

# EXPLORING THE DIFFERENCE IN CARDIOVASCULAR MORTALITY BETWEEN SYRIA AND ROMANIA

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**Keywords:**  
cardiovascular  
mortality, standardised  
mortality ratio,  
cardiovascular deaths

**Abstract:** Introduction: The cardiovascular (CVD) mortality in Syria is difficult to analyze, because the country routine reporting system is not very informative and the coverage of causes of deaths registration was estimated by the World Health Organization (WHO) to 80%. The aim of this paper was to analyze the model of the cardiovascular mortality in Syria, by exploring the potential excess of deaths compared to Romania. Methods: We standardised the cardiovascular mortality for the year 2010, using the indirect method and having as reference model the specific CVD mortality by five years age-groups in Romania. We calculated the standardised mortality ratio (SMR) and its confidence interval. Results, discussion: Using the CVD model of mortality from Romania, applied by real age-groups structure and gender in Syria, we would expect to have 16915 deaths in females and 22693 deaths in males, meaning an overall of 39608 CVD deaths. The observed number of deaths in Syria is not accurately known and the reported CVD proportionate mortality is 44.7%, meaning an absolute number of CVD deaths between 35039 (according to the crude mortality) or 28324 (according to the reported number of deaths). The standardised mortality ratio (SMR) is 88.5% (CI: 87.54; 89.39) in the first alternative or 71.5% (CI: 70.7 ; 72.3). The main weak point in our estimation was the total number of CVD deaths in Syria, which is not known, but the available estimations are closer to the first alternative. Conclusion: Our study revealed the CVD mortality in Syria is only 11.5% lower than in Romania and beside the political crisis and war from the country, adequate ecological preventive strategies need to be developed in order to control this public health problem on long term.

**Cuvinte cheie:**  
mortalitate prin boli  
cardiovasculare, raport  
standardizat de  
mortalitate, decese prin  
boli cardiovasculare

**Rezumat:** Introducere: Mortalitatea prin boli cardiovasculare (BCV) în Siria este dificil de analizat deoarece sistemul informațional de rutină al țării nu este prea informativ, iar înregistrarea deceselor pe cauze a fost estimată de Organizația Mondială a Sănătății (OMS) la 80%. Scopul acestui studiu a fost să analizeze modelul de mortalitate prin BCV în Siria, prin explorarea potențialului exces de decese comparativ cu România. Metodologie: Am standardizat mortalitatea prin BCV pentru anul 2010, folosind metoda indirectă (a mortalității standard) și având ca referință modelul de mortalitate prin BCV din România, pe genuri și pe grupe de vârstă cincinale. Am calculat Raportul Standardizat de Mortalitate (RSM), cu intervalul de încredere (IC). Rezultate, discuții: Utilizând modelul de mortalitate BCV din România, aplicat pe structura reală pe grupe de vârstă cincinale și pe genuri din Siria, erau așteptate în Siria, pentru anul 2010, 39608 decese prin BCV, dintre care 16915 la femei și 22693 la bărbați. Numărul observat de decese BCV în Siria nu este cunoscut cu precizie, iar mortalitatea proporțională prin BCV raportată este de 44.7%, însemnând un număr absolut de decese prin BCV de 35039 (în funcție de rata brută de mortalitate), sau de 28324 (în funcție de numărul total de decese). RSM a fost, în aceste condiții, de 88.5% (IC: 87.54 ; 89.39) în prima alternativă, sau de 71.5% (IC: 70.7 ; 72.3), în cea de a doua. Principalul punct slab al studiului nostru este numărul absolut de decese BCV în Siria, care nu este cunoscut, dar estimările existente în literatură sunt mai aproape de prima alternativă. Concluzie: Studiul nostru a relevat că mortalitatea prin BCV în Siria este cu doar 11.5% mai redusă decât în România și că, dincolo de criza politică și de conflictul din țară, sunt necesare strategii preventive adecvate, de tip ecologic, pentru a controla problematica BCV pe termen lung.

## INTRODUCTION

Situated in the Middle East, the Syrian Arab Republic is a lower middle income country upon the Income Classification of the World Bank, having a total population of 20619 thousands inhabitants in 2010 and a life expectancy at birth of 75.7 years (74.2 and 77.3 years in males and females respectively).(1,2) Romania is an upper middle income country, having a population of 21431 thousands inhabitants in 2010,

with a life expectancy at birth of 73 years (71 and 77 years in males and females respectively).(3,1)

Despite the potential similarity in number of population, there is a very important difference between the two states related to population growth: Syria faced a 62.6% increasing in population in the last two decades (since 1990), meanwhile Romania lost 7.7% of the population during 1990 – 2010.(1,3) Also the age-groups structure is very different: from

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Article received on 27.02.2013 and accepted for publication on 23.04.2013

