

# Bulletin

of the Institute of Public Health



INSTITUTE OF PUBLIC HEALTH



No. 3 - 2016

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## Effects of breast cancer control in the Albanian health system

Alban Ylli<sup>1</sup>, Ferdinand Jorgoni<sup>2</sup>, Elizana Petrela<sup>2</sup>, Kozeta Filipi<sup>1</sup>, Eduard Kakarriqi<sup>1</sup>

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### Abstract

Deaths from cancers represent a significant medical and public health problem. Some cancers are easily curable, while others are almost totally incurable when diagnosed. Despite that breast cancer is classified in the group of diagnosable and potentially curable cancers when timely detected, it remains the most common cancer among women in Albania. Health and mortality data indicate a steady increase of this cancer in Albania during recent years. Through this study we aim to investigate and analyze trends and the observed effects of breast cancer on the health system in Albania, with the main aim to boost efforts to increase the capacity of diagnostic screening services and the awareness of the population about timely prevention and screening. The data suggest a slight increase in the total number of new cases encountered every year in our country. Meanwhile in recent years there has been an increase in the proportion of average size (2-5 cm) breast cancers detected and is reduced to a minimum (only 3%) the proportion of breast cancer that has been seriously ignored/overlooked and identified at sizes just over 5 cm, thus reflecting the effects of awareness and screening campaigns. Also, awareness campaigns are reflected in the increasing number of women seeking information about the disease. Based on these data, in our country mammography is beneficial for women suspected to be affected by breast cancer, but it is necessary to increase the capacities for breast screening at national level.

## Introduction

Breast cancer is the most common cancer among women in most countries of the world. Age standardized incidence (45 / 100 000 population) for breast cancer in our country is lower than in the Mediterranean countries of the European Union (EU), but much higher than countries of the Eastern Mediterranean (such as Turkey, Egypt or Tunisia). There are several methods by which it can be detected earlier if there are infrastructure and professional opportunities. Mammography screening, whether or not supported by clinical breast examination, and follow-up of individuals with positive or suspicious results, would reduce mortality from this cancer in women aged 50-69 years by almost a third. Mortality-incidence ratio, which reflects the capacity to early detect and treat cancer, is estimated to be 0.35 for breast cancer and 0.4 for cervical cancer. These indicators, although in many cases higher than the Eastern Mediterranean countries are lower than in the Mediterranean countries of the EU (0.19 and 0.25, respectively). The maximum benefit is achieved by performing screening every 2-3 years. The effectiveness of screening for women aged 40-49 is not very clear.

Physical breast examination by doctors has proven to provide health benefits to women in their 50's. Some studies in the '90s support the idea that women of all ages have health benefits from systematic application of breast self-examination. However, a recent study in China showed no significant reduction in mortality from breast cancer due to breast self-examination. Based on these facts we can say that a program that would be based only on encouraging breast self-examination would not bring about any reduction in mortality from this cancer. However, women should be strongly advised to seek medical help immediately if they notice any suspicious change to their breasts.

Mammography is a relatively expensive test that requires particular care and expertise, both during execution of the procedure and when interpreting the results. For this reason it is not a viable screening option for many countries. Although scientific data on the effectiveness of clinical breast examination as the only method of screening is not complete, there is reason to believe that clinical examination of the breast when optimally performed by trained doctors or nurses could play an important role in reducing its mortality. A study suggested, for example, that the addition of mammography to women, who were clinically examined by doctors in a systematic way, did not bring additional mortality reduction.

## Methodology

This paper is based on secondary analysis of data on breast cancer situation in the country and the level of provision of preventive, screening and examination services. Data on health indicators (prevalence, incidence, burden of cancer, total number of admissions, total number of surgical interventions), refer to the Oncology service statistics at the University Hospital Center (UHC) in Tirana.

Regarding delivery of clinical examination service, the data has been obtained from the Ministry of Health and the Health Insurance Fund. The obtained data reflect the trends of indicators of breast cancer during the period 2009-2014.

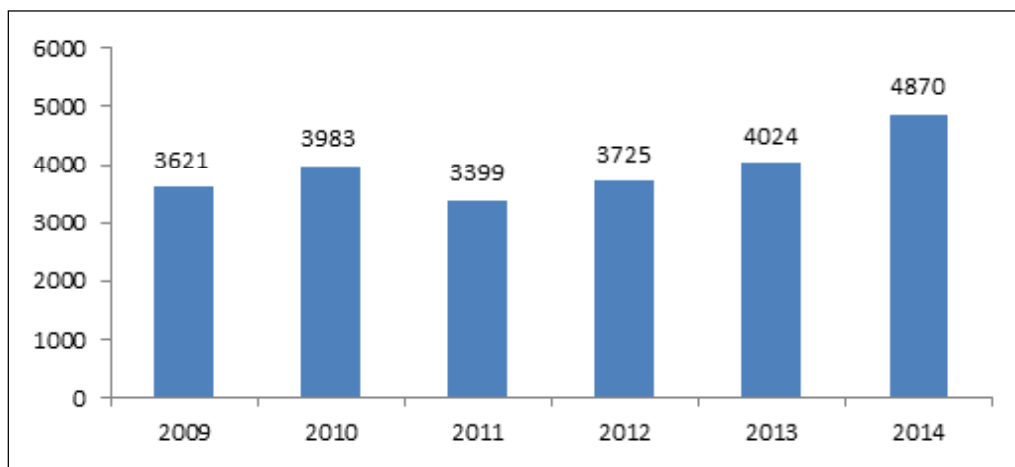
## Results

The combination of epidemiologic factors, population growth and improved services capacity seems to have an effect in the growth of health services provided and a relatively positive effect in the "down-staging" of breast cancer through reducing the number of cancers diagnosed too late.

The increasing burden of cancer in the health system as well as the increased capacity has been demonstrated in an analysis of the volume of services in the service of Oncology at the University Hospital Center in Tirana (UHC). For example, in 2014 there were recorded 26.6% more inpatients, 42.8% more consultations, outpatients, 7.3% more patients treated with radiotherapy, 22.1% more biopsy and cytology examinations, 7% more radiological examinations and endoscopic, 55% more immune-histochemical examinations for inpatients compared with 2013 data.

Figure 1 shows the volume of all services provided including visits for diagnosis purposes, surgery, chemotherapy and radiotherapy in UHC. A patient maybe hospitalized several times a year for getting these services. This indicator is influenced not only by the profile of the disease in the population but also by the opportunity to provide services. The volume of hospital admissions seems to have been increasing and in 2014 there was a hop with about 20% more hospitalizations than the average of the previous five years.

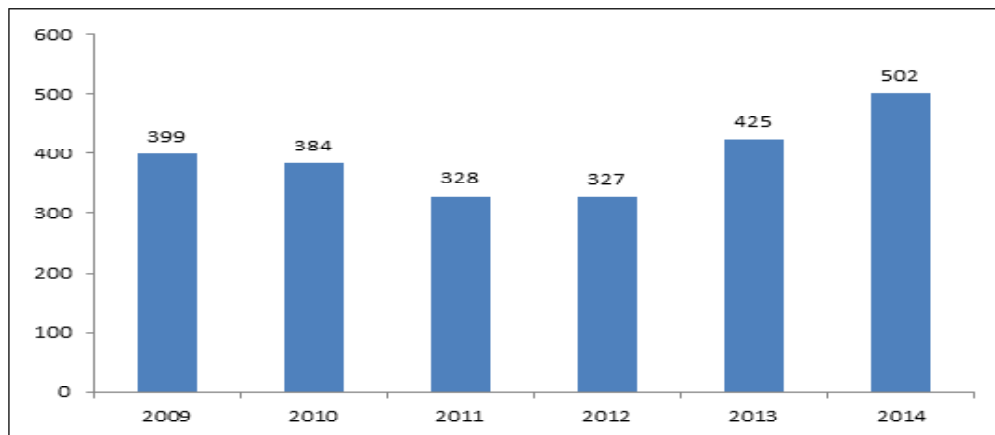
**Figure 1. Total number of breast cancer hospitalizations in UHC during given years**



The total number of surgical interventions is another specific indicator of the frequency of breast cancer disease and volume of services

provided. This indicator also shows an increase, reaching for the first time in 2014 the value of over 500 operations (Figure 2).

