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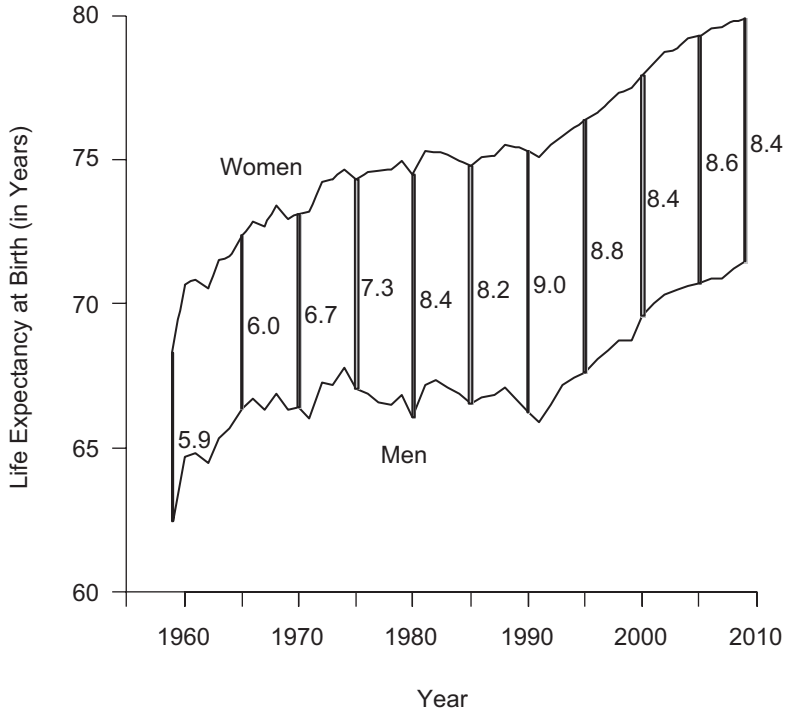
THE FEMALE-MALE GAP IN LIFE EXPECTANCY IN POLAND

INTRODUCTION

In 2006 women lived longer than men in all the countries in the world (Barford et al. 2006). In the last decades, however, in many developed countries improvements in the mean duration of life were faster for men than for women. We can observe an almost universal pattern of a steady increase in the sex gap in life expectancy at birth (female minus male), which stopped by the mid-1970s or 1980s, and a narrowing gap ever since (Glei and Horiuchi 2007). Poland represents no exception, but the narrowing of the sex gap occurred later than in most developed countries: since 1991 life expectancy at birth has improved more rapidly for males than for females, resulting in a shrinking gap between the two (Figure 1). As a result, the sex gap in life expectancy decreased from the largest observed value of 9.2 years in 1991 to 8.4 years in 2009.

The faster increase in life expectancy for women than for men in developed countries from around the 1920s until recent decades – which translated into a widening gap between the two sexes – resulted both from women's growing advantage in survival and from men's increasing excess mortality. First, due to the fall in maternal mortality and mortality at young ages as a result of control over infectious diseases, women could fully benefit from their biological survival advantage (Vallin et al. 2006). The biological differences between the sexes that guarantee the female advantage include: the genetic advantage of the additional X-chromosome (Christensen et al. 2001), estrogen which protects against circulatory diseases until menopause (Roeters van Lennep et al. 2002), and the ability to store and eliminate food reserves that allows women to endure overfeeding and adjust to existing living conditions more easily (Seely 1990). As far as infant mortality is concerned, with the shift from the predominance of deaths from infectious diseases to those from perinatal conditions, girls benefited more from the epidemiological transition than boys (Drevenstedt et al. 2008).

Figure 1. Life expectancy at birth in Poland for females and males and their difference every five years (bars), 1959–2009



Data Source: Human Mortality Database (2011).

On the other hand, male excess mortality is most often discussed as the result of differences in behavioral patterns between the sexes where men are exposed to mortality risks to a greater extent. These behaviors include "…smoking, drinking, driving, and violence" (Nathanson 1984: 204). Unquestionably, the widespread adoption of smoking among men born during the first decades of the 20th century (see, for instance, Giovino 2002, Giovino et al. 1995, Harris 1983) contributed considerably to the sex differences in mortality among these generations. According to the estimates of McCartney et al. (2011), in 2005 smoking-related deaths explained between 40 and 60% of the gender gap in all-cause mortality in European countries.

