INTRODUCTION

To evaluate the performance of health care systems and their impact on the health of the population, several types of measurements are used, of which we quote: assessing the economic efficiency, medical efficiency, social acceptability or organizational structure assessment. Regular assessments are focused mainly on measuring the results of the hospital activities, of various categories of physicians, especially family physicians, of the health system as a whole, in terms of numbers and types of services provided, and less on health impact assessment. Within this context, the concept of “avoidable deaths” has been introduced. This paper aims at highlighting the avoidable deaths tendency in Romania, based on their assessment for two years, 2002 and 2007, and based on the list of diseases used by Leveque, A, Humblet, P.C. Lagasse, R. in the atlas made for Belgium.(1)

Abstract: To evaluate the performance of health care systems and their impact on the health of the population, several types of measurements were used, of which we quote: assessing the economic efficiency, medical efficiency, social acceptability or organizational structure assessment. Regular assessments are focused mainly on measuring the results of the hospital activities, of various categories of physicians, especially family physicians, of the health system as a whole, in terms of numbers and types of services provided, and less on health impact assessment. Within this context, the concept of “avoidable deaths” has been introduced. This paper aims at highlighting the avoidable deaths tendency in Romania, based on their assessment for two years, 2002 and 2007, and based on the list of diseases used by Leveque, A, Humblet, P.C. Lagasse, R. in the atlas made for Belgium.(1)

Definition – as mentioned in the literature, “avoidable deaths” are defined as premature deaths (deaths before the age of 65 years) that can be influenced by health care or health promotion activities.(1)

Brief history of “avoidable deaths” concepts:

β 1976 Rutstein, DD. (together with a working group) proposes the concept of “sentinel health events” - a list of diseases, disabilities and premature deaths that could be considered “avoidable through preventive and curative measures”;(3)

β 1980, the same workgroup reviewed the list of events:

β RJ Charlton (1983) and Mackenbach J. P. (1984) - have made the assumption that if the events are limited to deaths, “avoidable deaths” could easily be used to assess the impact of health resources on the health status of population.(4)

β 1997 - Holland, W.W. together with the European Community’s Working Group on “Health services and avoidable deaths” published a list and an atlas of avoidable deaths. Compared to the previous lists, they introduced a series of sensitive causes to primary prevention (lung cancer, liver cirrhosis, road accidents).(4)

There were two reasons that led to changing the lists of disorders: introduction of diseases that can be influenced by...
primary prevention measures and improving the techniques of diagnosis and treatment for some diseases. The authors admit that diagnoses lists are not exhaustive; they do not cover all diseases that could have been included in the category of those generating avoidable deaths because:

- there is insufficient health information at local level;
- there are problems / difficulties with the declaration and coding the causes of death;
- there are differences of opinion among experts on the character of “avoidable death”;
- the use of some lists with different structures makes it impossible to compare diverse data (over time and across countries). For example - a study conducted in the province of Valencia in Spain showed that for the period 1975 – 1990, avoidable deaths calculated based on “Holland” list accounted for 30% of all deaths and those calculated based on “Charlton” list only 3%.

These works made “avoidable deaths” to become a technique commonly used in assessing the impact of health services on the health of the population.

**Application of the concept of “avoidable deaths”**

- assessing the health status of the population;
- identifying health problems;
- establishing priorities and prioritizing health problems;
- comparing the health status of the population in different areas, territories, population subgroups;
- identifying health inequalities (especially at territorial level);
- establishing quantitative objectives of health programmes;
- assessing and monitoring the programmes / projects / interventions;
- measuring quality of care;
- assessing the health system’s performance.

**List of diseases which are included in “avoidable diseases” category**

Deaths from external causes of injury and poisoning (all age groups);

- tuberculosis (5 – 64 years old);
- breast cancer (15 – 64 years old);
- cervical cancer (15 – 64 years old);
- hypertension and cardiovascular diseases (35 – 64 years old);
- asthma (5 – 49 years old);
- infant mortality;
- gastrointestinal disorders (1-14 years old);
- testicular cancer (15-64 years old);
- Hodgkin ‘s disease (5-64 years old);
- leukaemia (0-14 years old);
- chronic rheumatic heart disease (5-44 years old);
- respiratory diseases (1-14 years old);
- peptic ulcer (15-64 years old);
- appendicitis (5-64 years old);
- abdominal Hernia (5-64 years old);
- cholecystitis and cholelithiasis (5-64 years old);
- congenital anomalies of the heart and vessels (1-74 years old);
- maternal mortality (all ages).

