

Lung cancer mortality decline among middle-aged men and women in Poland and the UK

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ABSTRACT

In the early 1990s Poland was the country with the highest levels of lung cancer in Europe, especially among men. According to an analysis published in the *Lancet* in May 2017 (GBD-2015-1), in the years 1990-2015 Poland had one of the fastest smoking prevalence declines in Europe. This was accompanied by a steady lung cancer decline, also one of the fastest in Europe, that began among men in 1990, and among women in 2005. This article analyses the pace of decline in lung cancer mortality in middle-aged (35-54-year-old) men and women in Poland and the UK. If current trends continue in both countries, optimal conditions for the eradication of lung cancer in both countries could be achieved in the years 2020-2030.

KEY WORDS: lung cancer, mortality, middle-aged men and women, Poland, UK.

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INTRODUCTION

Europe has historically been the region with the highest smoking prevalence in the world, and the highest rates of smoking-related diseases [1-6]. The epidemic of smoking and lung cancer in Europe had two peaks. The first one was in the 1950s, when smoking prevalence in the UK stood at 80% among men and 25% among women. The second peak came three decades later, when smoking prevalence in Poland reached 73% among men in 1976, and 30% among women in 1982 [7].

In May 2017 an important article was published summarising the changes in smoking prevalence in 195 countries in the last quarter of century (1990-2015) [8]. European Union (EU) member states were among the countries which made the most significant progress in tobacco control in this period [9]. In several of them including Poland and UK tobacco-related disease incidence and mortality was halved [10-13].

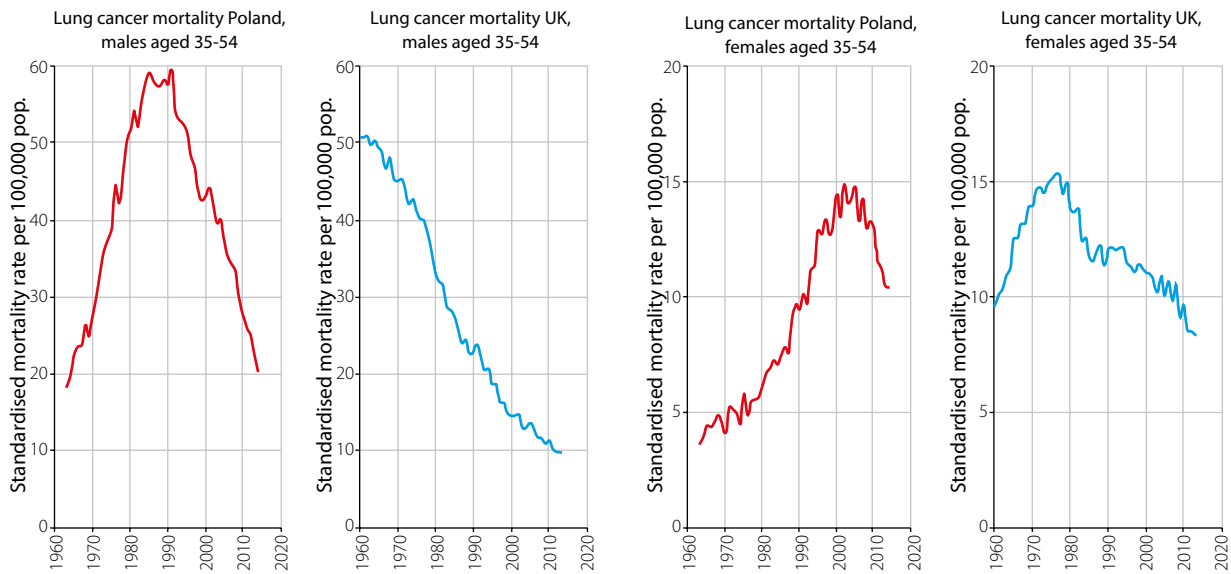
The aim of this article is to compare and contrast the lung cancer epidemic among middle-aged (35-54-year-old) men and women in Poland and the UK.