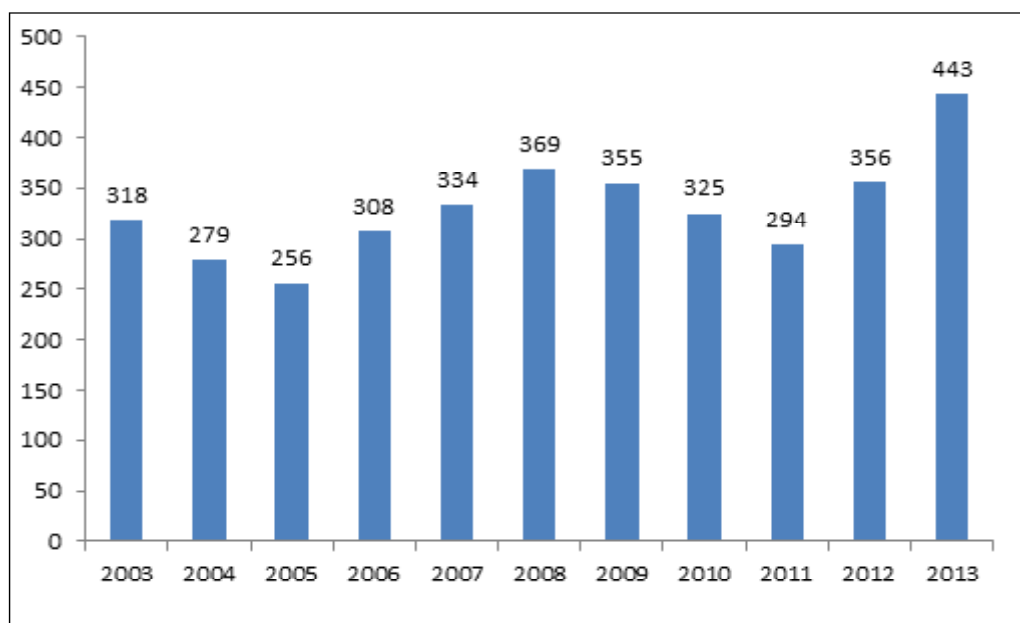
**Figure 2. Total number of surgeries for breast cancer at the UHC over the years**



Every year in UHC are registered about 350 new cases of breast cancer with a slight growth trend with a peak of 443 cases in 2013 (Figure 3). While the efforts to verify individual cases for the year 2014 continue, this year there were

also new cases reported by private hospitals and regional hospitals. After the reporting of new individual cases by UHC, the indicator in 2015 could represent a figure much closer to reality.

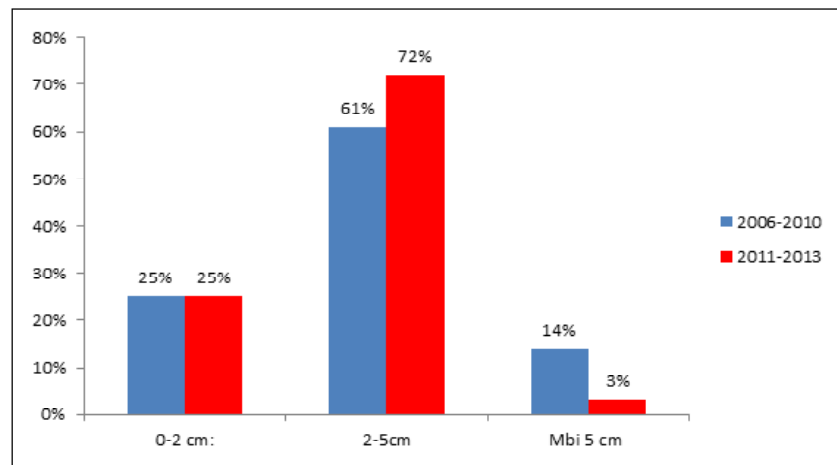
**Figure 3. New cases of breast cancer diagnosed in UHC during given years**



The diameter of breast cancer at the moment of diagnosis is an important indicator associated with early detection of this cancer. The 2011-2013 data analysis show that there is not yet an improvement in timely detection rates of breast cancer (the proportion of detection of cancers up to 2 cm in diameter has remained the same). However it

seems that the awareness campaigns and capacity building efforts in primary care have started to give a small effect by reducing to a minimum (only 3%) the proportion of breast cancer seriously overlooked and identified when it is just over 5 cm in diameter (Figure 4).

**Figure 4. The diameter of breast cancer at the time of diagnosis. Annual averages for the period 2006-2010 compared to the period 2011-2013**



### **Efforts to increase the capacity of services and awareness of population**

Although Albania has not yet organized screening programs for breast cancer, the efforts made during the past 5 years have brought some improvements regarding capacity at different levels of the health system.

Cancer diagnosis and treatment are offered in principle for free, but most services are concentrated at the University Hospital Center in Tirana.

Meanwhile over the past 5 years efforts have been made to strengthen the capacity of multidisciplinary management of breast cancer cases, where the needs still remain very high. About 20 radiologists, mammography technicians, pathologist, surgeons, psychologists and nurses has been trained abroad.

In the primary care services since 2012 the clinical breast procedure examination has started to be broadly applied as a technique of breast cancer early detection. The capacities in health centers have been increased following the training of about 800 doctors and nurses. Several thousands of clinical breast examinations are reported annually throughout the country, although from the verification of data, it results

that these figures could have been exaggerated by doctors.

In 2014 the Ministry of Health and the Health Insurance Fund reviewed and approved the package of primary health care services including also the activities associated with early detection of breast cancer and cervical cancer. It has been prepared and approved by the Ministry of Health the guideline on clinical breast examination in primary health care centers.

Two mobile mammography units have started to offer their services for free during 2015 for areas where no stationary mammography is available thus improving the access (with about 5850 examinations carried out) of women of small towns and villages to the service of early detection of breast cancer. This service has increased the total volume of mammography in the country by 30-40%, while the number of stationary mammography examinations in the country continues to remain low at around 2-4 examinations per day for mammography unit. Knowledge of reproductive age women about early detection of breast cancer and cervical cancer has been increasing; since year 2012, the information and awareness campaigns are becoming increasingly systematic with

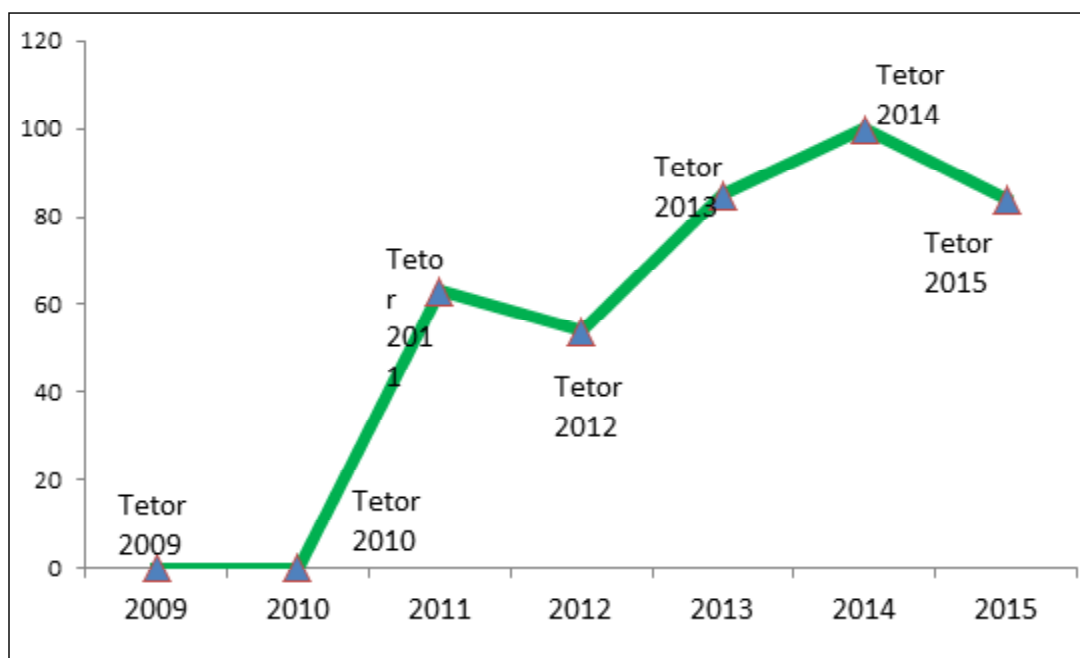


increased involvement of media. Public information and advocacy activities by involving all stakeholders important to the process are being intensified.

A glance on the popularity of the term “breast

cancer” in Google trends shows that after a peak in 2012 it remains massively used in Albania in 2013-2015. This is evidence of a greater awareness of the population about this problem (Figure 5).

**Figure 5. The trend in the volume of clicks of the term “breast cancer” during the 2009-2015 period**



However there are still important bureaucratic and geographical barriers regarding the access too early detection services; for example there is no legal regulation for the free delivery of all tests or examinations of early detection, whereas a considerable number of uninsured women cannot access the free services even when they exist.