ACTA MEDICA TRANSILVANICA June 2013;2(2):167-169

the total Syrian population, 37.2% is represented by children (0 – 14 years old), 58.7% by adults (15 – 64 years old) and 4.1% by elderly (65 years and over), Romania having 15.1%, 70% and 14.9% children, adults and elderly respectively.(2,3)

Syria passes through a well advanced epidemiological transition, marked by an overall decline in mortality, declining rates of communicable diseases and increasing in proportion of burden attributable to non-communicable diseases.(4) The cardiovascular diseases are the main cause of deaths in Syria, accounting 44.7% of the total deaths in 2010.(2) Romania faced these changes few decades ago. The mortality due to cardiovascular diseases is the main cause of death in Romania since many decades and over 156 thousand of deaths due to cardiovascular diseases were reported in 2010, meaning 60.2% of the total number of deaths.(5)

**PURPOSE**

The aim of this paper was to analyze the model of the cardiovascular mortality in Syria, by exploring the potential excess of deaths compared to Romania.

**METHODS**

Due to the very low levels for mortality and absolute number of deaths in Syria compared to Romania, we expect for the model of mortality by cardiovascular diseases to be more favourable in Syria, compared to Romania.

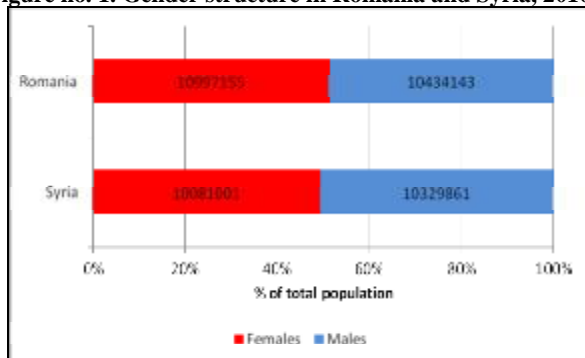
We standardised the cardiovascular mortality, using the indirect method and having as reference model the specific CVD mortality by five years age-groups in Romania (5) The Standardised Mortality Ratio (SMR) was calculated with its confidence interval.

We have chosen for our analysis the year 2010, as last year before the conflict that affected the country in the last two years. For Syria we used the five years age-group structure by gender of UN.(6) We adjusted this structure to the specific real mortality due to cardiovascular diseases in Romania in both genders, obtaining the expected cardiovascular deaths in Syria in the eventual similarity to the Romanian model.

**RESULTS**

The gender structure is little in favour of women in Romania (51.3%, versus 49.4% in Syria respectively) (figure no. 1).

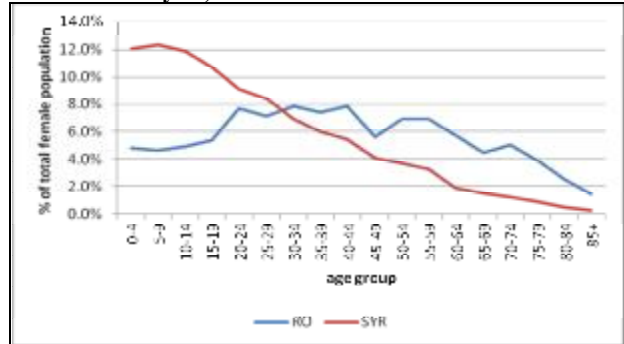
**Figure no. 1. Gender structure in Romania and Syria, 2010**



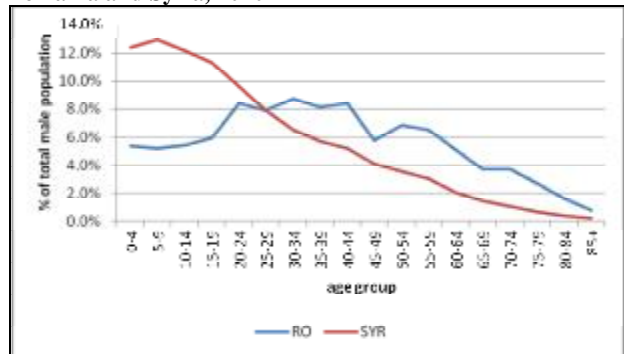
The five years structure by gender in both countries for the year 2010 is presented in figures 2A,B.

There is an obvious predominance of young age-groups in both genders in Syria and a predominance of middle-aged adults (starting to the age of 30) and elderly in Romania.

