

## ***Analysis of Natural Movement of Bacau County's Population – General Mortality and Infant Mortality***

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***Abstract:*** *This paper is an analysis of the phenomenon of death (overall and infant one) in Bacau County in the past 10 years. The analysis traces the evolution of the phenomenon according to the backgrounds, genders, ages and causes of death. It also provides a comparison of the situation at the country level.*

***Keywords:*** *general mortality, infant mortality, deaths*

### **Introduction**

In the analysis of demographic phenomena it has a special role natural movement. On statistics, the population is a community whose volume changes constantly as a result of natural movement and migration. Vital statistics comprises a set of demographic phenomena, whose production and editing time is influenced by factors such as socio-economic and biological factors.

Demographic phenomena that compose natural movement are: birth, death, Marriage and divorce. The first two phenomena play a key role in changing the number and structure of population from one period to another. Marriage and divorce, although not contribute to changes in population, which manifests itself in the intensity will positively or negatively influence the population.

Amid economic and social crisis faced by Romanian society, in recent years the demographic situation worsened birth rate continued the downward trend and mortality both in the general and infant mortality, marked an increase.

In the following lines we are analyzing the phenomenon of population mortality in Bacau County during 2005-2014.

### **1. General Mortality**

Mortality as demographic phenomenon refers to the frequency of deaths to a given population and also for a limited period of time. Unlike birth rate and fertility, mortality constitutes the negative natural population movement. Mortality is used as a key indicator in measuring the health of the population.

According to the Dictionary of the Romanian Language, the mortality rate is an “index result from reporting deaths in a population in a given period, the total of the population, in a given territory”. [2, 654]. National Statistics Institute defines as mortality “number of deaths in a calendar year per 1000 inhabitants. Calculate the legal population (permanent residence) on 1 July of that year” [3, 43].

The analysis of mortality in our country in the period 2005-2014 (data from Table no. 1) shows a slight decrease from 2005, when he recorded the maximum period 11.6 deaths per 1,000 inhabitants by 2008 (11.6-11.2), and small fluctuations of growth and decline, reaching in 2014 to 11.4 (provisional) at the country level. With these values, Romania is among countries with high mortality, although we should not overlook the fact that in many developed countries overall death rate is 10-11 thousand, so do not differ significantly.

**Table no. 1 The rate of mortality in Romania between 2005-2014**

Dead people for 1000 inhabitants

Years									
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
11.6	11.4	11.2	11.2	11.4	11.5	11.2	11.4	11.2	11.4

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

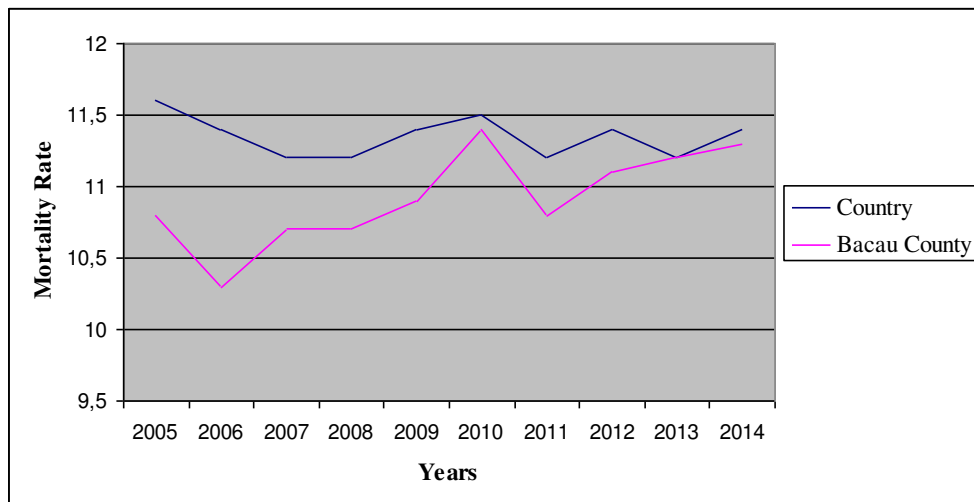
Bacău County, with mortality rates increasing in the last three years (11.3‰ in 2014), while in 2005-2009 had values below 11‰ (the lowest value of 10.3‰ in 2006) is below the country level, but closer to the end of it (Figure no. 1).