### Measures taken

Awareness raising, early detection and over-diagnosis.

Analysis and interpretation of mammography images obtained from mobile mammography examinations' campaigns recommend additional examinations (especially breast ultrasound) in a much higher percentage compared to the best

global practices. On average only about 10% of healthy women who undergo mammography in organized screening programs is expected to be referred to additional examinations. In the practice of radiology in our country this proportion (especially the practice for additional breast ultrasound examination) varies from 30% to 60% in some cases.

About 0.5% -1% of healthy women screened is expected to be diagnosed with cancer and there is need to minimize costs to make diagnostic services more accessible for women who undergo mammography and those who will need additional examinations.

There is need for training of experts and improvement of methods used in order to avoid the “over-diagnoses” phenomenon, i.e. the

number of women who are incorrectly diagnosed with cancer (several studies estimate that about 20% of women diagnosed with cancer in mammography-based programs are “over-diagnosed”; i.e. they did not suffer or die from breast cancer).

### Conclusions

The combination of epidemiologic factors, population growth and improved services capacity seems to have an effect in the growth of health services provided and a relatively positive effect in the “down-staging” of breast cancer through reducing the number of cancers diagnosed too late.

In the context when there are still important bureaucratic and geographical barriers regarding the access too early detection

services, it is necessary to improve the capacities and promote quality standards in different levels of the health system.

Specifically, regarding mammography, we should prioritize work depending on the improvement of tools and professional skills. Firstly, this technique should be used as a preliminary diagnostic tool for women who are considered suspicious or positive on clinical examination in health centers or during home self-examination. We must not forget that cancer may be present even in the context of normal or negative mammography results. Mammography as a massive population primary screening tool should be used only when resources are able to provide good quality screening in at least 70% of the target population (women 50-69 years).

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## Infant and child mortality rate by structure, gender and districts of Albania in 2014

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### Abstract

Infant and child mortality are considered as two important indicators that reflect the health status of a population. They are a constant concern for the public health and for this reason they have attracted special attention from all health policymakers with the aim to improve the capacities and quality of health care services for mother and child. This study was conducted to better explore these two indicators in Albania and it provides information about infant and child mortality rates by gender and regions of the country in 2014. Data were obtained from the Ministry of Health, because all districts report to the Ministry of Health regarding these indicators. Indicators of infant mortality, child mortality, and perinatal mortality present considerable fluctuations among districts/regions in 2014, which need careful investigation in order to detect the causes of such differences. Data collection and analysis will serve as an important source for assessing the situation, analyse the main causes of infant and child mortality and for the identification of gaps and future planning of needs.

## Introduction

Infant mortality rate is widely used as an indicator of population health status and quality of health care. It is considered as a constant concern for public health. Infant mortality refers to deaths of young children, typically those less than one year of age. It is measured by the infant mortality rate (IMR), which is the number of deaths of children under one year of age per 1 000 live births.

The Federal Bureau for Children, founded in 1912, launched its first initiative focusing on infant mortality and officially recognized its importance (State Infant Mortality Toolkit, 2007). The infant mortality rate is seen not only as an indicator of risk for infant death, but it is widely used as a crude indicator for:

- Health status of the community;
- Poverty and levels of socio - economic development in a community;
- The availability and quality of health services and medical technology.

Health and well-being of children and families across the globe are measured by infant mortality rates. The fact that this indicator has been widely accepted and it is relatively easy to calculate have resulted in the wide use of it for comparisons across regions, populations and different time periods. Such comparisons of infant mortality rates are often used to assess the needs of the population and the impact of public health programs (World Health Statistics 2013).

Another important indicator is child mortality. Child mortality is a crucial indicator for child health and welfare. In 2000, world leaders included this indicator among the Millennium Development Goals (MDGs) and called for the reduction of child mortality rate by two-thirds

during 1990 - 2015. The child mortality rate is defined as the number of deaths of children <5 years of age during a period of time (usually 1 year) per 1 000 live births (Child Mortality Report, 2015). Child mortality estimates based on evidence are a fundamental step for:

- tracking the progress of child survival goals;
- national planning and global health strategies;
- policies and interventions regarding children's health and welfare.

Another indicator used for the evaluation of children's health is perinatal mortality. Perinatal mortality is defined as the number of early neonatal deaths (0-6 days) plus the number of fetal deaths per 1 000 live births.

Due to the importance of these indicators, the aim of this study was to assess the rate of these indicators in our country in 2014 in order to shed light upon the current situation and thus guiding evidence based decision making.

## Methodology

For the calculation of infant, child and perinatal mortality indicators, the official data of the Ministry of Health reported in 2014 was used. Data related to the number of deaths and the number of relevant reference population (denominator) was used to calculate infant mortality rates, child mortality rates and perinatal mortality rates. These indicators are expressed as a percentage.

## Results

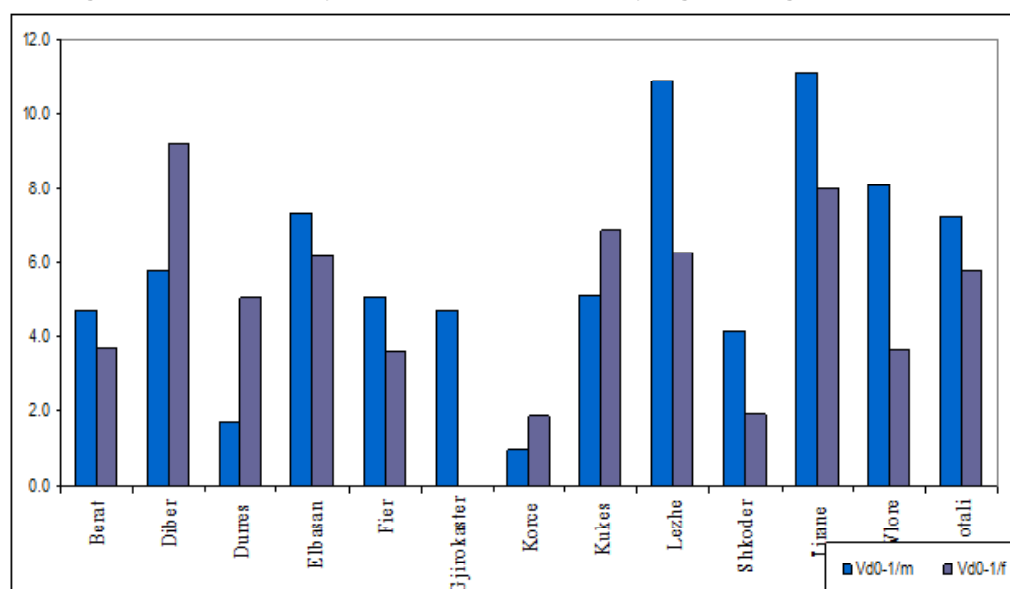
The infant mortality rate for 2014 was 6.5 / 1 000 live births (Table 1). Infant mortality data are reported from all districts of the country at the Ministry of Health.

**Table 1. Infant mortality per 1 000 live births by region and gender in 2014**

District	Total	Gender	
		Male	Female
Berat	4.2	4.7	3.7
Dibra	7.4	5.7	9.2
Durres	3.3	1.7	5.1
Elbasan	6.8	7.3	6.1
Fier	4.4	5.1	3.6
Gjirokaster	2.3	4.7	0.0
Korçë	1.4	1.0	1.9
Kukes	5.9	5.1	6.9
Lezha	8.9	10.9	6.3
Shkodra	3.0	4.2	1.9
Tirana	9.6	11.1	8.0
Vlora	5.9	8.1	3.7
<b>Total</b>	<b>6.5</b>	<b>7.2</b>	<b>5.7</b>

Overall infant mortality rate is higher among males than females, respectively 7.2 and 5.7 per 1 000 live births, but there are significant changes by districts. Infant mortality is higher among men in all regions except Dibra, Durres, Kukes and Korçë districts (Table 1).

Figure 1 presents infant mortality rate by region and sex in 2014, where there can be clearly noticed the districts with opposite the gender trends. It is necessary to investigate further the reasons of the gender differences and higher female mortality in Dibra, Durres, Korçë and Kukes regions.

**Figure 1. Infant mortality rate per 1 000 live births by region and gender for 2014**

From Table 1 and Figure 1 it can be noted that Dibra, Tirana, Elbasani and Lezha are the regions that have the highest levels of infant mortality, whereas males show the highest mortality. In the regions of Lezha, Tirana and Vlora, the infant mortality gender gap in favour of males is higher than in other districts. In the district of Gjirokastra, there are no deaths among females

0-1 years old during 2014. Dibra, Korca and Kukesi regions have higher infant mortality rate among females, while Korca region has the lowest infant mortality rate among both females and males. Data related to infant mortality rates by region are visually presented in Figure 2 below, in the form of a country map.