**Conditions amenable to medical care**

- conditions amenable to medical care
- cancer of the trachea, bronchus and lung (5-64 years old);
- ischemic heart disease (5-64 years old);
- cirrhosis (15-64 years old);
- road accidents due to motor vehicles (all ages);
- skin cancer (non-melanoma) (5 – 64 years old).

WHO experts included among avoidable deaths some deaths that could have not occurred:
- through primary prevention measures - deaths due to road accidents involving motor vehicles, cerebrovascular pathology, chronic liver disease and cirrhosis and some cancers (liver cancer, cancer of the upper respiratory and digestive tract, lung cancer);
- through measures for secondary prevention (early diagnosis and initiation of therapy) - deaths due to skin melanoma, breast cancer, cervical cancer and some cancers of the endometrium that may benefit from early diagnosis. In these conditions, it is possible to cure the patient or the long-term survival.

The rationale for choosing deaths produced only in specific age groups is the following:

- increase the avoidable part within the indicator structure (along with aging);
- the fact that any cause of death could not be completely eliminated; opportunity to enter into the category of avoidable causes is higher in a particular age group;
- in certain age groups, early diagnosis and treatment of some diseases can lead either to postpone death and consequently, to the survival expectancy increase.

**METHODS**

**Source of data** - for the identification and quantification of deaths that fall into the category of avoidable deaths, we used the mortality database of the World Health Organization. It includes deaths by cause, age and gender and a time series.

**Period of time** - to highlight the trend of the phenomenon, two times have been used (for 2 years), at an interval of five-year period (2002 and 2007).
limits were chosen according to the existing data in the WHO database.

List of diseases – As a model, there has been chosen the list used by Leveque, A, Humblet, PC Lagasse, R. in the atlas made for Belgium for the years 1985-1989. It was completed based on existing data and taking into account changes in the coding of diseases, occurred in the study period. The criterion was to ensure the perfect comparability of data (diagnoses) studied in the two years. The list of diseases is presented in table no. 1. Data were taken separately for males and females.

Table no. 1. Avoidable deaths list of diagnosis used by Leveque, Humblet and Lagasse

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Code (ICD-9)</th>
<th>Code (ICD-10)</th>
<th>Age groups</th>
<th>Deaths amenable to medical care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-intestinal infections</td>
<td>001–009</td>
<td>A00-A09</td>
<td>0–14</td>
<td></td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>110–118</td>
<td>B15-B19; B90</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>174</td>
<td>C50</td>
<td>15–64</td>
<td></td>
</tr>
<tr>
<td>Cancer of cervix uteri and body of the uterus</td>
<td>179-180;182</td>
<td>C53-C55</td>
<td>15–64</td>
<td></td>
</tr>
<tr>
<td>Leukaemia</td>
<td>204–208</td>
<td>C40-C46</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Chronic RHD</td>
<td>303–308</td>
<td>I05-I09</td>
<td>5–44</td>
<td></td>
</tr>
<tr>
<td>Hypertension and cerebrovascular diseases</td>
<td>401–405;430–438</td>
<td>I10-I15;I60-I69</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>660–669</td>
<td>J00-J09</td>
<td>1–14</td>
<td></td>
</tr>
<tr>
<td>Gastric and duodenal ulcer</td>
<td>531–534</td>
<td>K25-K28</td>
<td>15–64</td>
<td></td>
</tr>
<tr>
<td>Appendicitis</td>
<td>540–543</td>
<td>K35-K38</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Abdominal hernia</td>
<td>550–553</td>
<td>K40-K46</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Cholecystitis and cholelithiasis</td>
<td>574–575.1</td>
<td>K80-K83</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Maternal mortality</td>
<td>650–678</td>
<td>O00-O97</td>
<td>1–14</td>
<td></td>
</tr>
<tr>
<td>Congenital anomalies of the heart and vessels</td>
<td>745-747</td>
<td>Q20-Q28</td>
<td>1+</td>
<td></td>
</tr>
<tr>
<td>Infant mortality</td>
<td>745-747</td>
<td>Q20-Q28</td>
<td>0–1</td>
<td></td>
</tr>
<tr>
<td>Diseases amenable to health promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trachea, bronchus and lung cancer</td>
<td>662</td>
<td>C33-C34</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Ischemic heart disease</td>
<td>410</td>
<td>I20-I25</td>
<td>5–64</td>
<td></td>
</tr>
<tr>
<td>Liver cirrhosis</td>
<td>571</td>
<td>K70-K73;K74;K76</td>
<td>15–64</td>
<td></td>
</tr>
<tr>
<td>Accidents involving motor vehicles</td>
<td>810-825</td>
<td>V02-V04;V09;V12-V14;V16-V19;V86-V89</td>
<td>All ages</td>
<td></td>
</tr>
</tbody>
</table>

