

SOCIAL AND ECONOMIC BURDEN OF BREAST CANCER IN RUSSIA

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BACKGROUND

- Breast cancer accounts for 1 in 5 of all new female cancers each year in Russia (figure 1)¹ and ranks 4 in the structure of malignant neoplasms mortality (figure 2)¹.

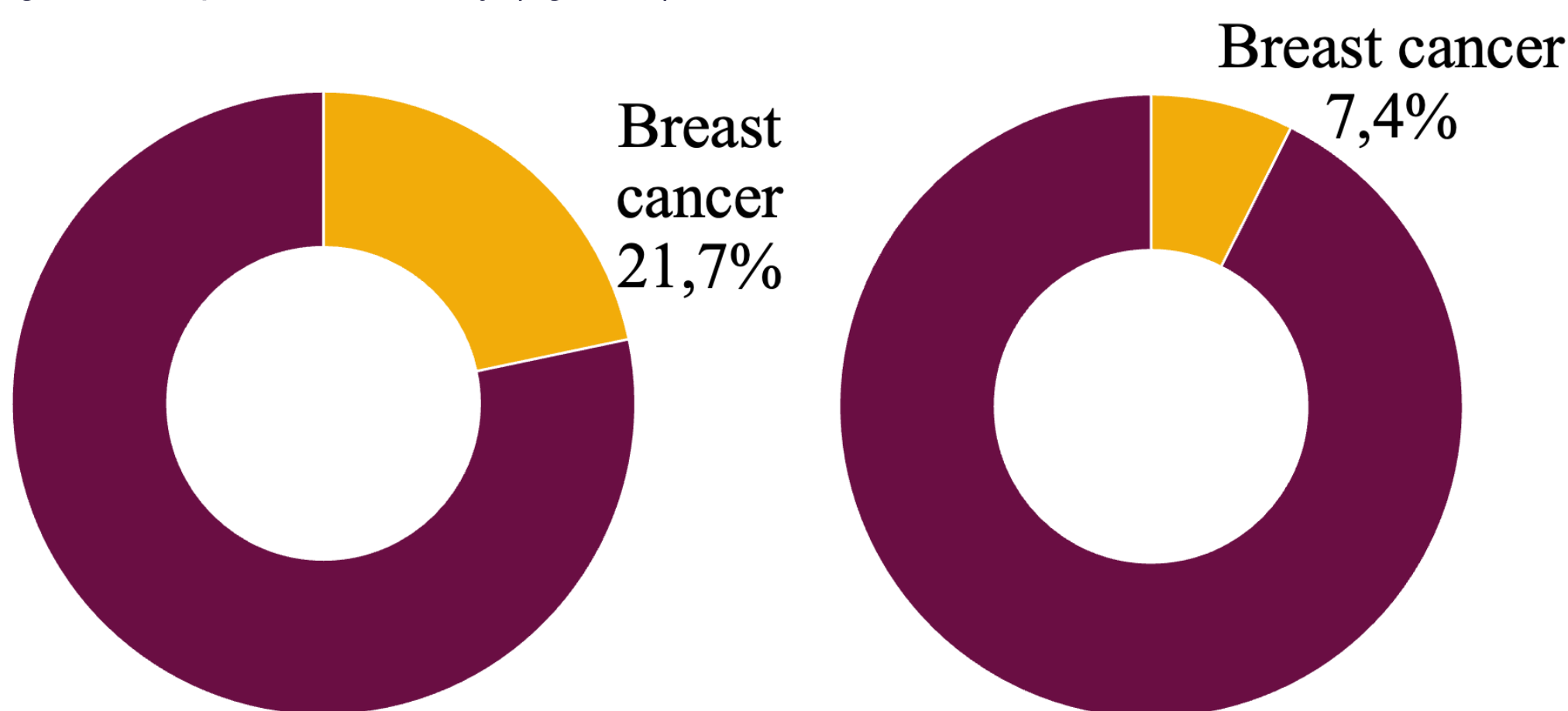


Figure 1 and 2. Structure of malignant neoplasms incidence in women in 2020 and structure of malignant neoplasms mortality in both sexes in 2020.