Consequently, women's growing involvement in previously male-dominated risky behaviors is usually brought forward to explain the narrowing differences in life expectancy between the sexes in developed countries over the last decades (e.g. Case and Paxson 2005, Pampel 2002, Preston and Wang 2006, Vallin et al. 2006, Wingard 1984). A major role is commonly attributed to the increased prevalence of smoking among women. For example, Pampel (2002: 96) argues that "smoking fully explains the recent narrowing of the sex differential".

In this descriptive paper we present the sex gap in life expectancy in Poland since 1959. We study territorial variation in the differences in life expectancy between the sexes, and differences by type of settlement (rural and urban) and across educational groups. We are also interested in the contribution of selected age-groups to the sex gap and its change over calendar time, as well as in examining which causes of death are the main factor behind the sex gap and its shifts over the last two decades. Following the argument that differences in the propensity to undertake risky behaviors are the main factor driving recent developments in the studied phenomenon, additional analysis is undertaken to study the contribution of alcohol- and smoking-related deaths to the sex gap in life expectancy at birth in Poland.

METHODS AND DATA

METHODS

In the first, descriptive part of the paper, we present shifts in the sex gap in life expectancy at birth over calendar time, as well as differences in life expectancy between Polish males and females according to place of residence and educational level. Place of residence in the study is quantified as urban versus rural as well as by voivodship.

The effect of age and causes of death on the sex gap in life expectancy at birth is quantified using Arriaga's (1984) discrete decomposition method. Our work follows the description of the discrete decomposition method presented in Preston et al. (2001). We define the contribution of the difference in mortality between the sexes (with superscripts *m* for male and *f* for female) at age *(x,x+n)* to the total gap in life expectancy as:

$$ {}_n\Delta_x = \frac{l_x^m}{l_0}\left(\frac{{}_nL_x^f}{l_x^f} - \frac{{}_nL_x^m}{l_x^m}\right) + \frac{T_{x+n}^f}{l_0}\left(\frac{l_x^m}{l_x^f} - \frac{l_{x+n}^m}{l_{x+n}^f}\right) \qquad (1) $$

This notation follows the standard demographic life-table notation where survivors at age x are given by l_x, the number of life-years lived between age x and $x+n$ by ${}_nL_x$ and the number of life-years lived at ages $x+n$ and higher by T_{x+n}.

The first part of the above equation stands for a direct effect of the difference in the rates between ages x and $x+n$. The second part measures indirect and interaction effects at ages above $x+n$. We assume that the distribution of deaths by cause is constant within each age group. This implies that the contribution of the difference in death rates from cause i at ages between x and $x+n$ (${}_n\Delta_x^i$ will be proportional to the weight of deaths from this cause in each age group:

$$ {}_n\Delta_x^i = {}_n\Delta_x \frac{{}_n m_x^i(f) - {}_n m_x^i(m)}{{}_n m_x(f) - {}_n m_x(m)} = {}_n\Delta_x \frac{{}_n R_x^i(f)\,{}_n m_x(f) - {}_n R_x^i(m)\,{}_n m_x(m)}{{}_n m_x(f) - {}_n m_x(m)} \quad (2) $$

where ${}_n R_x^i(j)$ measures the proportion of deaths from cause *i* between ages *x* and *x+n* in population *j*. The sum of these differences in age groups gives us the overall contribution of each cause to the sex gap.

DATA

Life expectancy at birth in the calendar years 1959–2009 and the corresponding values of other measures in the life-table by age and sex were derived from the Human Mortality Database (2011), Główny Urząd Statystyczny (1992) and Główny Urząd Statystyczny (2010) were the sources of data on life expectancy by sex according to type of settlement (rural, urban). The description of variation by voivodship was based on life-tables downloaded from Eurostat (2011).

Data on life expectancy at birth in 2008 by the highest completed level of education were derived from Eurostat (2011). In the original data-source, educational attainment was identified according to the International Standard Classification of Education (ISCED97) and grouped into the following three levels: 1. Pre-primary, primary and lower secondary education; 2. Upper secondary and post-secondary non-tertiary education; 3. Tertiary education.