**Table no. 2 The rate of mortality in Bacău county between 2005-2014**

Dead people for 1000 inhabitants

Years									
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
10.8	10.3	10.7	10.7	10.9	11.4	10.8	11.1	11.2	11.3

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

**Figure no. 1. The evolution of the rate of mortality during 2005-2014**

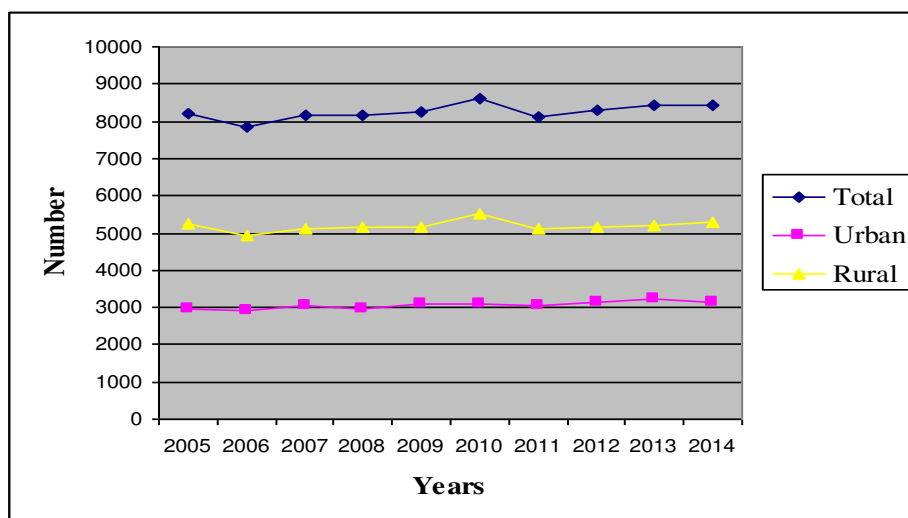
In Bacău County the situation of dead people is presented as follows:

**Table no. 3 Dead people in Bacău County according to the social environment**

Residence environment	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Number persons</b>										
<b>Total</b>	8,198	7,865	8,154	8,147	8,260	8,627	8,134	8,309	8,420	8,439
<b>Urban</b>	2,969	2,936	3,034	2,968	3,095	3,092	3,042	3,161	3,211	3,155
<b>Rural</b>	5,229	4,929	5,120	5,179	5,165	5,535	5,092	5,148	5,209	5,284
<b>%</b>										
<b>Total</b>	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
<b>Urban</b>	36.2	37.3	37.2	36.4	37.5	35.8	37.4	38.0	38.1	37.4
<b>Rural</b>	63.8	62.7	62.8	63.6	62.5	64.2	62.6	62.0	61.9	62.6

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

The unfavourable evolution of total mortality in these years is due to the demographic aging of the population manifested by the increasing share of the total population of older people to the risk of death that is higher and the worsening state of health of the population due to stress, working conditions, difficult access to medicines, general deterioration of health care, as well as environmental pollution, which in Bacău county exceeds permissible limits.



**Figure no. 2. The evolution of the number of dead people during 2005-2014 according to their residence environment**

The total number of dead people in rural areas is about 2/3 presenting a slight decrease from 2006 to 2014 (with the largest decrease being in 2013), while the number of deaths in urban areas is increasing in lately (the largest increase since 2005 was in 2013, 1.9%).

On average social life, the overall mortality is lower in urban than in rural areas (according to the table no. 4), the general trend of decreasing this gap in recent years (from 5.3 ‰ in 2010, 4.0 ‰ - in 2012 and 2013 and 4.3 ‰ – in 2014). This gap is due to causes demographic, and smaller share of urban children and the elderly in the total population and socio-economic development, for example, the cultural and medical higher availability higher a healthcare professional for a higher standard of living higher than in the countryside to the city, etc.