- Breast cancer significantly affects both social and economic development, deteriorates human capital and slows economic growth.
- Social and economic burden of breast cancer in Russia was previously estimated for 2014 in Ignatyeva V.I. et al., 2016², but since then many novel drugs have entered the market and a Federal Project “Cancer control” was launched in Russia.

OBJECTIVES

- To estimate social and economic burden of breast cancer in Russia in 2020.

METHODS

- Social burden was defined as difference between actual value of an indicator in 2020 and hypothetical value of an indicator calculated given the absence of negative impact of breast cancer. Indicators included in the research were:
 - excess mortality (with a correction for all-cause mortality);
 - short-term disability;
 - decrease in number of births;
 - decrease in life expectancy at birth.
- Economic burden was defined based on cost of illness model³ and included:
 - Direct medical costs of diagnostics, treatment and monitoring of breast cancer;
 - Direct non-medical costs of social benefits to disabled (both for temporarily and persistently disabled);
 - Indirect costs of GDP loss due to excess mortality and disability (including tax revenue losses and wage losses).
- Utilization of healthcare resources (outpatient care, inpatient care, and emergency medical care) and short-term disability duration was determined based on health insurance company’s anonymized data in five regions of the Russian Federation and extrapolated on the national level. Characteristics of the regions included in research are presented in table 1. Regions were chosen based on public health spending per capita, breast cancer incidence¹, prevalence⁴ and mortality¹ in order to have territories both above and below all-Russia level.

	Population (Million people) ⁵	Number of new breast cancer cases	Incidence (per 10000)	Total number of patients with breast cancer	Prevalence (per 10000)	Number of deaths due to breast cancer	Mortality (per 10000)	% insured by the company under consideration in the region	State spending on healthcare, \$ per capita ⁶
Region 1	0.6	266	25.2	3 629	606	107	9	69%	298.0
Region 2	1.92	852	27.5	9 375	484	320	9	50%	297.8
Region 3	1.3	691	31.3	8 035	635	202	7	18%	306.9
Region 4	1.5	600	26.28	6 629	434	119	5	52%	466.4
Region 5	1.7	554	24.75	6 288	377	137	6	77%	746.9
Total for 5 regions as % of total for Russia	4.8%	4.5%		4.6%		4.1%			
Russia	146.5	65 468	27	734 587	501	21 634	8		409.8

Table 1. Characteristics of the regions included in research
Note: green is used for numbers above all-Russia level, pink is used for numbers below all-Russia level.

- All indicators were estimated only for 2020 and no future costs were considered.
- Indirect costs were estimated using human capital theory. We assumed that both mortality and disability immediately lead to a decrease in labor supply and GDP (with adjustments for sex-age structure of labor participation and productivity).

