ASSESSING LOSSES RELATED TO ACTUAL DISEASE INCIDENCE IN A REGION'S POPULATION: AN ECONOMIC ASPECT (A CASE STUDY OF ALTAI REGION OF RUSSIA) [1]

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Abstract. In this article, we present the analysis of the economic losses associated with the actual disease incidence in the region's population by the following classes of diseases "Poisoning by drugs, medicaments and biological substances” (T36-T50) and "Toxic effects of substances chiefly nonmedicinal as to source” (T51-T65) which includes an assessment of production losses in the region's economy in value terms and an assessment of changes in cash flows in the RF budgets (tax revenues). The period of time covered by the analysis by the classes of diseases is 5 years (from 2007 to 2011). The greatest region's GRP losses related to the actual disease incidence in the population by classed of diseases T36-T50 and T51-T65 GRP over the analyzed time period occurred in 2011 - more than 7 million rubles and were related to the actual disease incidence in men of working age (over 4 million rubles) and women of working age (more than 2 million rubles), the biggest income tax losses were observed in 2010 (more than 176 thousand rubles) with the share of the regional budget of 90 %, value added tax (VAT) losses in the region occurred in 2011 (more than 253 thousand rubles), the actual ratio of the paid VAT to the gross value added in the region in 2011 amounted to 3 %, the highest losses of personal income tax (PIT) were observed in 2011 (more than 22 thousand rubles). Thus, the greatest losses of tax revenues were in 2011 (more than 400 thousand rubles) and in 2010 (more than 427 thousand rubles).
Keywords: economic evaluation of VAT, income tax and GRP losses; actual disease incidence in the population by classes of diseases; time period covered by the analysis; production loss evaluation in value terms, evaluation of changes in cash flows in the RF budgets (tax revenues).

It is practical to assess the costs of a period of economic activity of the population (more specifically, reduction in the period) to the state (RF subject) by assessing the impact of the duration of the period of economic activity on the main social and economic indicators (GDP for the country and GRP for the region) through evaluating the change in the main financial flows including fiscal revenues and expenditures on various state levels, and revenues and expenditures of extrabudgetary funds [1].

Overall, assessment of the economic losses associated with the actual disease incidence (reduction in the period of economic activity) includes the following three components 2:

1) assessment of the undermanufactured product in the economy of a corresponding territory in value terms;

2) evaluation of the change in the financial flows in the RF budgets;

[1] *Translated by Ksenya Zemnlyanova*

[2] The procedure to assess the period of incapacity to work developed by the Federal Budget Scientific Institution “Federal Scientific Center for Medical and Preventive Health Risk Management Technologies” of the of the Federal Service on Customers' Rights Protection and Human Well-Being Surveillance (Perm) is based on the best practices and approaches to the assessment theory adapted to the Russian reality with consideration for the specifics of the country’s state of social services and statistical observation practices.

3) evaluation of the change in the financial flows in the extrabudgetary funds of the RF (RF Pension Fund, Social Security Fund, Federal Compulsory Medical Insurance Fund, Local Compulsory Medical Insurance Fund).

While we can obtain actual data on the expenditures associated with the class of disease under review from the Social Security Fund and Federal Compulsory Medical Insurance Fund, assessment of the undermanufactured product and changes in the financial flows in the RF budgets (tax revenues) requires special approaches and methods [2]. This article focuses on those components of the economic assessment.

The assessment of economic losses in Altai Region associated with the disease incidence in the region's population by the following classes of diseases Poisoning by drugs, medicaments and biological substances" (T36-T50) and "Toxic effects of substances chiefly nonmedicinal as to source" (T51-T65) includes a monetary assessment of the reduction in the duration of the population's economic activity. The choice of the above classes of diseases is determined by the possibility of managing the health risks associated with those diseases by the local department of the Federal Service on Customers' Rights Protection and Human Well-Being Surveillance. The period of time covered by the analysis by the classes of diseases T36-T50 and T51-T65 is 5 years (from 2007 to 2011).