Deaths by sex, age and cause of death in the years 1989, 1991 and 2006 came from the World Health Organization (2011). In the years 1989 and 1991 causes of death were classified according to the ninth edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-9), and in 2006 according to the tenth edition of the classification (ICD-10). In our estimations we used corresponding population values from the Human Mortality Database (2011).

RESULTS

Increase in life expectancy was not at all a universal pattern in Poland in the years 1959–2009 (see Table 1). Only between 1959 and 1989 do we observe a steady increase in life expectancy at birth for both sexes. Greater improvements in mortality for females than males resulted in a widening of the gap in life expectancy at birth in this period. Over the same years, the increase in life expectancy at birth for males was limited to improvements in mortality at age 0 and there were no significant improvements in life expectancy at age 1 among males. In the second period studied, 1989–1991, i.e. directly after the collapse of communism in Poland mortality grew, resulting in a decrease in life expectancy for both sexes. As the negative developments had a bigger effect on male mortality, the sex gap in life expectancy at birth

continued to grow over these years. Only in the last period under study, between 1991 and 2009, can we observe a narrowing of the sex gap in life expectancy, which resulted from faster improvements in mortality among males than among females over these years.

Table 1. Life expectancy at birth and at age 1 for Polish males and females and sex gap in life expectancy in selected years, 1959–2009

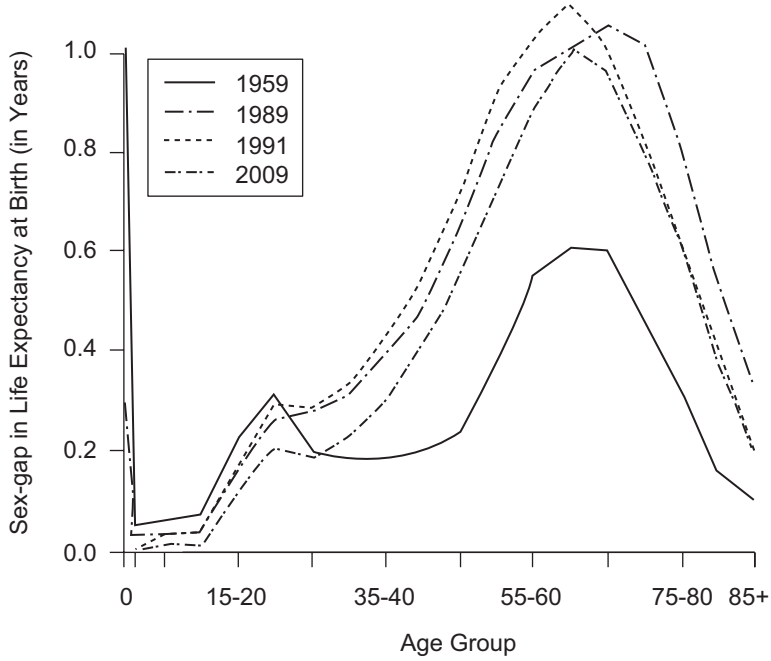
Year	Female	Male	Sex gap
At Age 0			
1959	68.3	62.4	5.9
1989	75.4	66.7	8.7
1991	75.1	65.9	9.2
2009	79.9	71.5	8.4
At Age 1			
1959	71.9	66.7	5.2
1989	75.5	67.0	8.5
1991	75.3	66.2	9.1
2009	79.3	70.9	8.4

Data Source: Human Mortality Database (2011).

AGE-GROUP CONTRIBUTION TO THE SEX GAP IN LIFE EXPECTANCY AT BIRTH

The age contribution to the sex gap in life expectancy at birth in the selected years: 1959, 1989, 1991 and 2009, is presented in Figure 2. At the beginning of the observation period, the largest difference in mortality between the sexes was present at age 0, with a contribution of over a year to the sex gap. The disadvantage of male infants shrank over the studied years to equal less than a month in 2009. A similar phenomenon observed in the US since the 1970s was explained by the fact that "the increasing use of C-section and improvements in neonatal medicine further reduced infant mortality, particularly among small and premature infants, which disproportionately benefited men" (Drevenstedt et al. 2008: 5018). The ages characterized by excess male mortality also include the teenage and young adult years; however, the disadvantage of young Polish males over females decreased in the studied period. Similar results were reported by Wróblewska (2006). For ages above 0, the female advantage in mortality grew with age to reach the maximum at the age of 60–65 years apart from 2009, when the maximum contribution to the sex gap in life expectancy was observed at 65–70 years.