**Figure 2. Infant mortality rate by regions in 2014**

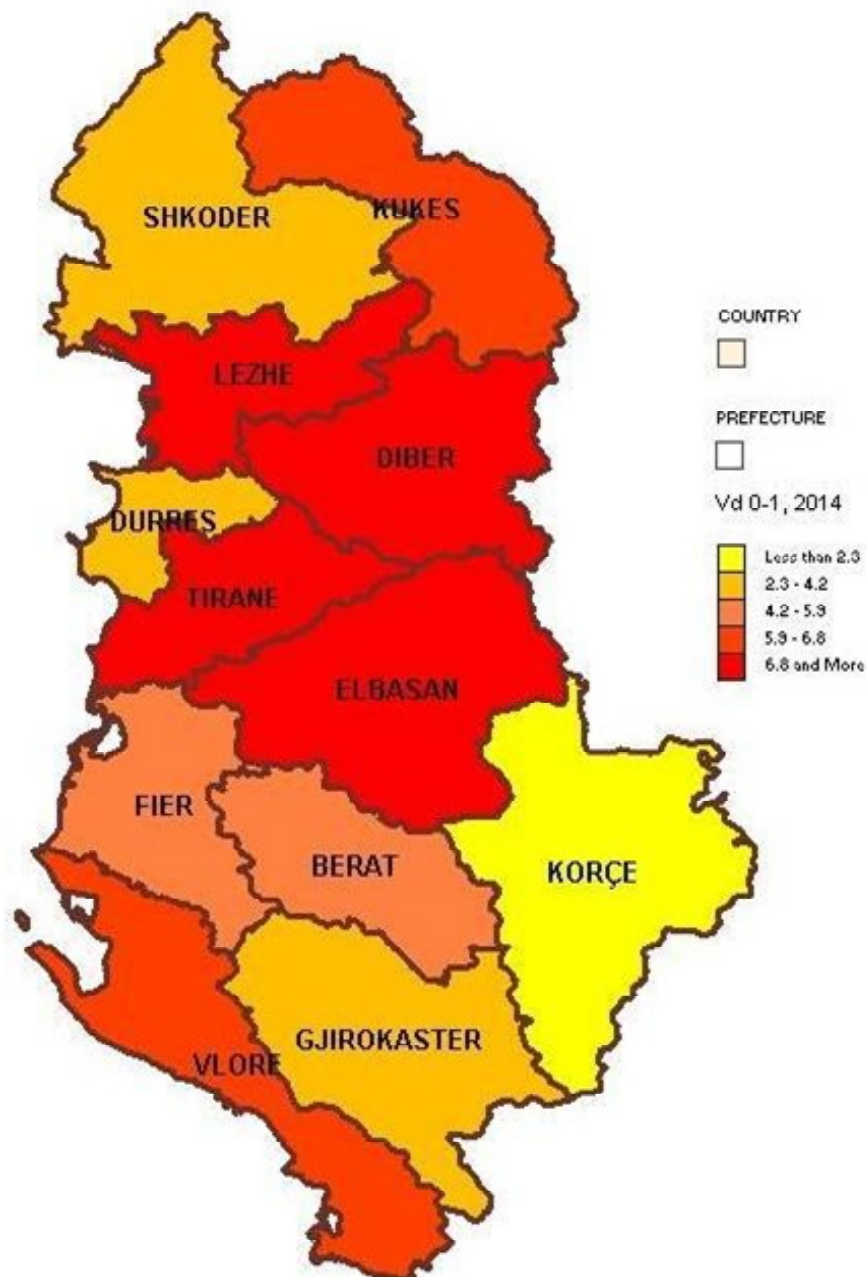


Table 2 below presents perinatal, fetal and neonatal mortality rates in 2014. Neonatal and perinatal mortality rates have declined alongside the reduction of infant mortality rate, but they still comprise a considerable proportion of infant mortality rate (0-1 years). From Table 2 it can

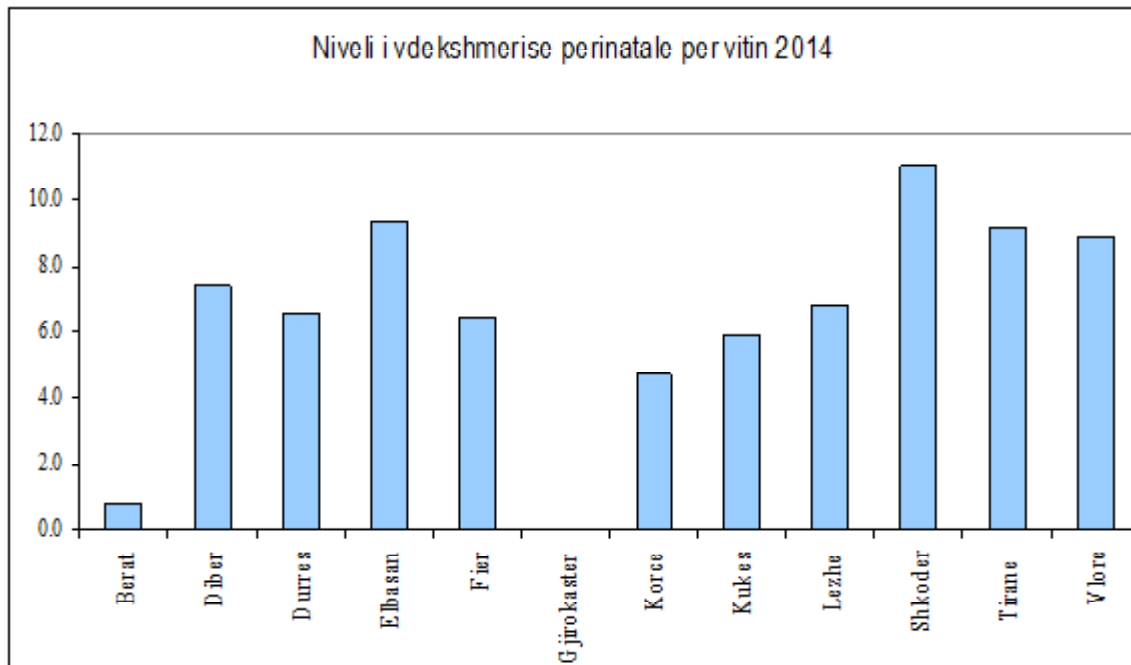
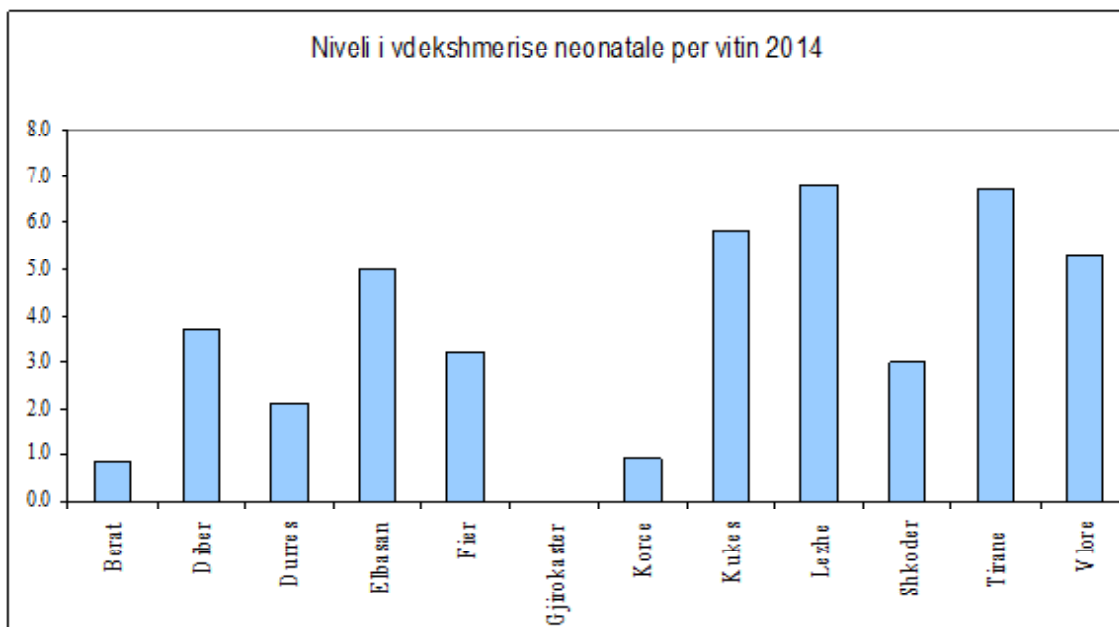
be noted that the district of Gjirokastra has no reported neonatal deaths. Shkodra region has the highest perinatal mortality rate (11 / 1 000 live births), and the lowest level of mortality rate was registered in district of Berat (0.8 / 1 000 live births).