**Figure no. 2A. Females structure by five years age-groups in Romania and Syria, 2010**



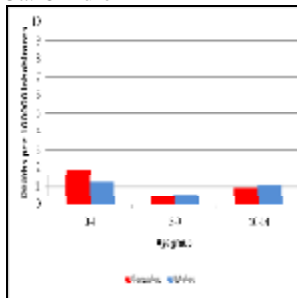
**Figure no. 2B. Males structure by five years age-groups in Romania and Syria, 2010**



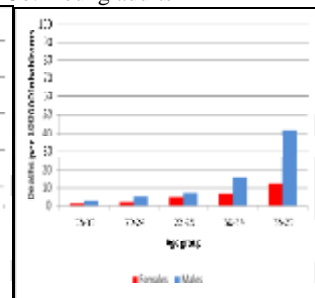
The specific CVD mortality by age-group and gender in Romania is shown in figures no. 3a-d. We can notice the excess CVD mortality in middle aged males.

**Figure no. 3. CVD mortality by gender and five years age-groups in Romania 2010\***

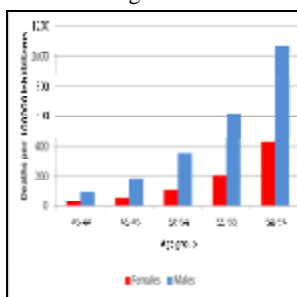
**3a. Children**



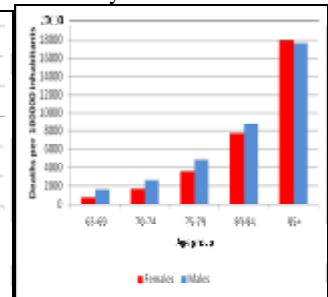
**3b. Young adults**



**3c. Middle-aged adults**



**3d. Elderly**



\* OY axis has different maximum units.

Using the CVD model of mortality from Romania, applied by real age-groups structure and gender in Syria, we

would expect to have 16915 deaths in females and 22693 deaths in males, meaning an overall 39608 CVD deaths.

The observed number of deaths in Syria is not accurately known. According to the official statistic reported by the Syrian Ministry of Health, the crude mortality rate reached in 2010 3.8 deaths per 1000 inhabitants.(2) This means around 78352 deaths, but the absolute number of deaths officially reported is 63336, meaning a difference of around 15000 deaths among the two indicators from the official data source of the country.(2)

According to WHO, the civil registration coverage was estimated to 95% for birth and to 80% for deaths.(7) The quality of cause of death information sent to WHO was classified as “low” in another study.(8)

Per contrary, the registration of births and causes of deaths are 100% in Romania and the quality of completeness of death certificates was assessed as “high” in the same study.(7,8)

The reported CVD proportionate mortality is 44.7%, meaning an absolute number of CVD deaths between 35039 (according to the crude mortality) or 28324 (according to the reported number of deaths). The standardised mortality ratio (SMR) in presented in table no. 1.

**Table no. 1. Standardised Mortality Ratio in Syria versus Romania, 2010**

	<b>Alternative 1</b>	<b>Alternative 2</b>
No. of deaths	35039	28324
RSM	88.5%	71.5
CI for RSM	(87.54 ; 89.39)	70.7 ; 72.3

**DISCUSSIONS**

The CVD mortality in Syria seems to be lower than in Romania in both situations: by 11.5% lower in the first alternative and by 28.5% lower respectively in the second alternative.

The main weak point in our estimation is the total number of CVD deaths in Syria, which is not known. The country official statistics report a proportionate CVD mortality of 44.7%, but the number of overall deaths is also unclear. According to WHO estimates for mortality, the CVD deaths in Syria reached 34500 in 2008, this estimation being more closed to our first alternative. (9) A cross-sectional survey in Aleppo reported a specific CVD mortality over the age of 20 years of 314 deaths/100000 inhabitants in 2005, thus meaning 33700 deaths for all Syrian population aged 20 years+, which is, again, closer to our first alternative (only few hundred deaths due to CVD occur in population bellow the age of 20).(10)

Another limitation of our study is the number of population by age-groups. We used the UN estimation, Revision 2010 (6), with a total number of 20411 thousand inhabitants, but the number reported by the country is 20619 inhabitants. The difference is around 1%, which does not affect seriously our calculations.

A question to raise is how much the political situation from the country affects the population structure and mortality, considering that in two years of conflict (since March 2011) around 80000 died.(11)

Based on the above mentioned pieces of information, we can assume that the CVD mortality in Syria it's by 11.5% lower compared to Romania. This is still good news, but just for short term, because keeping this model, the younger generations will bring in few years or decades a lot of CVD pathology and deaths. This is a very important reason to try to understand the prevalence of the CVD mortality determinants and to start to develop adequate preventive strategies. The importance of our results is probably minimized by the political war from the

country. Beside this worrying humanitarian situation that is desirable to be solved immediately, the CVD remain an important threat for the health status of Syrian people, needing understanding of causes and developing of ecological preventive strategies.

**CONCLUSIONS**

Our study revealed the CVD mortality in Syria is only 11.5% lower than in Romania and beside the political crisis and war from the country, adequate ecological preventive strategies need to be developed in order to control this public health problem on long term.

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