Some of the diagnoses belonging to the avoidable deaths group and the identification of the possible factors are shown in table no. 2.

Table no. 2. Level of intervention in the case of some avoidable deaths

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Level of health system responsibility</th>
<th>Other potential influencing factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-intestinal infections</td>
<td>Public health care</td>
<td>Socio-economic and living conditions level</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Public health care</td>
<td>Socio-economic and living conditions level</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>Public health care</td>
<td>Socio-economic and living conditions level</td>
</tr>
<tr>
<td>Cancer of cervix uteri and body of the uterus</td>
<td>Public health care</td>
<td>Socio-economic and living conditions level</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>Public health care</td>
<td>Socio-economic and living conditions level</td>
</tr>
</tbody>
</table>

Table no. 3. Avoidable deaths in Romania, per causes and gender, in 1992, 2002 and 2007

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>2007</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>F</td>
<td>T</td>
</tr>
</tbody>
</table>

| Diseases amenable to medical care |
| Gastro-intestinal infections | 15 | 14 | 29 | 8 | 8 | 16 |
| Tuberculosis | 1068 | 174 | 12 | 42 | 704 | 139 | 843 |
| Breast cancer | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Cancer of cervix uteri and body of the uterus | 1445 | 14 | 45 | 14 | 45 | 14 | 14 |
| Leukaemia | 24 | 21 | 45 | 20 | 14 | 34 | 34 |
Chronic RHD 23 28 13 7 20
Hypertension and cerebrovascular diseases 5750 90 5214 2827 8041
Respiratory diseases 106 18 95 70 165
Peptic ulcer 173 21 111 34 145
Appendicitis 8 6 6 2 8
Abdominal hernia + intestinal obstruction 85 15 64 63 127
Maternal mortality 33 33 23 23
Congenital anomalies of the heart and vessels 51 36 87 34 64
Infant mortality 1176 27 1032 869 1901
Total secondary prevention 8479 16 69 5324 6689 14013

Diseases amenable to health promotion
Trachea, bronchus and lung cancer 3642 706 4348 3880 850 4730
Ischemic heart diseases 7322 2473 9795 6431 2030 8461
Liver cirrhosis 3706 1826 5532 3704 1606 5310
Accidents involving motor vehicles 1703 610 2313 1527 485 2012
Total primary prevention 1637 3 5615 21988 15542 4971 20513
Total 2485 2 13779 38683 22866 11660 34526

Constantly, avoidable deaths are higher among men compared to women. The difference is obvious for the group of diseases that can be prevented by measures which promote a healthy lifestyle.

Figure no. 1. Gender distribution of avoidable deaths by primary prevention in 2007 and 2012

Gender variable also intervenes in the distribution of avoidable deaths according to the two possible categories of interventions, both in 2007 and in 2012. In men, the number of avoidable deaths by primary prevention measures is higher and in women, those by secondary prevention measures (so, early diagnosis and treatment).

Evaluation of reserves in decreasing the crude mortality rate can be done by calculating the share (%) of avoidable deaths in relation to the deaths produced in population (see table no. 4).

In 2007, the total number of deaths was 251 965 (figure existing in WHO database) and in 2012, 255 539 (figure existing in the database of Computing Centre), so the crude mortality rate was higher in 2012 than in 2007. The share of avoidable deaths in 2012 is 1% lower than in 2007. The decrease has the same amplitude as in males and females.