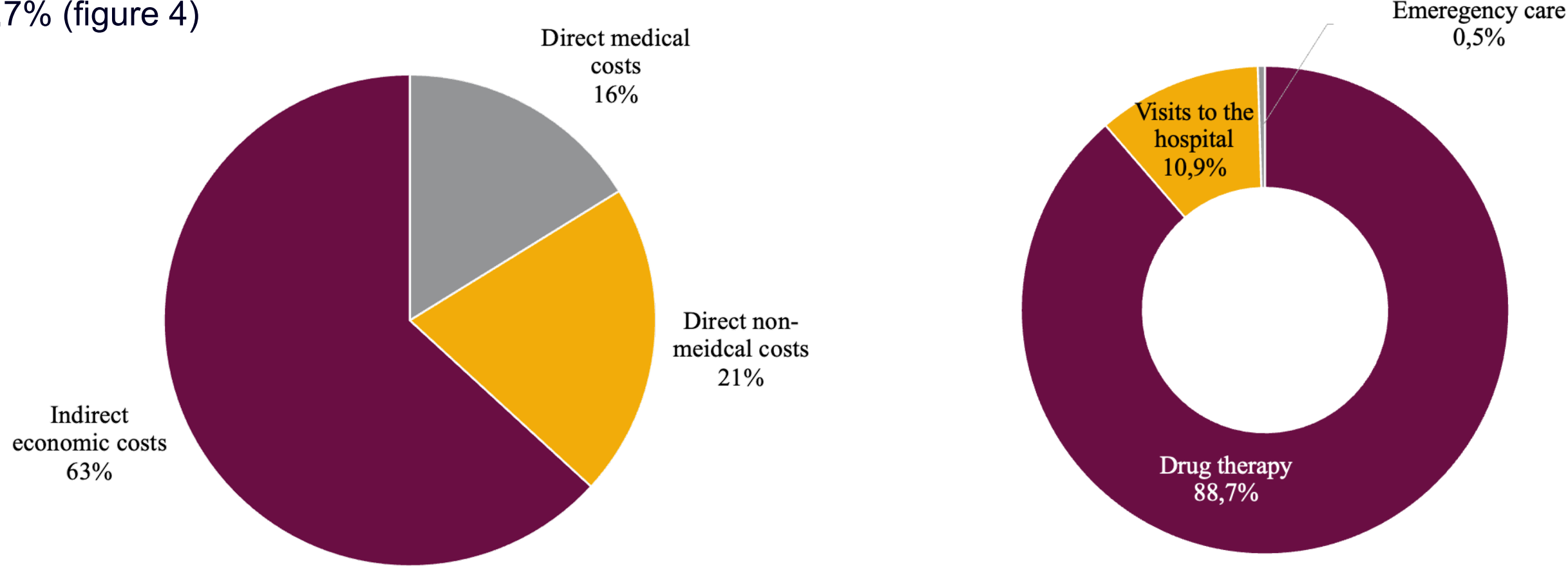
RESULTS

- All indicators were estimated only for 2020 and no future costs were considered.
- Indirect costs were estimated using human capital theory. We assumed that both mortality and disability immediately lead to a decrease in labor supply and GDP (with adjustments for sex-age structure of labor participation and productivity).

	Actual amount in 2020	Breast cancer burden	Amount in 2020 without negative effect of breast cancer
Number of births	1,436.5 thousand	+1.2 thousand	1,437.7 thousand
Number of deaths	2,138.6 thousand	-20.8 thousand	2,117.8 thousand
Natural population growth	-702.1 thousand	-22.0 thousand	-680.1 thousand
Life expectancy	71.53 years	+0.26 years	71.67 years
Days of short-term disability		2 million days	

Table 2. Estimated number of patients available for treatment every year

- In terms of excess deaths social burden of breast cancer (20.8 thousand) is commensurable with social burden of HIV (19.9 thousand excess deaths)⁷ and above social burden of chronic hepatitis C (16.7 thousand excess deaths).
- In terms of life expectancy social burden of breast cancer (0.26 years) is also commensurable with social burden of HIV (0.3 years)⁷ and above social burden of chronic hepatitis C (0.17 years)
- Economic burden of breast cancer was US\$ 5,259.3 million (0,35% of GDP in 2020), including US\$ 851.3 million direct medical costs, US\$ 1,085 million direct non-medical costs, and US\$ 3,323 million indirect economic costs (figure 3). Among indirect economic costs of wage losses accounted for 46,3% (US\$ 1,537 million), tax revenue losses accounted for 10% (US\$ 329.2 million)
- Outpatient care amounted to US\$ 94.9 million (11.2%). Drug therapy also accounted for the largest part of costs – 88,7% (figure 4)



- Inpatient care accounted for the largest part of direct medical costs –US\$ 756.4 million (88.8%). In both day hospital and all-day hospital, the largest amount is accounted for drug therapy: 91% and 76% respectively (table 3).