MATERIAL AND METHODS

The lung cancer mortality rates are based on the WHO mortality database, Health and statistics information system [10, 14-15]. We estimated change-points and time trends in lung cancer. The analysis was conducted using the 'segmented' R package for regression models with break-points and change-points estimation (Version 0.5-3.0 [16]), which allows to identify the chain points in logistic regression, after which regression function is assumed to be continues [17].

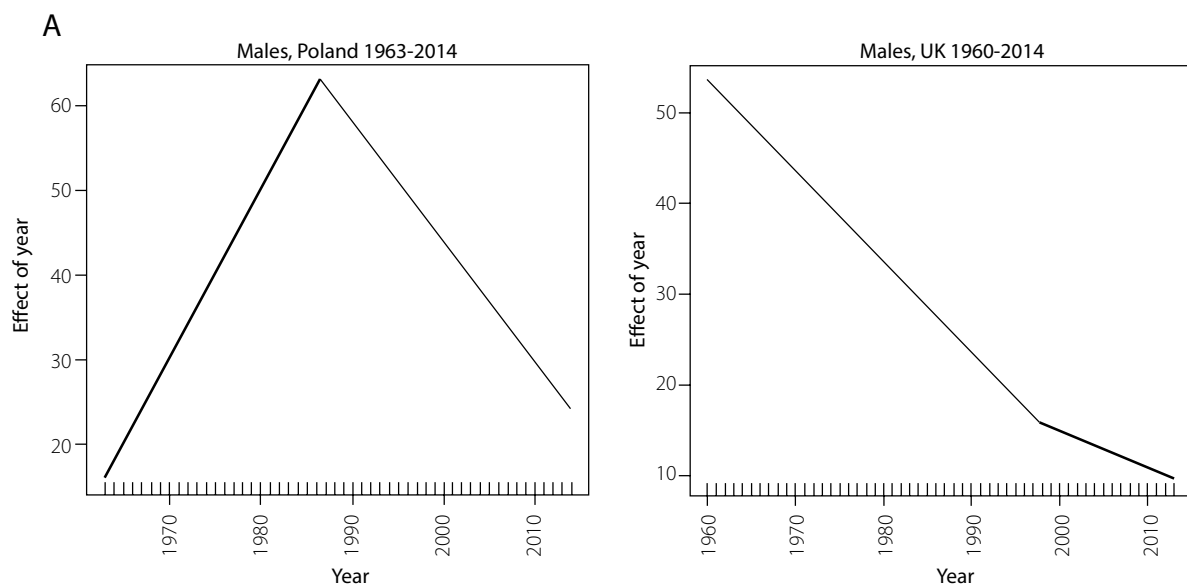
RESULTS AND DISCUSSION

Similarly to the UK half a century prior, towards the end of the 20th century Poland was one of the world leaders in tobacco consumption [7, 10, 12]. In the late 1980s it had the highest recorded smoking prevalence in Europe, and one of the highest levels of lung cancer among men [10, 12-13, 18-21]. The breakthrough came in the 1990s. According to GBD-2015-1 [8] in the years 1990-2015 Poland had one of the fastest smoking prevalence declines among men (1.7% annually) and women (0.9% annually)



Sources: [6, 10, 14, 15]

FIG. 1. Lung cancer mortality, age group 35-54, males and females, Poland vs. UK



Country	Gender	Parameter	Mean	St.Err.	CI (95%).l	CI (95%).u	P-Value
Poland	Males	Break-Point	1986.564	0.301			
		Slope1	1.919	0.05324	1.812	2.027	< 0.05
		Slope2	-1.420	0.04224	-1.505	-1.335	< 0.05
UK	Males	Break-Point	1997.639	1.403			
		Slope1	-1.0180	0.02135	-1.0610	-0.9748	< 0.05
		Slope2	-0.4087	0.07827	-0.5659	-0.2515	< 0.05

FIG. 2. Trends of lung cancer mortality in Poland and UK

in Europe. Polish state tobacco statistics [7, 22] show that in this period the sale of cigarettes in Poland fell from 100 bn per annum to around 40 bn. Smoking prevalence among Polish men decreased from 73% to 29%, and

among women from 30% to 19%. Lung cancer among men aged 34-54 hit a peak in 1990, and among women in the early 2000s, after which it began to decrease rapidly (see Figure 1).