During 2005-2014, the overall mortality of urban and rural population has evolved as follows:

**Table no. 4 The mortality rate in Bacau county according to social environments**

Dead people compared to 1000 inhabitants

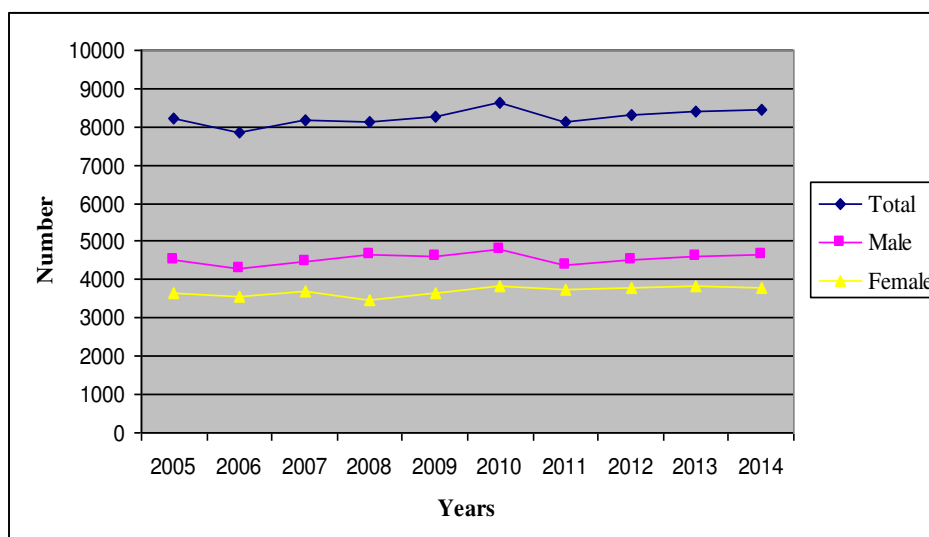
Residence environment	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Total</b>	10,8	10,3	10,7	10,7	10,9	11,4	10,8	11,1	11,2	11,3
<b>Urban</b>	8,1	8	8,3	8,2	8,6	8,6	8,5	8,9	9,1	9
<b>Rural</b>	13,3	12,5	12,9	13	13	13,9	12,8	12,9	13,1	13,3
<b>Difference (rural-urban)</b>	5,2	4,5	4,6	4,8	4,4	5,3	4,3	4,0	4	4,3

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

In Bacau County also, during 2005-2014 the mortality variation is higher among male population, compared to that seen in women (Table no. 5).

**Table no. 5 Mortality seen as male/female population in Bacau**

Sex	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Number of people</b>										
<b>Total</b>	8198	7865	8154	8147	8260	8627	8134	8309	8420	8439
<b>Male</b>	4533	4298	4473	4662	4591	4789	4396	4522	4604	4664
<b>Female</b>	3665	3567	3681	3485	3669	3838	3738	3787	3816	3775
(Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online)										
<b>%</b>										
<b>Total</b>	100	100	100	100	100	100	100	100	100	100
<b>Male</b>	55,3	54,6	54,9	57,2	55,6	55,5	54,0	54,4	54,7	55,3
<b>Female</b>	44,7	45,4	45,1	42,8	44,4	44,5	46,0	45,6	45,3	44,7



**Figure no. 3. Evolution of number of dead people during 2005-2014 according to their sex**

This legitimate is generally checked on each age group of the population. Superiority male over the female mortality, combined with the variation in mortality from age to another, entail changing gender population structure in different age groups of the population.

Table no. 6 shows the evolution of mortality by age group. The data proves that in the age group 0-4 years, deaths are declining continuously over the years analyzed, and the age groups after 75 years, the number of deaths is increasing.

**Table no. 6 Mortality in Bacau County on group of age**

Age group	Number of persons									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Total</b>	8,198	7,865	8,154	8,147	8,260	8,627	8,134	8,309	8,420	8,439
<b>0- 4 years</b>	154	128	132	106	101	101	99	95	67	61
<b>5- 9 years</b>	24	19	13	13	11	16	5	4	8	6
<b>10-14 years</b>	18	17	20	13	23	16	9	11	12	10
<b>15-19 years</b>	51	40	44	38	31	21	23	18	13	17
<b>20-24 years</b>	38	52	29	49	54	61	45	43	33	31
<b>25-29 years</b>	52	58	38	60	47	44	47	51	46	49
<b>30-34 years</b>	86	73	74	83	87	89	76	66	62	56
<b>35-39 years</b>	150	122	156	149	106	130	108	98	104	99
<b>40-44 years</b>	177	163	166	182	221	233	164	217	175	154
<b>45-49 years</b>	348	315	311	280	244	281	233	225	254	225
<b>50-54 years</b>	430	451	483	472	468	476	405	385	335	338
<b>55- 59 years</b>	498	505	521	572	662	610	505	547	567	616
<b>60-64 years</b>	567	520	515	534	596	630	623	662	691	701
<b>65-69 years</b>	977	850	876	731	713	698	643	650	647	688