Figure 2. Age Contribution to Sex-gap in Life Expectancy at Birth in Poland, 1959, 1989, 1991 and 2009



Data Source: Human Mortality Database (2011).

SEX-GAP IN LIFE EXPECTANCY AT BIRTH ACCORDING TO EDUCATIONAL LEVEL

In Table 2 we present life expectancy at birth by sex and the sex gap according to educational level in 2008. In general, men's disadvantage in mortality decreases with educational level. The largest difference in life expectancy at birth of 12.9 years characterized males and females with pre-primary, primary and lower secondary educational attainment. This was 2.6 times the value of the gap between males and females with completed tertiary education (4.9 years). In addition, men with tertiary educational attainment had a higher life expectancy at birth than women with pre-primary, primary and lower secondary education. It has to be noted that in 2008 the differences in life expectancy at birth between those with the highest and the lowest level of education equaled 5 years among women and 13 years among men.

Table 2. Life expectancy at birth by sex and sex gap in life expectancy in 2008 according to the highest educational level attained

Educational level	Female	Male	Gap
Pre-primary, primary and lower secondary education	77.4	64.5	12.9
Upper secondary and post-secondary non-tertiary education	80.2	71.7	8.5
Tertiary education	82.4	77.5	4.9
Total	79.8	71.2	8.6

Data Source: Eurostat (2011).

TERRITORIAL VARIATION IN THE SEX GAP IN LIFE EXPECTANCY AT BIRTH

The description of territorial variation in the sex gap in life expectancy in Poland will start with a discussion of differences by type of settlement in selected years between 1960 and 2009 (Table 3). With the exception of the first period under study, the sex gap in life expectancy at birth was greater in Poland's rural than in urban areas. This phenomenon is related to the interesting fact that, again with the exception of the years 1960–61, life expectancy at birth for females was higher in rural settlements than in urban ones. For males this was the case only in 1989 and 1991, and the difference among males was much smaller than among females. In the years 1960–2009 the dynamics of the sex gap in the two types of settlements were characterized by the same pattern as changes in the whole country: a constant increase in the gap until 1991, followed by a decrease. Between 1991 and 2009, the last period studied, the largest increase in life-expectancy of 5.9 years, was observed among men in urban settlements. In the same period, female life expectancy at birth in urban areas increased by 5.1 years. In rural settlements male life expectancy at birth increased by 4.8 years, and that of females by 4.3 years.

In Table 4 we present values of life expectancy at birth for males and females by voivodship in 1991 and 2008, as well as the corresponding sex gap in life expectancy in these two years.

In 1991 the lowest value of the sex gap in life expectancy of 8.6 years characterized the Małopolskie voivodship, where both male and female life expectancy were above the Polish average. The second smallest gap, almost 8.6 years, was noted in Śląskie, where life-expectancy for both sexes was below the average value for the whole country. The largest sex gap in 1991 (10.2 years) was present in Warmińsko-Mazurskie, where male life expectancy at birth was the lowest in the country and the female one was above the Polish average. In general, female life expectancy at birth in 1991 varied between 74.1 in Śląskie and 76.6 in Podlaskie. The lowest male life expectancy of 64.9 years characterized the Łódzkie and Warmińsko-Mazurskie voivodships. The highest value of male life expectancy at birth of 67.5 was observed

in Małopolskie. The difference between the extreme values in Polish voivodships in 1991 was therefore 2.5 years for females and 2.6 years for males.

In 2008, the sex gap in life expectancy in Polish voivodships (with the exception of Lubelskie and Łódzkie) was lower than in 1991. The increase in the value of the indicator in the latter two voivodships resulted from faster improvements in life expectancy among females than among males. In the remaining voivodships the opposite was true, resulting in a narrowing sex gap. Its smallest value in 2008, 7.9 years, was noted in the Pomorskie voivodship while the highest value of 10.2 years was present in Lubelskie. In the Pomorskie voivodship both male and female life expectancies were above the corresponding values for the whole country in that year. In the Lubelskie voivodship, female life-expectancy was above the Polish average while the male value was below the average. Altogether, in 2008 the female life expectancy at birth varied between 78.9 years in Łódzkie and 81.5 in Podlaskie. The Łódzkie voivodship was also characterized by the lowest value of male life expectancy at birth (69.1 years) in 2008, which was already the case in 1991. Podkarpackie was the leader in the expected duration of life of male infants born in 2008, with the value of 73 years. While in the years 1991–2008 there was no significant change in the difference between the extreme values of female life expectancy in the voivodships, the corresponding difference between the minimum and maximum value of male life expectancy increased from 2.6 in 1991 to 3.9 in 2008.