**Table 2. Perinatal, fetal and neonatal mortality rate per 1 000 live births in 2014**

<b>District</b>	<b>Perinatal mortality rate</b>	<b>Fetal mortality rate</b>	<b>Neonatal mortality rate</b>
Berat	0.8	0.8	0.8
Dibra	7.4	3.7	3.7
Durres	6.6	4.5	2.1
Elbasan	9.4	3.8	5.0
Fier	6.4	3.5	3.2
Gjirokastra	0.0	0.0	0.0
Korça	4.8	3.3	1.0
Kukes	5.9	1.0	5.9
Lezha	6.8	2.0	6.8
Shkodra	11.0	8.0	3.0
Tirana	9.2	4.9	6.7
Vlora	8.9	3.6	5.3
<b>Total</b>	<b>7.8</b>	<b>4.1</b>	<b>4.6</b>

Also in these two districts was recorded the lowest (Berat) and highest rate (Shkodra) of fetal mortality has been registered. In 2014, in all regions the perinatal mortality rate was higher than neonatal mortality rate. District with the

highest level of neonatal mortality rate are Lezha (6.8 / 1 000 live births), Tirana (6.7 / 1 000 live births) and Kukes (5.9 / 1 000 live births) [Table 2 and Figure 3].

**Figure 3. Perinatal mortality rate per 1 000 live births by region in 2014****Figure 4. Neonatal mortality rate per 1000 live births by region in 2014**

In 2014, the infant mortality rate in all regions was higher than the mortality rate for 1-4 years old children (Table 3). The highest level of child mortality (0-5 years) was 10.4 per 1 000 live births in the district of Dibra and Tirana. High mortality rates are also noticed in the district of

Kukes (8.8 / 1 000 live births), Lezha (8.9 / 1 000 live births) and Vlora (8.3 / 1 000 live births). Lower mortality rates (0-5 years old) are noted in the district of Korca (1.9 / 1 000 live births) and Gjirokastra (2.3 / 1 000 live births).



**Table 3. Child mortality rate per 1000 live births by region in 2014**

<b>District</b>	<b>Mortality rate 0-5 years</b>	<b>Mortality rate 0-1 year</b>	<b>Mortality rate 1-4 years</b>
Berat	4.2	4.2	0.0
Dibra	10.4	7.4	3.0
Durres	4.5	3.3	1.2
Elbasan	7.1	6.8	0.3
Fier	5.3	4.4	0.9
Gjirokaster	2.3	2.3	0.0
Korça	1.9	1.4	0.0
Kukes	8.8	5.9	2.9
Lezha	8.9	8.9	0.0
Shkodra	3.5	3.0	0.5
Tirana	10.4	9.6	0.8
Vlora	8.3	5.9	2.4
<b>Totali</b>	<b>7.4</b>	<b>6.5</b>	<b>0.9</b>

In 2014 the infant mortality rate (0-1 year old) in our country (6.5 / 1 000 live births) was lower than infant mortality rate in Europe (10.2 / 1 000 live births) and in Eastern Mediterranean countries (41.6 / 1 000 live births). In the same year, the neonatal and child mortality rates (0-5 years) in our country were lower compared to Europe and the Eastern Mediterranean countries. Neonatal mortality rate in our country is reported at 4.6 deaths / 1 000 live births, while in Europe

and the Eastern Mediterraneans is reported at 6.2 deaths / 1 000 live births and 27.3 / 1 000 live births, respectively. Child mortality (0-5 year) in our country was 7.4 / 1 000 live births, while in Europe and the Eastern Mediterranean was 11.7 deaths / 1000 live births and 53.6 / 1 000 live births.

From Table 4 and Figure 5 it can be noticed that the regions with the highest rates are Dibra, Kukes, Tirana and Vlora

Figure 5. Infant mortality rate per 1000 live births in 2014

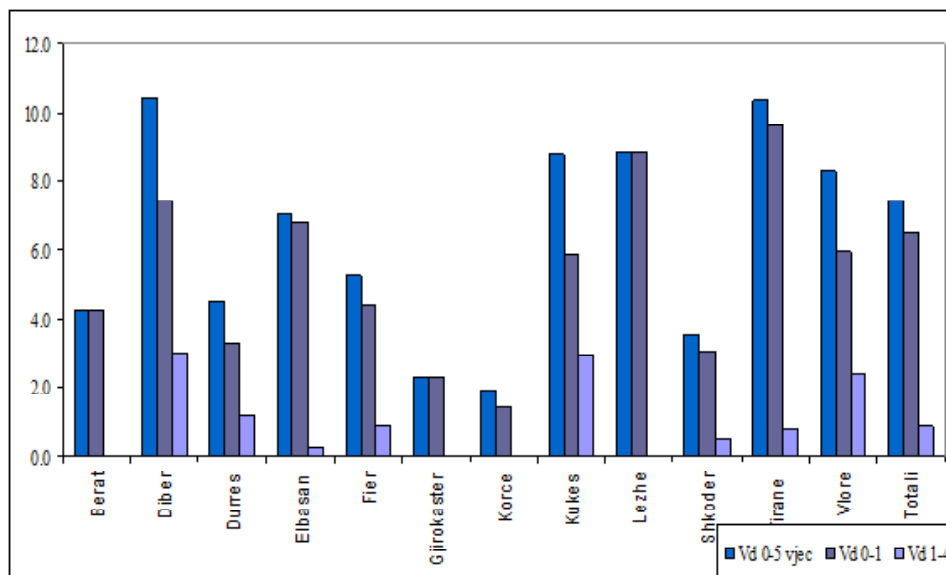
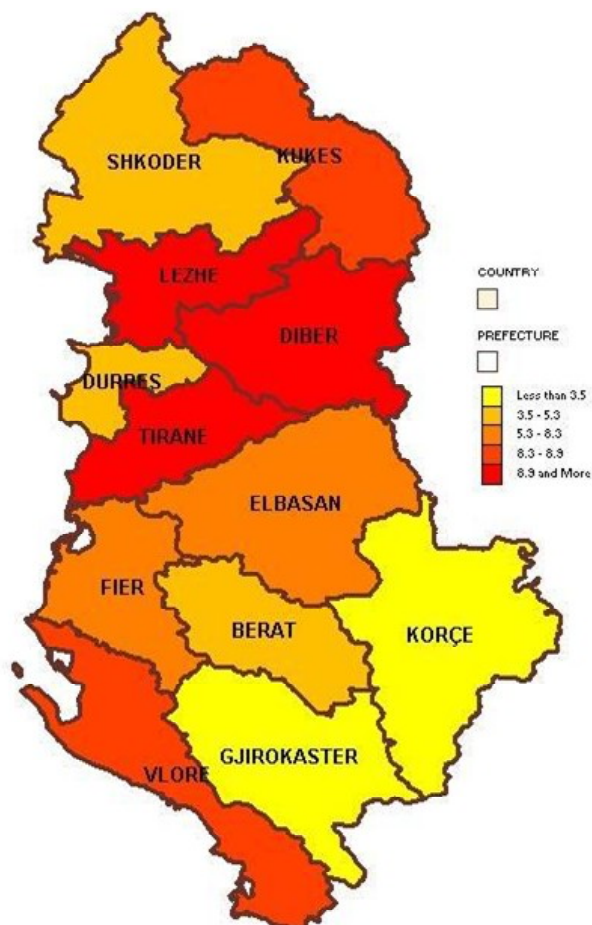


Figure 6. Child mortality rate (0-5 years) by regions in 2014



In 2014, in our country, congenital anomalies, neonatal diseases and respiratory diseases were the most common causes of infant mortality (0-1 year) [Table 4]. In the districts of Diber, Elbasan and Durres, respiratory diseases constituted the most frequent cause of infant

mortality. In the district of Tirana and Vlora, congenital anomalies represented the most frequent cause of infant mortality. While neonatal diseases compose the most frequent cause of infant mortality in Kukes region (Table 4).