The suggested assessment of economic losses (reduction in the period of economic activity) associated with the actual disease incidence in the population in the classes of diseases under review includes the assessment of the undermanufactured product in the region's economy in value terms and evaluation of the change in the financial flows in the RF budgets (tax revenues).

The total (aggregate) period of the population's incapacity to work in the region in the classes of diseases T36-T50 and T51-T65 for the period of time under review is presented in the table below (Table 1).

Table 1

Total (aggregate) period of the population's incapacity to work in Altai Region in the classes of diseases T36-T50 and T51-T65 for 2007–2011, in percent of the year

№	Age, years old	% of the year under review [3]	2007	2008	2009	2010	2011
1	0–14	20	1.06	1.05	0.95	0.95	0.83
2	18–55 (women)	100	10.41	9.26	9.13	7.25	7.23
3	18–60 (men)	100	15.02	12.96	11.73	12.79	12.51
4	56 and older (women)	20	0.77	0.68	0.76	0.74	0.81
5	61 and older (men)	20	0.48	0.45	0.43	0.65	0.58
TOTAL:			27.74	24.41	23.00	22.37	21.96

Table 1 shows that the longest period of incapacity to work is among the men of working age (18-60 years old). The share of this group totaled in 2007 – 52.4 %, in 2008 – 53.1 %, in 2009 – 51.0 %, in 2010 – 57.2 %, in 2011 – 57.0 %. The longest period of incapacity to work

[3] – since the calculations are based on the length of the period of incapacity to work, the result is taken into account for the percent of cases resulted in incapacity to work for the working population (including the parents with sick children). The percentage is calculated based on the statistical data for the previous period.

was in 2007; in that year, the number of acute poisonings related to chemical substances in the population exceeded the value of 2008 onward (per 10 thsd. population) – 22.96 0/000, 21.85 0/000, 21.66 0/000, 21.03 0/000, 18.77 0/000 respectively.

The region's estimated GRP losses per employee per year of incapacity to work in the class of diseases T36-T50 and T51-T65 for the period under review are presented in Table 2.

Table 2

GRP losses associated witht the actual incidence in the classes of diseases T36-T50 and T51-T65 in Altai Region for 2007–2011, RUB

№	Age, years old	2007	2008	2009	2010	2011
1	0–14	214395	247818	236142	271662	266998
2	18–55 (women)	2100826	2178560	2278015	2083107	2341111
3	18–60 (men)	3031271	3048437	2928193	3674358	4048411
4	56 and older (women)	155019	158640	189652	211065	263098
5	61 and older (men)	96306	106705	108021	186039	187218
TOTAL:		5597817	5740160	5740024	6426231	7106837

Table 2 shows that the region's biggest estimated GRP losses per employee per year of incapacity to work in the classes of diseases T36-T50 and T51-T65 took place in 2011 (7 106.8 thsd. RUB) exceeding the values of 2007, 2008, 2009 and 2010 by 1.3, 1.2, 1.2 and 1.1 times respectively.

Specifics of the calculation of GRP result in the fact that the input of 1 employee in one industry in the total volume of GRP in one year will significantly differ from the input of 1 employee in a different industry (temporary incapacity of an employee working in different industries will have a different impact on GRP).

Review of the region's main industries (Table 3) shows that in 2011 the following industries experienced the biggest economic losses (based on the Russian National Classifier of Economic Activities): Manufacturing (a 2.9 increase in GRP losses in 2011 as compared to 2007) and Agriculture (a 2.9 increase in GRP losses in 2011 as compared to 2007), Wholesale Trade and Retail (a 1.6 decrease in GRP losses in 2011 as compared to 2007), State Administration of Government (a 1.7 increase in GRP losses in 2011 as compared to 2007), Property Operations (a 1.1 increase in GRP losses in 2011 as compared to 2007), Manufacturing and Distribution (a 2.2 increase in GRP losses in 2011 as compared to 2007), Transportation and Communication (GRP losses in 2011 are equal to the 2007 value).