Table 3. Life expectancy at birth for Polish males and females and sex gap in life expectancy by type of settlement, selected years between 1960 and 2009

Year	Female	Male	Sex gap
Urban			
1960–61	70.5	64.8	5.7
1989	75.0	66.6	8.4
1991	74.9	66.0	8.9
2009	80.0	71.9	8.1
Rural			
1960–61	69.9	64.7	5.2
1989	76.1	67.0	9.1
1991	75.9	66.2	9.7
2009	80.2	71.0	9.2

Data Source: Główny Urząd Statystyczny (1992, 2010)

Table 4. Life expectancy at birth for Polish males and females and sex gap in life expectancy at birth by voivodship, 1991 and 2008

Voivodship	1991			2008		
	Sex-gap	Females	Males	Sex-gap	Females	Males
Dolnośląskie	9.5	74.8	65.3	8.7	79.2	70.5
Kujawsko-Pomorskie	9.1	74.5	65.4	8.7	79.6	71.0
Łódzkie	9.8	74.7	64.9	9.9	78.9	69.1
Lubelskie	9.4	75.7	66.4	10.2	80.5	70.2
Lubuskie	9.5	74.5	65.0	9.0	79.5	70.5
Małopolskie	8.6	76.1	67.5	8.0	80.9	72.9
Mazowieckie	9.6	75.6	66.0	9.0	80.7	71.7
Opolskie	8.8	74.8	66.0	8.2	80.3	72.0
Podkarpackie	9.2	76.5	67.3	8.4	81.3	73.0
Podlaskie	9.9	76.6	66.7	9.5	81.5	72.0
Pomorskie	8.7	74.9	66.2	7.9	80.0	72.1
Śląskie	8.6	74.1	65.6	8.2	79.1	70.9
Świętokrzyskie	9.7	76.1	66.4	9.4	80.5	71.1
Warmińsko-Mazurskie	10.2	75.2	64.9	9.3	79.9	70.6
Wielkopolskie	9.4	75.0	65.6	8.1	79.9	71.7
Zachodnio-Pomorskie	9.5	74.5	65.0	9.2	79.8	70.6
Poland	9.2	75.1	65.9	8.6	79.8	71.2

Data Source: Eurostat (2011)

CAUSE-OF-DEATH CONTRIBUTION TO THE SEX GAP IN LIFE EXPECTANCY AT BIRTH

In Table 5 we present the contribution of the six cause of death groups to the sex gap in life expectancy at birth in 1989, 1991 and 2006. The six groups were selected for the analysis as the major causes of death among Polish males and females (Wojtyniak et al. 2008). The sum of the contribution of the six groups to the sex gap appears in the table under *Total causes*, as opposed to *Total gap* which refers to the entire sex gap in life expectancy at birth and also includes other causes of death. In addition, following the discussion of the excess male mortality resulting from a higher propensity to undertake risky behaviors, such as "…smoking, drinking, driving, and violence" (Nathanson 1984: 204), and women's growing involvement in these behaviors which is usually brought forward to explain the narrowing sex

gap in life expectancy in developed countries (for example, Case and Paxson 2005, Pampel 2002, Preston and Wang 2006, Vallin et al. 2006, Wingard 1984), in the lower panel of Table 5 we present the contribution of smoking- and alcohol-related causes of death to the sex gap in life expectancy at birth. Smoking-related mortality was defined following the classification by McCartney et al. (2011) as cancers of the respiratory tract, ischaemic heart disease, cerebrovascular disease and chronic obstructive pulmonary disease. The definition of alcohol-related mortality also followed McCartney et al. (2011) and comprised cancers of the oesophagus and larynx, chronic liver disease, liver cirrhosis and external causes of death. Unfortunately, the data source did not provide death counts due to alcohol dependence syndrome and alcohol psychosis that McCartney et al. (2011) included in the group of alcohol-related causes of death.