Age group	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
70-74 years	1,186	1,125	1,133	1,238	1,191	1,129	1,050	1,014	986	876
75-79 years	1,297	1,272	1,372	1,335	1,302	1,343	1,366	1,403	1,388	1,398
80-84 years	1,167	1,198	1,255	1,214	1,282	1,396	1,356	1,345	1,428	1,478
85 years and more	978	957	1,016	1,078	1,121	1,353	1,377	1,475	1,604	1,636

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

The analysis of general mortality demands its approach in terms of death causes. Conditioning socio-economic mortality by cause of death is obvious, leading to real typology of death in developed and underdeveloped countries. In developed countries almost half of all deaths lie with the pin cardiovascular disease, while in developing countries the proportion is considerably reduced. A similar situation is found at deaths from malignancies.

As a result of social and economic changes occurring in our land in recent decades there have been significant changes in the intensity and structure of mortality by cause of death, it approached the structure of mortality in developed countries.

Evolution of deaths by cause of death, and their share in total deaths in Bacau County are presented in Table no. 7.

**Table no. 7 Dead people in Bacau County according to death causes**

Death causes	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
	<b>Number of persons</b>									
Total	8,198	7,865	8,154	8,147	8,260	8,627	8,134	8,309	8,420	8,439
Infectious diseases and parasitic diseases	127	135	139	137	134	148	131	149	147	169
Tumors	1,406	1,372	1,427	1,367	1,435	1,487	1,464	1,517	1,557	1,568
Endocrine diseases, nutrition and metabolism diseases	55	47	78	60	76	75	52	52	73	53
Mental and behaviour disorders	19	18	37	33	37	35	21	20	21	26
Nervous system diseases, eyes, ears and mastoid apophyge diseases	90	72	96	87	72	89	98	122	82	95
Blood system diseases	4,539	4,469	4,536	4,552	4,530	4,775	4,557	4,619	4,741	4,706
Respiratory system diseases	489	428	445	431	389	376	415	411	375	363
Digestive system diseases	753	687	729	800	856	934	746	783	748	763
Genital-urinary system diseases	77	65	76	72	75	71	97	76	108	96
Pregnancy, birth and after birth	2	4	1	:	3	2	1	1	1	:
Before birth diseases	37	32	42	22	25	27	21	23	23	20
Congenital disturbances and chromosomal dysfunctions	27	26	19	23	22	20	20	12	8	10
Injuries, poisoning	540	463	475	480	505	486	391	426	391	419
Others	37	47	54	83	101	102	120	98	145	151
Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online										
	<b>%</b>									
<b>Total</b>	100	100	100	100	100	100	100	100	100	100
Infectious diseases and parasitic diseases	1.5	1.7	1.7	1.7	1.6	1.7	1.6	1.8	1.7	2.0
Tumors	17.2	17.4	17.5	16.8	17.4	17.2	18.0	18.3	18.5	18.6

Endocrine diseases, nutrition and metabolism diseases	0.7	0.6	1.0	0.7	0.9	0.9	0.6	0.6	0.9	0.6
Mental and behaviour disorders	0.2	0.2	0.5	0.4	0.4	0.4	0.3	0.2	0.2	0.3
Nervous system diseases, eyes, ears and mastoid apophyge diseases	1.1	0.9	1.2	1.1	0.9	1.0	1.2	1.5	1.0	1.1
Blood system diseases	55.4	56.8	55.6	55.9	54.8	55.3	56.0	55.6	56.3	55.8
Respiratory system diseases	6.0	5.4	5.5	5.3	4.7	4.4	5.1	4.9	4.5	4.3
Digestive system diseases	9.2	8.7	8.9	9.8	10.4	10.8	9.2	9.4	8.9	9.0
Genital-urinary system diseases	0.9	0.8	0.9	0.9	0.9	0.8	1.2	0.9	1.3	1.1
Pregnancy, birth and after birth	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Before birth diseases	0.5	0.4	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.2
Congenital disturbances and chromosomal dysfunctions	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.1	0.1	0.1
Injuries, poisoning	6.6	5.9	5.8	5.9	6.1	5.6	4.8	5.1	4.6	5.0
Others	0.5	0.6	0.7	1.0	1.2	1.2	1.5	1.2	1.7	1.8