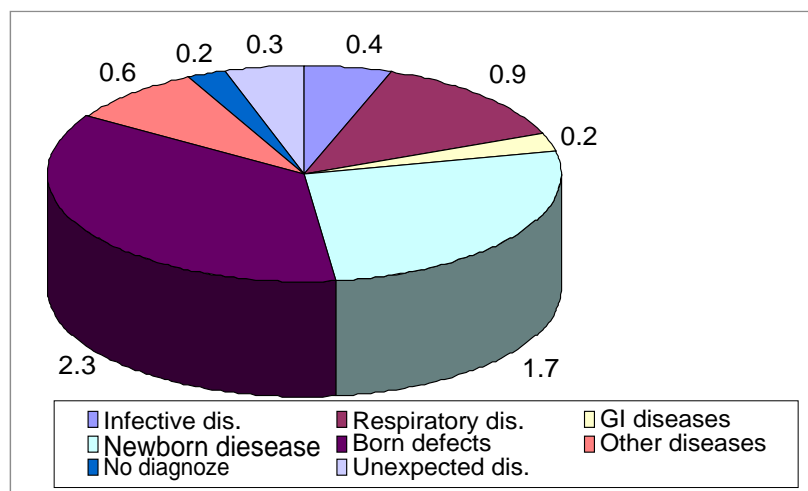
**Table 4. Mortality rates (0-1 year old children per 1 000 live births) by causes of death in 2014**

District	Infective diseases	Respiratory diseases	Digestive system diseases	Neonatal diseases	Congenital anomalies	Other diseases	Disease without a diagnose	Unexpected disease
Berat	0.0	0.0	0.0	0.0	0.8	2.5	0.8	0.0
Dibra	1.5	3.0	0.7	0.0	0.0	0.7	0.0	1.5
Durres	0.3	1.2	0.0	0.6	0.9	0.3	0.0	0.0
Elbasan	0.0	2.6	0.0	2.1	0.9	0.6	0.3	0.3
Fier	0.0	0.6	0.3	2.0	0.6	0.9	0.0	0.0
Gjirokaster	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
Korça	0.0	0.5	0.0	0.5	0.0	0.0	0.5	0.0
Kukes	0.0	0.0	0.0	4.9	0.0	1.0	0.0	0.0
Lezhe	0.0	0.0	0.7	0.0	1.4	4.1	0.0	2.7
Shkoder	0.0	0.0	0.0	1.5	1.0	0.0	0.0	0.5
Tirane	0.8	0.6	0.3	2.6	5.1	0.2	0.2	0.1
Vlore	0.0	1.2	0.0	0.6	2.4	0.0	0.0	0.6
<b>Total</b>	<b>0.4</b>	<b>0.9</b>	<b>0.2</b>	<b>1.7</b>	<b>2.3</b>	<b>0.6</b>	<b>0.2</b>	<b>0.3</b>

Figure 6 below visually shows the mortality rate among children aged 0-1 years old in 2014 in Albania. During this year, in Albania congenital

anomalies, neonatal diseases and respiratory diseases have been the most common causes of infant mortality (0-1 year).

**Figure 6. Mortality rate (0-1 years old children) by causes of death in 2014**



Neonatal mortality occupies a significant proportion of infant mortality (Table 5). The highest mortality rate is observed in the period 1-6 days after birth. The highest rates late neonatal mortality (1-6 days) are noticed in the districts of Kukes, Lezha and Tirana, which coincides with the high neonatal mortality rates in these regions as well (Table 5).

However, UNICEF estimates that this rate is under-reported, due to the under-registrations of the deaths 0-1 years old and the failure to correctly complete the death certificate. Ministry of Health, civil status offices and INSTAT should coordinate their efforts for an accurate reporting in order for every step of the reporting system to function optimally.

**Table 5. Neonatal mortality rate per 1 000 live births by age and districts in 2014**

<b>District</b>	<b>Neonatal mortality rate</b>	<b>Mortality rate 0-1 day</b>	<b>Mortality rate 1-6 days</b>	<b>Mortality rate 6-28 days</b>
Berat	0.8	0.8	0.0	0.0
Diber	3.7	3.0	0.7	0.0
Durres	2.1	0.6	1.5	0.0
Elbasan	5.0	2.4	2.6	0.0
Fier	3.2	2.3	0.6	0.3
Gjirokaster	0.0	0.0	0.0	0.0
Korça	1.0	1.0	0.0	0.0
Kukes	5.9	0.0	4.9	1.0
Lezha	6.8	0.7	4.1	2.0
Shkoder	3.0	2.0	1.0	0.0
Tirana	6.7	0.6	3.6	2.5
Vlora	5.3	4.7	0.6	0.0
<b>Total</b>	<b>4.6</b>	<b>1.4</b>	<b>2.1</b>	<b>1.1</b>

## Conclusions

This study gives an overview of epidemiological data for 2014 on:

- infant mortality by:
- district;
- gender;
- causes of death;
- infant mortality by the age structure in different regions;
- neonatal, perinatal and fetal mortality by regions of the country.

Also, this study provides a good opportunity to develop reports which reflect the trend of infant

and child mortality rates over the years. It can be noticed that infant mortality rate and child mortality rate have been reducing progressively over the years with the infant mortality rate going down from 23.3 deaths / 1 000 live births in 1994 to 6.5 deaths / 1 000 live births, and perinatal mortality rate from 14.6 deaths / 1 000 live births to 7.8 deaths / 1 000 live births. This shows a significant progress in the health system infrastructure, qualification of medical staff, early diagnosis of anomalies or keeping under control of causes of infant or child death.

It is important to carry out studies that will

provide a clearer picture for policy-makers, in order to undertake appropriate measures to further reduce these mortality rates and make them comparable with other region. Some suggested measures would be:

- establishment of qualitative services for mothers and children health in the community, especially in rural areas;
- improvement of existing structures;

- increasing of the number of professionals in primary health services (multidisciplinary teams);

- increasing the capacity of health professionals in the community with the aim of early screening of anomalies or health problems; specific interventions such as counselling, treatment and referring to other health system structures

### Summary Box

#### **What is known about this issue?**

Infant and child mortality rates are a serious concern for public health and health systems throughout the world, being a crude indicator of health status and socio-economic development of the population, availability and quality of health services.

#### **What this study adds?**

This report provides a clear picture of the real rates of infant and child mortality by regions of the country and by sex reported in the Ministry of Health in 2014.

#### **What are the implications for public health?**

Findings of this study can be used for the recognition of infant and child mortality as one of the main priorities of the health sector, because there is need for further improvement of these indicators. This can be accomplished through the establishment and strengthening of capacities for mother and child health in general, as well as through various specific interventions.

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## The incidence of zoonotic diseases (anthrax and brucellosis) in 2015 in Albania

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### Abstract

In our country, zoonotic diseases subject to veterinary control and prevention measures continue to be of increasing concern for the public health system. *Bacillus anthrax* and “Brucellosis” germs can infect all individuals, but are especially related to people who deal with livestock farming, veterinarians, butchers etc. The data are based on SMBs system 14-Sh reporting form according to person-place-time model. Brucellosis has the highest proportional morbidity among zoonotic illnesses. In 2015 there were 160 cases reported, resulting in an incidence of 6.0 cases / 10 000 inhabitants compared to leptospirosis with 33 cases (incidence 1.2 cases/10 000 inhabitants), anthrax with 31 cases (incidence 1.1 cases/10 000 inhabitants), *L. viscerale* with 15 cases (incidence 0.5 cases/100 000 inhabitants), and extra-pulmonary TBC (incidence 2.0 cases/10 000 inhabitants). Data processing and analysis was performed by SPSS statistical program, and Health Mapper software was used for compilation of respective maps. The data collected allow us to study the presence and the incidence of zoonosis throughout 2015 in various districts of our country. Due to the direct and indirect impact of these two zoonosis on the health of people and livestock, we carried out the present study hoping that it will serve as an important source for assessing the situation in the country, as well as to identify gaps and planning of short-term, mid-term and long term veterinary activities’ strategies.

## Introduction

Anthrax (anthrax) is one of the most serious zoonotic infections, which unfortunately is spread in some predominantly farming areas of our country. The cause of it is *Bacillus anthrax*, which is generally resistant to temperature and acids, and is present in food products infected by cattle and on their skin. Generally, it is an occupational disease and farmers, butchers, veterinarians, those who work in milk, meat, skin, horn processing factories, the medical staff working in laboratories etc., are the most exposed and vulnerable groups.

The main routes of infection are the following:

1. Respiratory (air intake of processed materials in areas infected with anthrax).
2. Gastrointestinal (from the consumption of food with unwashed hands after initial contact with livestock and their products contaminated with anthrax).
3. The surface of the skin (itching of the skin with unwashed hands).

Diagnosis of anthrax is difficult at early stages when there are no obvious clinical signs, but use of preventive medicine principles enables the detection of infection foci and the vaccination of employees related to livestock (NIAID, Anthrax 2001).