The six large cause of death groups studied here together explain over 95% of the total difference in life expectancy at birth between the sexes. The largest contribution to the sex gap in life expectancy was by diseases of the circulatory system. Women's advantage due to these causes of death equaled 3.5 years in 1989, increased to 3.7 years in 1991 and decreased to 2.8 years in 2006. The importance of this group for the sex gap fell from 40% of the total gap in 1989 to 32% in 2006. Altogether, in the last period under study (1991–2006), men gained 6 years of life expectancy at birth due to improvements in mortality from diseases of the circulatory system while women gained 5 years and 7 months (not shown in the Table).

The second largest contributor to the sex gap in life expectancy in 1989 was external causes of death. Their contribution of 1.8 years explained more than 20% of the total sex gap in life expectancy at birth in that year. The difference between the sexes as regards the number of years lived due to external causes of death increased to 2 years in 1991 and dropped to 1.6 years in 2006. Between 1991 and 2006, men gained about a year of life expectancy at birth due to improvements in mortality from external causes, while women's gain was less than 4 months (not shown in the Table).

Malignant neoplasms were the only group of causes studied here with a growing contribution to the difference in life expectancy at birth. In 1989 men lost on average about 1.6 years of life expectancy due to this group as compared with women. In 2006 the corresponding value equaled 2 years. Despite the growing contribution to the sex gap, there was an improvement in life expectancy for both sexes due to lower mortality from malignant neoplasms: between 1991 and 2006 women gained about 4 months, and men 2 months of life (not shown in the Table).

In the studied period, deaths due to disease of the respiratory system contributed about half a year to the sex gap in life expectancy at birth while deaths from causes grouped under *signs, symptoms and other ill-defined conditions* were responsible for half a year of the gap in 1989 and 0.8 years in 2006. The smallest contribution to the gap was by deaths from diseases of the digestive system: between 4 and 5 months in the studied period.

Smoking- and drinking-related causes of death together explained about 50% of the total difference in life expectancy at birth between the sexes in the years 1989–2006. According to our estimates for the studied period, due to diseases related to tobacco smoking men lost on average about two years and four months of life as compared with women. Alcohol-related causes were responsible for 2.1 years of the sex gap in life expectancy in 1989 and 2.4 years in 2006. Hence in the years 1989–2006, we did not observe in Poland the phenomenon of the narrowing-sex gap in mortality due to women's growing involvement in previously male-dominated risky behaviors, like cigarette smoking and increased drinking of alcoholic beverages, which is present in other developed countries.

Table 5. Cause of death contribution to sex gap in life expectancy at birth, 1989, 1991 and 2006

Group of causes	1989	1991	2006
Malignant neoplasms	1.6	1.6	2.0
Diseases of the circulatory system	3.5	3.7	2.8
Diseases of the respiratory system	0.5	0.5	0.6
Diseases of the digestive system	0.3	0.3	0.4
Signs, symptoms and other ill-defined conditions	0.5	0.6	0.8
External causes	1.8	2.0	1.6
Total causes	8.3	8.8	8.3
Total sex gap	8.7	9.2	8.7
Smoking-related causes	2.2	2.2	2.3
Alcohol-related causes	2.1	2.3	2.4

Data Source: Human Mortality Database (2011), World Health Organization (2011)

SUMMARY

In this paper we describe differences in life expectancy between Polish men and women in the last half-century and study the territorial variation of the sex gap (rural-urban, by voivodship), as well as differences between educational groups. We also decompose differences in life expectancy at birth between the sexes in order to discuss the contribution of age groups and major causes of death to the total gap. In addition, to study the effect of traditionally male-dominated behaviors on the differences in mortality between the sexes in Poland, we study the contribution of alcohol- and smoking-related mortality.

To sum up, the phenomenon of the narrowing sex gap in life expectancy at birth that has characterized most developed countries in the last decades, appeared in Poland only after 1991, and the value of the gap in 2009 was only 0.8 years lower

than in 1991. In addition, in a period of increased mortality among both sexes (1989–1991), the sex gap in life expectancy at birth grew by half a year.