The study data presented show that the main causes of death of the population of Bacau are: cardiovascular diseases, tumors, digestive diseases, injuries and poisonings. Thus, in the period under review, over 54% of deaths are caused by cardiovascular diseases and over 16% of tumors.

Analyzing the causes of deaths on, there is an increase each year in the share of the groups that are the main causes. Thus, diseases of the circulatory system at 55.4% of total deaths (2005) to 55.8% in 2014 (reaching 56.8% in 2013, however, 56.3% in 2013 and 56% in 2011) and tumors from 17.2% at the start of the period to 18.6% at the end.

Among the major causes of death and showing a general downward trend in mortality highlighted digestive diseases (from 9.2% in 2005 to 9% in 2014) and injuries, poisonings (6.6% in 2005 5% in 2014). Also present downward trend and deaths from respiratory diseases (from 6% in 2005 to 4.3% in 2014).

Mortality cases vary considerably by gender, being male population characteristics in most cases higher levels.

The ranking causes of death in the numerical order of their importance, by age group reveals that some diseases whose origin is in the before birth period, and respiratory diseases are ranked first in children aged 0-4 years, whereas people the age groups over 45 years, first returns circulatory diseases. In general mortality structure and its intensity, is found as infant mortality, a situation encountered in all countries.

## **2. Infant Mortality**

Infant mortality is the demographic phenomenon of deaths of children under one year of live births registered in the population of a particular region and for a given period of time, usually one year.

Study of infant mortality is of particular interest because, with average life, are the most sensitive and commonly used indicators of the level of socio-economic development and the health of the population.

Dictionary of the Romanian Language defines infant mortality as ‘the frequency of deaths in the first year of life per thousand live births’ [2, 654]. National Statistics Institute defines as the infant mortality rate “indicator which measures mortality among children less than 1 year. It is calculated by dividing the deaths aged less than 1 year per 1000 live births” [3, 44].

The infant mortality rate is a complex indicator of the health of a population, “reflecting the extent to which medical care that most people have access ensures good health” [1, 80].

Infant mortality in Romania, i.e. they exhibit deaths mortality in the population under 1 year (analyzed in table no. 8), has experienced a continuous decline in the years 2005-2014, from 15 ‰ in 2005 to 8.8 ‰ in 2014.

**Table no. 8 Infantile mortality rate in Romania between 2005-2014**

Dead children less than 1 year compared to 1000 born alive

Years									
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
15	13.9	12	11	10.1	9.8	9.4	9	8.5	8.8

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

However, even if the recovery trend of this indicator in recent years is evident, the infant mortality rate continues to remain at a very high level compared with other European countries, is 2-3 higher than that of most of them.

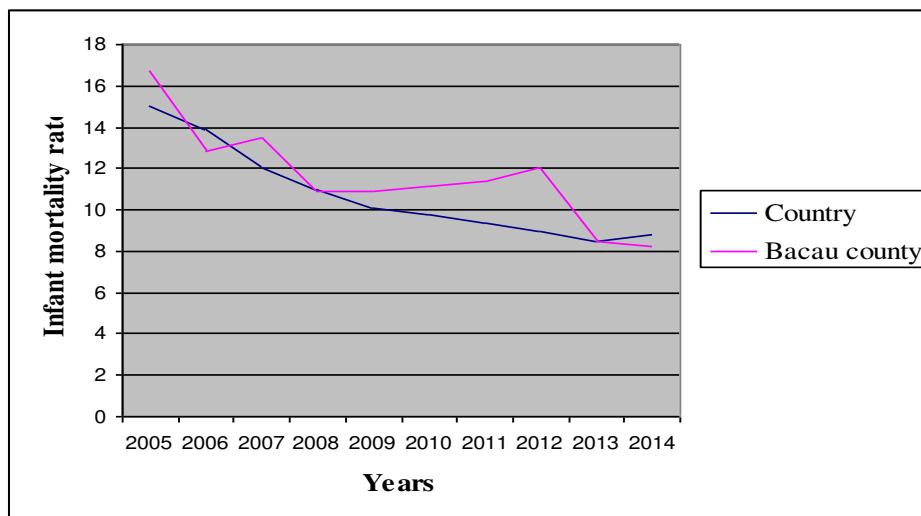
In Bacau county, infant mortality was in most years of the analyzed period greater than recorded in the country (except 2006, 2008 and 2014). It is observed a downward trend in infant mortality - from 16.7 ‰ in 2005 to 8.2 ‰ in 2014 (Figure no. 5).

