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