With the exception of excess mortality of male infants, the female advantage in mortality grows with age and reaches its maximum at the age of 60–65 years (65–70 years in 2009). The excess mortality of male infants decreased over the studied period from a contribution of over a year to the sex gap in life expectancy at birth in 1959 to less than a month in 2009. In addition, differences in life expectancy at birth between the sexes are greater in Poland's rural areas than in urban areas. For example, while the average value of the sex gap in Poland in 2009 was 8.4 years, in urban settlements it equaled 8.1 years and 9.2 years in rural areas. Even greater differences existed between Polish voivodships. For example, in 2008 the smallest value of the sex gap equaled 7.9 years and characterized the Pomorskie voivodship, while the highest value of 10.2 years was noted in Lubelskie. The variation in the sex gap between the voivodships in 1991 was even greater.

The largest variation in the sex gap in life expectancy was found between different educational groups: the gap decreased with the level of educational attainment. In 2008 a gap of 12.9 years characterized males and females with pre-primary, primary and lower secondary levels of educational attainment, and 4.9 years – those with completed tertiary education. In addition, men with tertiary educational attainment had higher life expectancy at birth than women with pre-primary, primary and lower secondary education. This finding raises the question whether women's advantage in survival is currently a result of behavioral differences between the sexes rather than of genetic factors. However, the possible selection effect into education by health might be an alternative explanation of this result: boys in better health might be more likely to attend university than those in poor health.

Out of the six large groups of causes of death, diseases of the circulatory system had the largest contribution to the sex gap in life expectancy. Similarly to Meslé's (2004) findings, mortality from circulatory diseases was also in the larger part responsible for the decline in life expectancy between 1989 and 1991, and in addition, for improvements in life expectancy for both sexes and the narrowing of the sex gap between 1991 and 2006. External causes of death were the second-largest group contributing to the sex gap in 1991. External conditions also caused an increase in male and female mortality between 1989 and 1991, and were responsible for the narrowing of the gap between 1991 and 2006. Over the years 1989–2006 life expectancy for both sexes improved due to a decline in deaths from malignant neoplasms, but at the same time such deaths caused the sex gap to increase. The remaining three large cause of death groups (disease of the respiratory system; disease of the digestive system; signs, symptoms and other ill-defined conditions) were together responsible for 1.3 years of the sex-gap in life expectancy in 1989, with a growing importance of these causes over calendar time.

According to our estimates, smoking- and alcohol-related causes of death together explain about 50% of the total difference in life expectancy at birth between the

sexes in the years 1989–2006. We observe a widening of the sex gap in life expectancy due to these causes of death between 1989 and 2006, that is the opposite of what was reported in other developed countries (Case and Paxson 2005, Pampel 2002, Preston and Wang 2006, Vallin et al. 2006, Wingard 1984).

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THE FEMALE-MALE GAP IN LIFE EXPECTANCY IN POLAND

ABSTRACT

The difference in life expectancy between the sexes in Poland started to decline only in 1991, equaling 8.4 years in 2009. In addition, with the rapid increase in male excess mortality between 1989 and 1991, the sex gap also increased. With the exception of excess mortality of male infants, the female advantage in mortality grows with age and reaches the maximum at the age of 65–70 years in 2009. The excess mortality of male infants decreased over the studied years from a contribution of over a year to the sex gap in life expectancy at birth in 1959, to less than a month in 2009. Differences in life expectancy at birth between the sexes in Poland are greater in rural than in urban areas and there is a variation between the voivodships: from 7.9 years in 2008 in the Pomorskie voivodship to 10.2 years in Lubelskie. The largest variation in the sex gap in life expectancy was that between different educational groups: and the gap decreased with the level of educational attainment.

Diseases of the circulatory system are a major group of causes of death, with the highest contribution to the sex gap in life expectancy, and were the largest factor in the narrowing of the sex gap between 1991 and 2006. External causes of death were the second-largest group contributing to the sex gap in life expectancy at birth in 1991, and to the narrowing of the gap in the studied period. Over the years under study, the importance of malignant neoplasms for the phenomenon in consideration increased, but at the same time life expectancy of both sexes rose due to improvements in mortality from this group of causes.

According to our estimates, smoking- and alcohol-related causes of death together explained about 50% of the total difference in life expectancy at birth between the sexes in the years 1989–2006. In this period, the sex gap in life expectancy due to these causes of death increased, which is opposite to what was reported for other developed countries.