Country	Gender	Parameter	Mean	St.Err.	CI (95%).l	CI (95%).u	P-Value
Poland	Females	Break-Point	2005.343	0.893			
		Slope1	0.2862	0.01106	0.2639	0.3084	< 0.05
		Slope2	-0.4710	0.11620	-0.7046	-0.2374	< 0.05
UK	Females	Break-Point	1971.678	0.589			
		Slope1	0.4612	0.045120	0.3706	0.5519	< 0.05
		Slope2	-0.1491	0.006869	-0.1629	-0.1353	< 0.05

We estimated change-points and time trends in lung cancer among males and females aged 35-54 in Poland and in the UK. In Poland, among men, in the years 1960-1986 a steep increase in lung cancer mortality rates was observed at the pace of almost 2/100,000 people annually. In 1986 the trend was reversed, and between 1986 and 2015 an annual decrease in lung cancer mortality of almost 1.5/100,000 was observed. Both the increase, and the subsequent decrease were statistically significant. In the UK among men the trend reversal was observed around 1960. Between 1960 and 1997 the rate of decrease stood at 1/100,000 per year, and between 1997-2014 at 0.4/100,000 per year. Among women the pace of increase in lung cancer mortality between 1963 and 2005 was 0.3/100,000. The trend reversed in 2005, and in the period 2005-2014 the mortality decreased by almost 0.5/100,000 annually. Among women in the UK the mortality grew by almost 0.5/100,000 annually between 1960-1971. The trend then reversed, and between 1971 and 2014 the annual pace of decrease was almost 0.5/100,000. In all the cases described the trends were statistically significant.

FIG. 2. Trends of lung cancer mortality in Poland and UK

While the UK can boast with the unquestionable success of bringing down its lung cancer mortality five-fold between the early 1960s and the 2010s [12-13, 23], it must be remembered that the rate of decline in lung cancer mortality among Polish men in the period 1960-2010 was twice faster (see Figures 1 and 2).

Figures 1 and 2 present the lung cancer mortality time trends among middle-aged (35-54-year-old) men and women in Poland and UK from 1960 to 2015. The peak of lung cancer mortality among men in Poland (60/100,000) was significantly higher than in the UK (50/100,000), and it came several decades later – in 1990 in Poland, as opposed to 1960 in the UK. Among women, the lung cancer mortality peak in the UK came in 1971 and in Poland in 2005. Historically, the highest observed lung cancer mortality among women in this age group in Poland and the UK was at a very similar rate of around 15/100,000. In the period of observation,

1960-2015, the annual decrease in lung cancer mortality was twice faster in Poland than in the UK in both sexes.

Logistic regression analysis estimating change points and time trends in lung cancer in age group 35-54 in men and women in Poland and UK is presented and described in Figure 2.

CONCLUSIONS

Two questions emerge from these observations. The first is how important in promoting these developments was the use on a population scale of the cessation drug cytisine in Poland? [24-27]. The second is how to take the next step towards the eradication of smoking-related diseases in countries which have seen so much progress in tobacco control in the last years, such as the UK or Poland?

DISCLOSURE

Authors report no conflict of interest.

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AUTHORS' CONTRIBUTIONS

WAZ and MZ prepared the concept and draft of the article. AT prepared calculations. All authors contributed to preparing the final text and figures of the publication.