

Triple-negative breast cancer-related mortality in Central and Eastern Europe: Years of life lost and productivity costs

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Background and Objectives

Background

- The 2019 Global Burden of Disease study reported 2,002,354 new cases of breast cancer globally, with an age-standardized incidence rate of 24.17 per 100,000 persons, making breast cancer the most common tumor among women worldwide¹
- Out of all cancers, breast cancer is associated with the highest healthcare costs, at €6.73 billion every year, and accounts for approximately 13% of the total cancer healthcare costs in the European Union (EU)²
- Triple-negative breast cancer (TNBC) is an aggressive molecular subtype of breast cancer that lacks the expression of estrogen receptor, progesterone receptor, and human epidermal growth factor receptor-2 (HER-2).³ TNBC comprises approximately 15%-20% of all breast cancer cases, and women with TNBC are younger and are more prone to recur or relapse given its rare immunohistochemical characteristics⁴

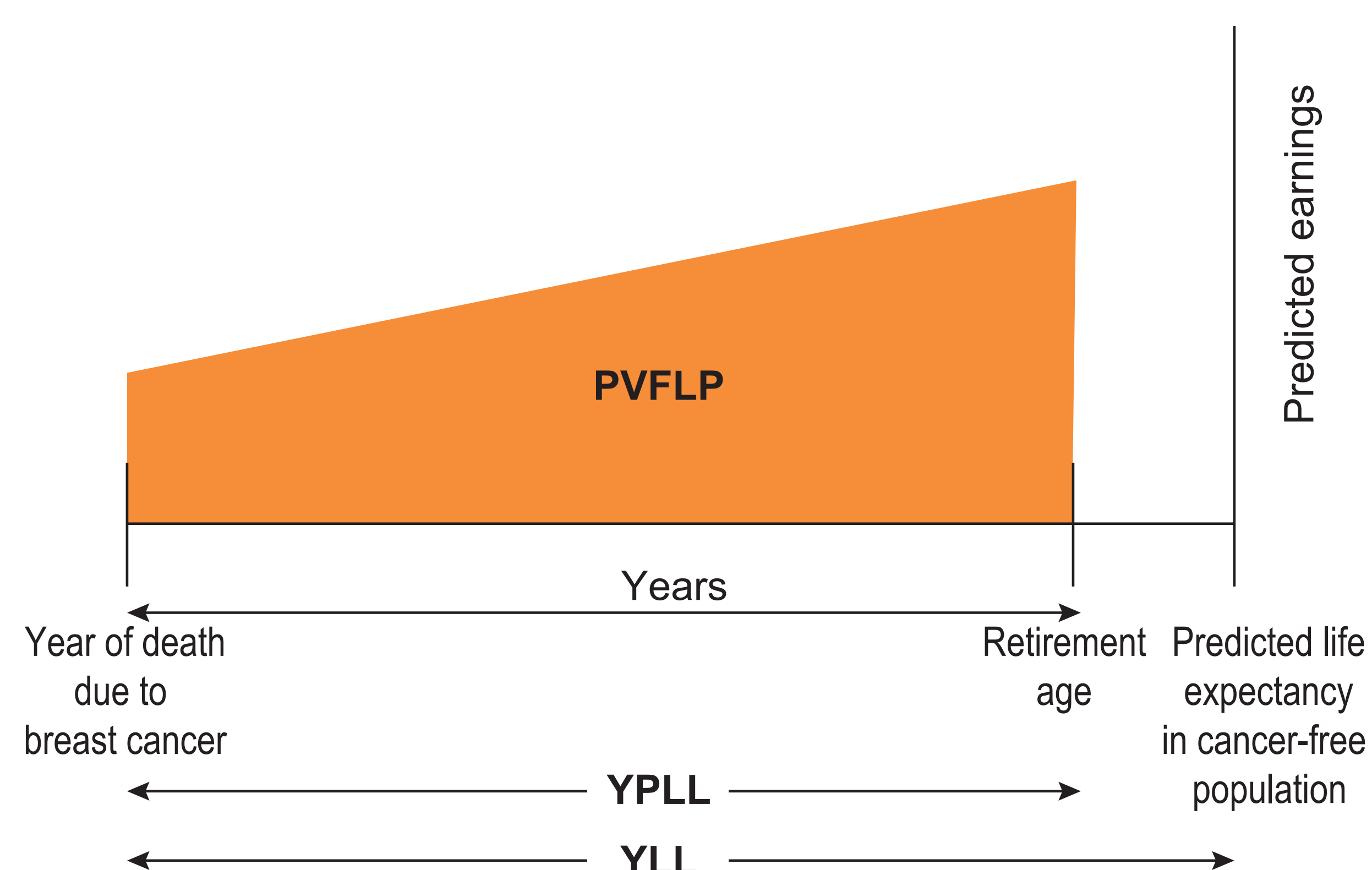
Objectives

- The objective of this study was to estimate the mortality burden and the cost of lost productivity due to premature breast cancer and TNBC deaths in 9 countries in Central and Eastern Europe (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Slovenia). To our knowledge, this is the first study that evaluates quantitatively the cost of lost productivity due to TNBC in these countries
- More specifically, this analysis estimated the years of life lost (YLL) due to premature mortality from TNBC and present value of future lost productivity (PVFLP) associated with premature mortality due to TNBC using mortality data from 2019