**Table no. 9 Infant mortality rate in Bacau County compared to the one recorded at the country level between 2005-2014**

Dead children less than a year compared to 1000 born alive

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Country</b>	15	13,9	12	11	10,1	9,8	9,4	9	8,5	8,8
<b>Bacau county</b>	16,7	12,8	13,5	10,9	10,9	11,1	11,4	12	8,5	8,2

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online



**Figure no. 5. The evolution of the rate of infant mortality during 2005-2014**

In absolute figures, the situation of deaths under 1 year registered in Bacau County, and their share in total deaths under 1 year in the country is presented in Table no. 10.

**Table no. 10 Dead persons less than a year between 2005-2014**

Number of persons

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Romania</b>	3,310	3,052	2,574	2,434	2,250	2,078	1,850	1,812	1,680	1,628
<b>From which in Bacau county</b>	132	104	109	86	82	81	78	84	57	49
<b>%</b>	4.0	3.4	4.2	3.5	3.6	3.9	4.2	4.6	3.4	3.0

Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online

Although the country level observed decline in actual number of deaths in the county of Bacau there is a contradictory trend when growth, while lowering both in terms of total deaths, and in terms of their share in total deaths under one year.

The high infant mortality in Bacau County is mainly influenced by external factors such as: healthcare specialist feed regime, the hygiene of the infant. Deaths of persons less than 1 year in Bacau on residence are shown in Table no. 11.

**Table no. 11 Dead people less than a year between 2005-2014 according their social background**

Residence background	Years									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>Number of people</b>										
<b>Total</b>	132	104	109	86	82	81	78	84	57	49
<b>Urban</b>	32	37	46	25	30	24	27	31	21	12
<b>Rural</b>	100	67	63	61	52	57	51	53	36	37
Source: The Romanian National Institute of Statistics, 2005-2014, Tempo-Online										
<b>%</b>										
<b>Total</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Urban</b>	24.2	35.6	42.2	29.1	36.6	29.6	34.6	36.9	36.8	24.5
<b>Rural</b>	75.8	64.4	57.8	70.9	63.4	70.4	65.4	63.1	63.2	75.5

Due to stronger action unfavourable factors influencing infant mortality in rural areas, the level is higher than in urban areas.

An analysis of the causes of deaths in children under 1 year period studied, leads to the conclusion that most of these are due to some disease whose origin is in the prenatal period (of between 34% and 39%) and respiratory diseases (of between 24% and 30%).

The decrease in infant mortality is an ongoing process largely explained by the socio-economic to general and improving health care. Analysis of infant mortality is important; it must identify reserves to reduce further its level.

The brief analysis of general and infant mortality in Bacau county in the years 2005-2014 highlights the socio-economic factors influence all over them and that there are reserves that can be capitalized in order to continue lowering the level of these indicators.

Studying mortality is also important from a public health perspective. The numerical increase of population mortality influences its structure by age. On the basis of the deaths can be identified and prioritized health problems of a population and may bring such projects and objectives of health programs. It also makes it possible to assess the effectiveness of health services.

### **Conclusions**

Mortality is one of the main demographic phenomena that compose natural movement. The analysis of mortality in Bacau County during 2005 - 2014 revealed the following:

- the upward curve of mortality;
- the positioning below the rate of mortality at the country level;
- a share almost double in rural areas compared to urban areas;
- a mortality rate in men that overpasses the one in the female sex;
- predominates deaths in people over 75 years;
- a predominant cause of death is cardiovascular diseases;
- the infant mortality rate has a downward trend.

In order to have a complete picture of the natural population movement, an analysis of the phenomenon of birth it is also required.

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