Brucellosis is a zoonotic disease, caused by microorganisms known as *Brucella*, which are of 3 types:

- Bovis
- Suis
- Melitensis

They are found mainly in the milk and meat of infected cattle as well as animal milk and meat products that have not undergone thermal processing. At the same time, ranchers or veterinarians could be infected during cattle pregnancy or abortion because placenta and embryo contain many *Brucella*.

Brucellosis can present with mainly acute clinical

picture but gradually, if not treated accordingly, it might develop to chronic state of infection featuring a variety of symptoms, affecting multiple systems and causing various forms of local infections (Masouridou et al. 2003).

Besides the occupational aspect, these two zoonotic diseases can affect consumers of infected products, especially when using non pasteurized or not boiled milk, in the case of brucellosis, and undercooked meat products in both cases (Fred Unger and Susanne Münstermann, Animal Health DFID Program). The Directory of Veterinary Service in cooperation with the sanitary control authorities are responsible for the general regulation of veterinary issues related to animal health and respective zoonotic diseases. Because in our country there are some areas considered as “endemic” it is important to conduct such studies that serve to create some epidemic maps, which enable the strengthening of health policy and welfare of live animals, as well as the development of programs of prevention, control, elimination and eradication of various infectious diseases in animals (Ministry of Agriculture, Veterinary Services).

## Methodology

The study analyzed the data reported in 2015 by all districts of Albania. The data are based on SMBs system 14-Sh reporting form, according to the information about person-place-time.

Based on the data reported by this information system, it was possible to estimate measures of frequency of zoonotic diseases in our country in 2015, and more specifically to assess the rate of new cases or the level of incidence of these diseases. The data are presented in tables and graphs. Maps are compiled using the Health Mapper software. Data processing and analysis was performed by the statistical program SPSS, version 20.

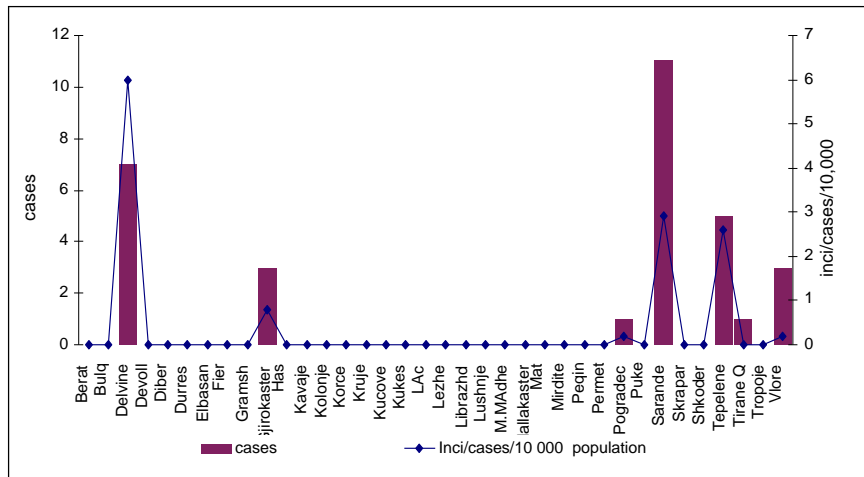
## Results

### Anthrax

In 2015 there were 31 reported cases of Anthrax

in total (incidence rate of 1.1 cases / 10 000 inhabitants) (Figure 1). Reported cases belong to cutaneous form.

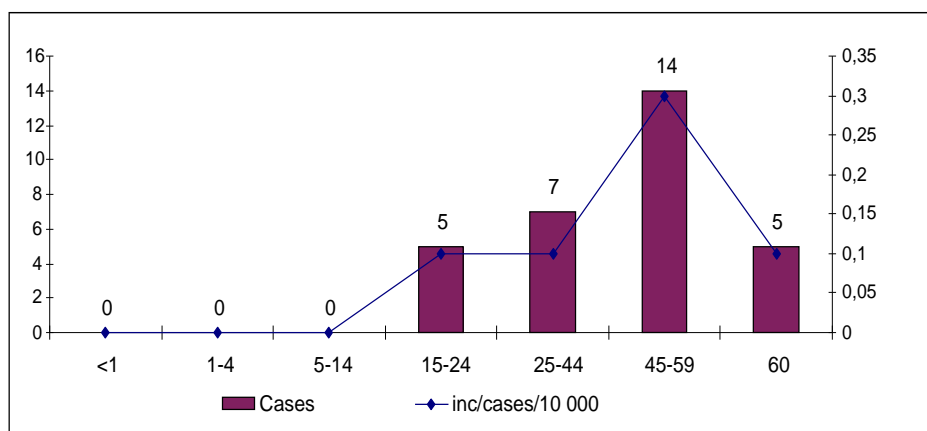
**Figure 1. The geographical distribution of Cutaneous Anthrax cases in 2015**



Traditionally the infection is present in the districts of southern Albania. Districts with the highest incidence of reported cases of anthrax in 2015 are: Delvina - 6.0 cases / 10 000 inhabitants, Saranda - 2.9 cases / 10 000 inhabitants and Tepelena - 2.6 cases / 10 000 population (Figure 1). As a result, rural areas are more affected than urban areas comprising about 80.6% of total reported cases. Confirmed cases represent about 54.8% of the total reported cases.

Distribution by age-group shows that active adults represent the population group most affected by this disease, mainly related to the occupational nature of the infection in humans. Among those affected, the age-group 45-59 years counts for the major proportion (with 14 cases out of 31 in total) or 41.2% of total reported cases (Figure 2). Men are more frequently affected than women representing 80.6% of cases.

**Figure 2. The distribution of Anthrax cases according to the age-groups in 2015**





**Brucellosis**

In 2015, there have been reported 160 cases of brucellosis (incidence rate of 5.7 cases / 10 000 inhabitants).

Figure 3 shows the distribution of cases of brucellosis in 2015 in Albania according to districts. The largest number of confirmed cases of brucellosis is noted in Kukës, Kolonjë, Lushnjë, Vlorë and Sarandë (Figure 3).

**Figure 3. Geographic distribution of brucellosis cases by districts in 2015**

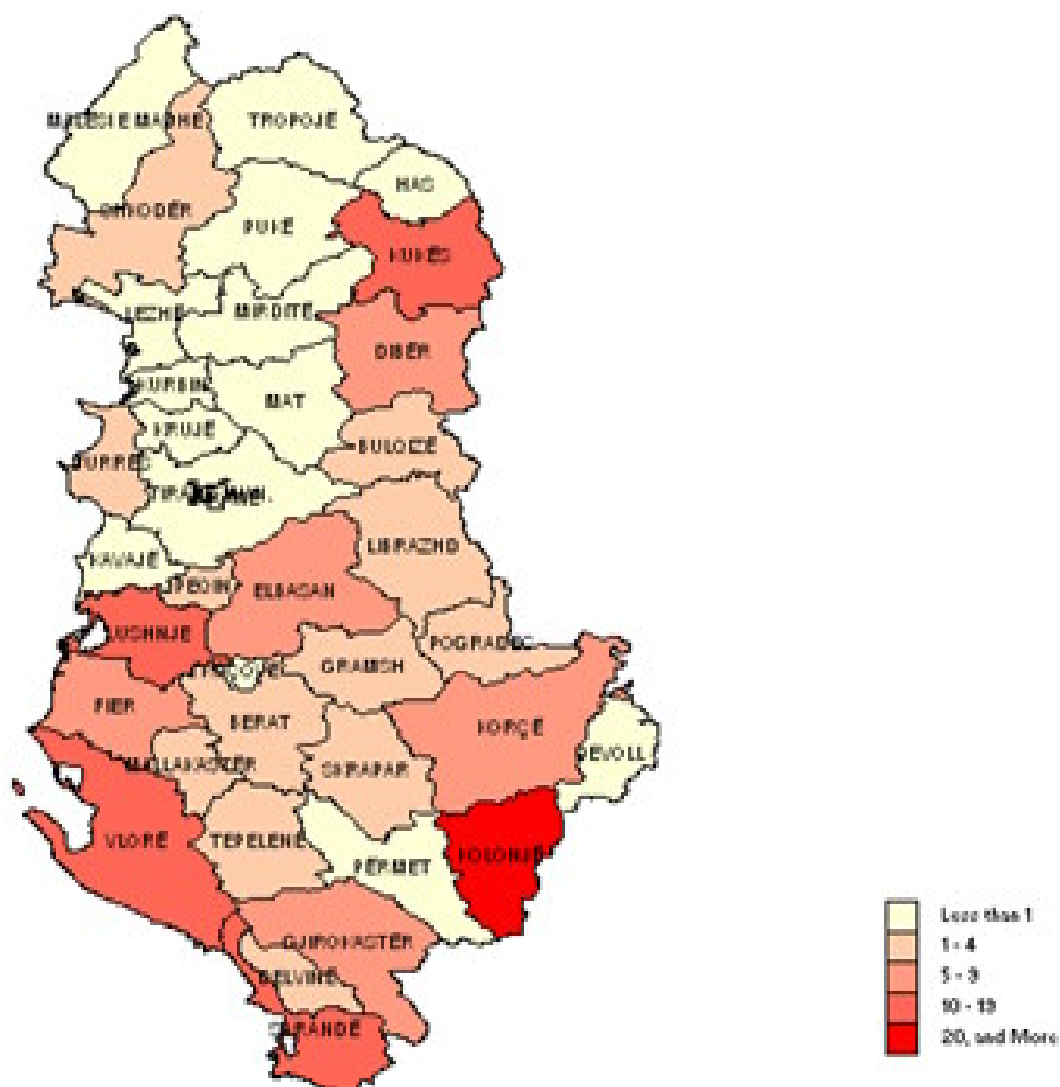
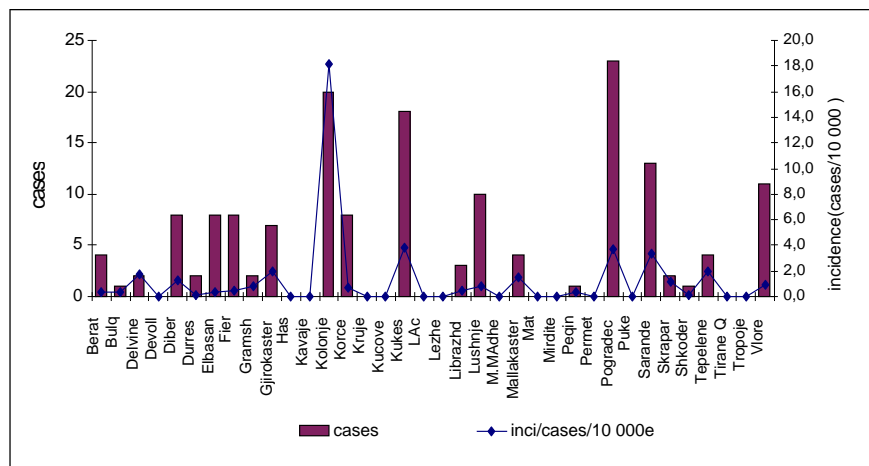