Cost type	Day hospital	All-day hospital
Radiotherapy	25,00	26,69
Radiotherapy + Drug therapy	4,56	1,10
Drug therapy	355,64	277,69
PET-CT	1,87	-
Without any specific antineoplastic therapy	1,41	1,44
Molecular genetic diagnosis	1,11	-
Surgery	0,58	55,12
Sepsis + Febrile neutropenia & Agranulocytosis due to drug therapy	-	0,14
Medical rehabilitation	-	4,02
Total	390,17	366,20

Table 3 – Structure of inpatient care, US\$ million

- Medication costs were US\$ 590.6 million or more than 85% of all direct medical expenditures.
- Among novel drugs trastuzumab is the most recently used for inpatient care: 60% of total inpatient drug therapy costs and 36,6% of all prescriptions in inpatient drug therapy (table 4).
- Share of patients provided with ribociclib (21%), palbociclib (27%), olaparib (0,67%) remains low (calculated based on Avxentyev N.A., et al., 2018⁸).

Medication	Total amount spend in inpatient care, US\$ million	% of all cost of inpatient drug therapy	Amount of prescriptions	% of all prescriptions of inpatient drug therapy
Trastuzumab	380,6	60,1%	190 399	36,6%
Palbociclib	11,8	1,9%	6 204	1,2%
Eribulin	38,824	6,1%	16 876	3,2%
Ixabepilon	1,106	0,2%	571	0,1%
Ribociclib	10,849	1,7%	5 824	1,1%
Lapatinib	5,562	0,9%	2 085	0,4%
Everolimus	4,697	0,7%	1 743	0,3%
Pertuzumab	125,381	19,8%	24 231	4,7%
Trastuzumab emtansine	84,334	13,3%	18 229	3,5%

Table 4 – Prescriptions of novel drugs in inpatient care

CONCLUSION

- Social and economic burden of breast cancer is considerable in Russia, which requires new measures for controlling the disease.

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References:

- Malignant tumors in Russia in 2020 (morbidity and mortality). Eds.: E.D. Kaprin, V.V. Starinskiy, A.O. Shachzadova. Moscow: MNIOL im. P.A. Gertsena – filial FGBU “NMITS radiologii” Minzdrava Rossii, 2021. 252 p.
- Ignatyeva V.I. et al. Social and Economic Burden of Breast Cancer in the Russian Federation. Medical Technologies. Assessment and Choice. 2016; 26(4):32-49.
- «Methodology of calculating economic burden of mortality, morbidity and disability» (Adopted by order №192/323n/45n/113 by Ministry of economic development, Ministry of Health Care and Social Development, Ministry of Finance, Federal State Statistics Service).
- State of oncology healthcare in Russia in 2020. Eds.: E.D. Kaprin, V.V. Starinskiy, A.O. Shachzadova. Moscow: MNIOL im. P.A. Gertsena – filial FGBU “NMITS radiologii” Minzdrava Rossii, 2021. 239 p.
- Federal State Statistics Service. Yearly average standard residential population. <https://showdata.gks.ru/report/278930/>
- Consolidated budget and territorial non-budgetary funds implementation report for the year 2020 <https://roskazna.gov.ru/ispolnenie-byudzheto/konsolidirovannye-byudzhety-subektov/>
- Avxentyev N. A. et al. Social and economic burden of HIV in Russia //ISPOR Europe. – 2022. – EE402.
- Avksentyev N.A., Zhuravleva M.V., Pazukhina E.M., Snegovoy A.V., Frolov M.Yu. Pharmacoeconomic evaluation of ribociclib for the first-line treatment of HR-positive HER2-negative advanced breast cancer. Tumors of female reproductive system. 2018;14(2):21-35.