Table 3

The region's estimated gross regional product losses per employee per year of incapacity to work in the classes of diseases T36-T50 and T51-T65 in Altai Region for 2007–2011, thsd RUB

Input of the industry into the GRP per employee per year of incapacity to work	№	Sections of the Russian National Classifier of Economic Activities	2007	2008	2009	2010[4]	2011[3]
	1	SECTION A. Agriculture, Hunting and Forestry	24.912	30.424	46.160	55.606	72.632
	2	SECTION B. Fishing and Fish-Farming	0.093	0.030	0.015	0.009	0.004
	3	SECTION C. Mining Operations	1.767	3.115	5.603	9.053	15.563
	4	SECTION D. Manufacturing	39.359	49.953	56.764	87.635	115.162
	5	SECTION E. Production and distribution of electricity, gas and water	10.988	13,493	18.864	19.777	24.070
	6	SECTION F. Construction	6.699	8.799	7.750	13.352	17.227
	7	SECTION G. Wholesale Trade and Retail; Automotive, Household Goods and Personal Appliances Repairs	76.833	63.696	50.382	52.999	47.097
	8	SECTION H. Hotels and Restaurants	0.827	1.192	0.769	0.818	0.844
	9	SECTION I. Transportation and Communication	21.291	27.742	21.613	21.066	21.287
	10	SECTION J. Finance	0.040	0.042	0.185	0.659	1.797
	11	SECTION K. Property Operations, Rent, and Related Services	22.192	24.578	20.241	23.855	24.818
	12	SECTION L. State Administration of Government, State Defense, Social Security	16.526	21.343	26,882	24.453	27.998
	13	SECTION M. Education	3.556	4.614	6,361	5.483	6.384
	14	SECTION N. Public Health and Social Services	7.322	10.480	11.395	9.951	11.135
	15	SECTION O. Provision of other utilities, social and personal services	1.049	1.122	1.300	0.902	0.854
TOTAL:			233.455	260.622	274.283	325.620	386.869
Simple GRP average per capita (for reference only)			201.790	235.189	249.542	287.244	323.554

Calculated based on the data [3– 5].

Table 4 shows that the region's biggest losses in GRP associated with the actual disease incidence in the classes of diseases T36-T50 and T51-T65 for the period of time under review took place in 2011 – over 7 mln RUB – which is related to the actual disease incidence in men (over 4 mln RUB) and women (over 2 mln RUB) of working age; biggest losses in income tax took place in 2010 (over 176 thsd. RUB) of which the share of the regional budget totaled 90 %; biggest losses in the region's VAT taxex took place in 2011 (over 253 thsd. RUB); actual ratio of the amount of VAT paid to the gross value added in the region this year totaled 3 %; biggest losses in the region's personal income taxes took place in 2011 (over 22 thsd. RUB). As a result, the biggest losses in tax income took place in 2011 (over 400 thsd. RUB) and 2010 (over 427 thsd. RUB).

[4] – forecast on the average annual GRP growth rate in the region. The values of losses associated with the actual disease incidence in the population in the region in the classes of diseases T36-T50 and T51-T65 for the period under review (Table 4).

Table 4

Economic losses associated with the actual disease incidence in the population of Altai Region in the classes of diseases T36-T50 and T51-T65 in 2007–2011, RUB

№	Indicator		2007	2008	2009	2010	2011
1	GRP	Losses in GRP	5597817	5740160	5740024	6426231	7106837
2	Tax income	Losses in income tax	99475	97703	78233	176292	132137
		Losses in VAT, RUB	145861	125500	103852	230668	253197
		Losses in personal income tax	16753	18601	18492	20188	22735
		TOTAL (losses in tax income)	262089	241804	200577	427148	408069

Calculated based on the data [3– 6].

The use of this evaluation procedure by the Federal Service on Customers' Rights Protection and Human Well-Being Surveillance can become a helpful tool in providing grounds for the decisions regarding funding the activities aimed at lowering the health risks.

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