Methods

- The human capital approach (HCA) was used to estimate the indirect cost of productivity losses due to premature death from breast cancer (ICD-10 code: C50 malignant neoplasm of breast) in Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Slovenia
- YLL and PVFLP were calculated using age- and sex-specific mortality, wage, and employment rates. Retirement age was country- and gender-specific. Data inputs for this model were taken from the World Health Organization, Eurostat, and the World Bank. Eurostat mortality data was used for breast cancer patients who died in a single year, stratified by age groups: 0-14, 15-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, and 70+ years old⁵
- To estimate the YLL and PVFLP for TNBC, the estimation of mortality ratio of molecular subtype TNBC, incidence, and 5-year survival data from Walle et al. was used.⁶ PVFLP costs were expressed in 2018 euros (€)

Figure 1. Model schematic illustrating years of life lost (YLL) and present value of future lost productivity (PVFLP) calculations



YLL, years of life lost; YPLL, years of productive life lost; PVFLP, present value of future lost productivity

Limitations

Due to a lack of mortality data for breast cancer molecular subtypes (ICD-10 code exists for breast cancer, but not TNBC), we had to rely on estimates of mortality ratio for TNBC in this analysis. This study does not account for direct costs of breast cancer and TNBC to the healthcare system and productivity loss due to breast cancer and TNBC morbidity or inability to work while alive. There is a wider impact on the caregivers of patients with breast cancer and TNBC, which is not included. Last available mortality data for some countries is for 2020, but due to different definitions of COVID-related mortality, this data was not included in the analyses.

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Results

In 2019, there were 19,726 breast cancer deaths in the investigated 9 countries from Central and Eastern Europe, resulting in an estimated 267,184 YLL (Table 1). When taking into account the mortality ratio for TNBC, there were 4,432 TNBC deaths in the 9 countries in 2019, resulting in an estimated 60,036 YLL.

Table 1. YLL and number of deaths (ICD-10: 50; TNBC molecular subtype) in 2019

Country	Number of breast cancer deaths, 2019	Number of TNBC deaths, 2019 ^a	YLL breast cancer, 2019	YLL TNBC, 2019 ^a
Bulgaria	1,343	302	16,546	3,718
Croatia	770	173	10,760	2,418
Czech Republic	1,762	396	23,612	5,306
Hungary	2,200	494	27,534	6,187
Poland	7,037	1,581	101,288	22,759
Romania	3,441	773	46,516	10,452
Serbia	1,706	383	21,138	4,750
Slovakia	1,026	231	13,474	3,028
Slovenia	441	99	6,316	1,419
All countries	19,726	4,432	267,184	60,036

^aUsing a mortality ratio for TNBC of 22.47%.⁶

In 2019, the premature mortality cost of breast cancer (PVFLP) was considerable in the 9 countries from Central and Eastern Europe, exceeding €259 billion (Table 2). For the TNBC molecular subtype, the PVFLP in the 9 countries exceeded €58 billion in 2019.

Table 2. PVFLP (€) of breast cancer and TNBC-related mortality

Country	PVFLP breast cancer (€)	PVFLP TNBC ^a (€)	PVFLP breast cancer (€/breast cancer-death)	YLL TNBC, 2019 ^a (€/TNBC-death)
Bulgaria	14,967,916	3,363,291	11,145	11,145
Croatia	12,650,059	2,842,468	16,429	16,429
Czech Republic	16,072,043	3,611,388	9,121	9,121
Hungary	38,813,087	8,721,301	17,642	17,642
Poland	85,062,587	19,113,563	12,088	12,088
Romania	45,736,741	10,277,046	13,292	13,292
Serbia	17,848,565	4,010,573	10,462	10,462
Slovakia	21,441,108	4,817,817	20,898	20,898
Slovenia	6,847,520	1,538,638	15,527	15,527
All countries	259,439,627	58,296,084	13,152	13,152

^aUsing a mortality ratio for TNBC of 22.47%.⁶

While Poland had the highest absolute PVFLP (33% of all PVFLP) of the 9 countries, when average premature mortality cost per TNBC-related death was calculated, Slovakia (€20,898) reported the highest PVFLP per TNBC-related death, followed by Hungary (€17,642) and Croatia (€16,429). Czech Republic had the lowest PVFLP per TNBC-related death (€9,121), less than half the PVFLP per TNBC-related death reported in Slovakia.

Conclusions

The YLL and productivity losses due to TNBC premature mortality are substantial in Central and Eastern Europe, with >60,000 YLL and >€58 billion PVFLP in 2019. This can be the result of low median age of diagnosis, with high recurrence rates in early TNBC and high progression rates in metastatic TNBC. The estimates presented here illustrate the economic burden resulting from breast cancer and TNBC in this region and provide relevant insights that can be used to support the development of future evidence-based health policies to reduce this burden and to inform future decision making in Central and Eastern Europe.

Disclosures

- This work was funded by Merck Sharp & Dohme LLC, a subsidiary of Merck & Co., Inc., Rahway, NJ, USA
- Goran Bencina, Carl Baxter, Eugenia Karamousouli, and Stina Salomonsson are employees of MSD subsidiaries of Merck & Co., Inc., Rahway, NJ, USA, and may own stock and/or stock options in Merck & Co., Inc., Rahway, NJ, USA. Nour Chami, Robert Hughes, and Georgie Weston are employees of Adelphi Values (PROVE), paid consultants to MSD

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