Table no. 4. Share of avoidable deaths in relation to total deaths

<table>
<thead>
<tr>
<th></th>
<th>% of total deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
<tr>
<td>Masculine</td>
<td>19</td>
</tr>
<tr>
<td>Feminine</td>
<td>12</td>
</tr>
</tbody>
</table>

If we refer only to the age group of 0-64 years old, the situation changes and is presented in table no. 5:

Table no. 5. Share of avoidable deaths in relation to total deaths in the age group of 0 – 64 years old

<table>
<thead>
<tr>
<th></th>
<th>% of all deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
</tr>
<tr>
<td>Masculine</td>
<td>52</td>
</tr>
<tr>
<td>Feminine</td>
<td>64</td>
</tr>
</tbody>
</table>

• Over half of the deaths in the age group of 0-64 years old, produced both in 2007 and 2012, falls into the category of avoidable deaths;
• The share of avoidable deaths in the three times has very small oscillations;
• This applies to both women and men;
• Constantly, the share of the avoidable deaths is higher in women than men, the difference being statistically significant.

In 2012, we are witnessing a 100% increase in the number of avoidable deaths from breast cancer in men and cancer of the trachea, bronchus and lung (6.53% increase in men and 20.40 in women) (see table no. 6 and figures no. 2, 3 and 4).

Table no. 6. Avoidable deaths in Romania, by causes and gender, in 2007 compared to 2002

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Masculine</th>
<th>Dif. +/-</th>
<th>Feminine</th>
<th>Dif. +/-</th>
<th>Total</th>
<th>Dif. +/-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastro-intestinal infections</td>
<td>53.33</td>
<td>-46.67</td>
<td>57.14</td>
<td>-42.86</td>
<td>55.17</td>
<td>-44.83</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>65.92</td>
<td>-34.08</td>
<td>79.89</td>
<td>-20.11</td>
<td>67.87</td>
<td>-32.13</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>0.00</td>
<td>100.00</td>
<td>96.32</td>
<td>-3.68</td>
<td>98.23</td>
<td>-1.77</td>
</tr>
<tr>
<td>Cancer of cervix uterus and body of the uterus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85.61</td>
<td>-14.39</td>
</tr>
<tr>
<td>Leukaemia</td>
<td>83.33</td>
<td>-16.67</td>
<td>66.67</td>
<td>-33.33</td>
<td>75.56</td>
<td>-24.44</td>
</tr>
<tr>
<td>Chronic RHD</td>
<td>56.52</td>
<td>-43.48</td>
<td>140.00</td>
<td>40.00</td>
<td>71.43</td>
<td>-28.57</td>
</tr>
<tr>
<td>Hypertension and cerebrovascular diseases</td>
<td>90.68</td>
<td>-9.32</td>
<td>86.66</td>
<td>-13.34</td>
<td>89.23</td>
<td>-10.77</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>89.62</td>
<td>-10.38</td>
<td>84.34</td>
<td>-15.66</td>
<td>87.30</td>
<td>-12.70</td>
</tr>
<tr>
<td>Peptic ulcer</td>
<td>64.16</td>
<td>-35.84</td>
<td>85.00</td>
<td>-15.00</td>
<td>68.08</td>
<td>-31.92</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>75.00</td>
<td>-25.00</td>
<td>33.33</td>
<td>-66.67</td>
<td>57.14</td>
<td>-42.86</td>
</tr>
<tr>
<td>Abdominal Hernia + intestinal obstruction</td>
<td>75.29</td>
<td>-24.71</td>
<td>95.45</td>
<td>-4.55</td>
<td>84.11</td>
<td>-15.89</td>
</tr>
<tr>
<td>Maternal mortality</td>
<td>69.70</td>
<td>-30.30</td>
<td>69.70</td>
<td>-30.30</td>
<td>69.70</td>
<td>-30.30</td>
</tr>
</tbody>
</table>

\[\text{AMT, v. II, no. 2, 2014, p. 159}\]
In conclusions, in 2012, in males, we are witnessing a growing number of avoidable deaths by two cases (+ breast cancer + trachea, bronchus and lung cancer - see figure no. 2) and in women for two causes (RHD + trachea, bronchus and lung cancer - see figure no. 4).

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**REFERENCES**