Figure 4 shows the incidence rate of brucellosis (number of cases per 10 000 population) by districts in Albania in 2015. The incidence rate

is higher in Pogradec, Kolonjë, Kukës, Vlorë and Sarandë (Figure 4)

**Figure 4. Incidence rate (cases / 10 000 inhabitants) of brucellosis in Albania in 2015**

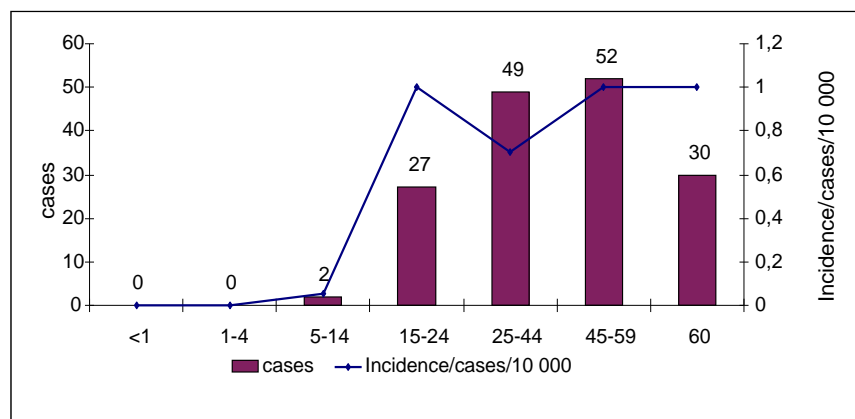


In 2015 there was a slight decrease in brucellosis incidence rate compared to 2014. These include Kolonja with 20 cases (incidence rate 18.1 cases / 10 000 inhabitants), Kukës with 18 cases (3.8 cases / 10 000 inhabitants), Saranda with 31 cases (3.4 cases /10 000 inhabitants) followed by Korça and Vlora. The largest number of cases has been reported during spring and summer, but despite

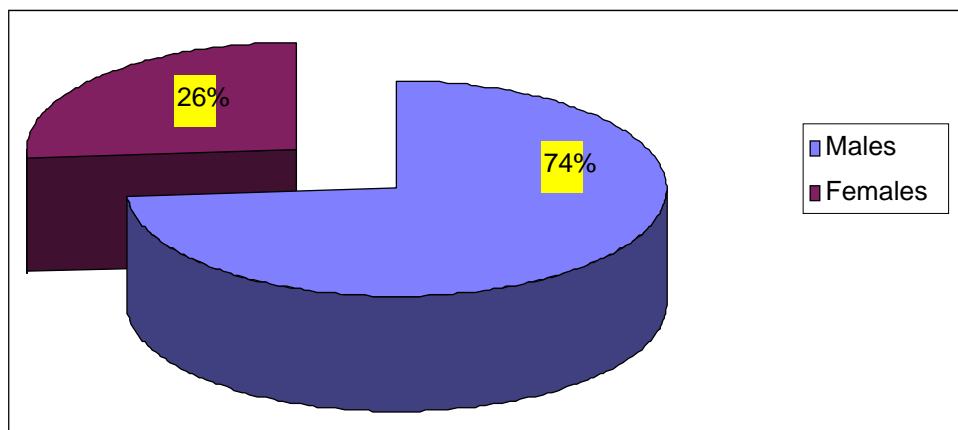
the seasonal nature of the disease, there have been cases reported throughout the year.

The age-group 45-59 years is the most affected by brucellosis, accounting for the highest specific weight with about 32.2% of total reported cases, followed by the 25-44 age-group and persons aged 60 and older. Sporadic cases have been reported also in the 5-14 years old individuals (Figure 5).

**Figure 5. Distribution of brucellosis cases by age-group in 2015**



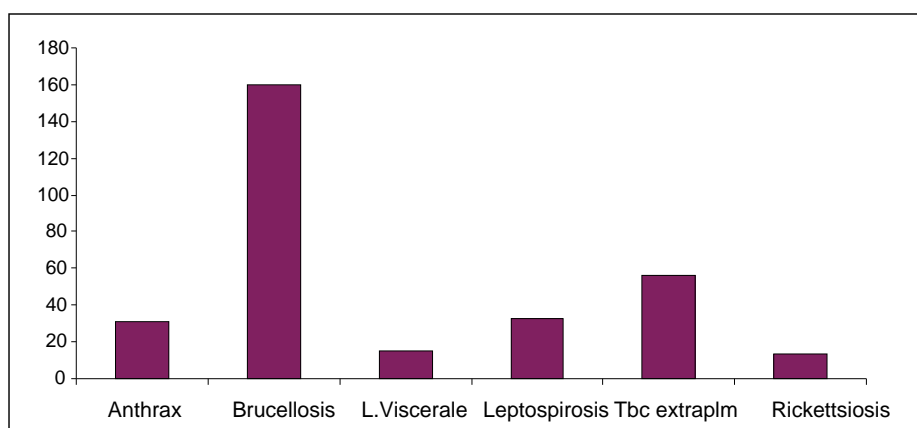
**Figure 6. Male / female ratio regarding the occurrence of brucellosis in Albania in 2015**



As expected, men are affected about three times more often than women, because for every woman affected by brucellosis there are about three infected men. Of course, men are more engaged in occupations that increase exposure to brucellosis causes, that are reflected in disease incidence rates several times higher in males than females (Figure 6). This difference is statistically significant ( $P < 0.01$ ). Rural areas are more affected than urban areas. The specific weight of anthrax and brucellosis

among other zoonotic diseases is displayed in Figure 7. Brucellosis shows the highest specific weight in zoonotic morbidity. In 2015, 160 cases were reported – incidence rate of 6.0 cases / 10 000 inhabitants compared with 33 cases of leptospirosis (incidence rate 1.2 cases / 10 000 inhabitants, 31 anthrax cases (incidence rate 1.1 cases / 10 000 inhabitants), *L. viscerale* with 15 cases (incidence rate - 0.5 cases per 10 000 inhabitants), extra-pulmonary TBC (incidence rate 2.0 cases / 10 000 inhabitants).

**Figure 7. Number of reported cases of anthrax and brucellosis against other zoonosis**



### Conclusions and recommendations

- Anthrax and brucellosis are two zoonosis of public health importance which require special attention from both the human health and veterinary sectors, as well as a close intersectoral cooperation.
- Vaccination of animals and timely elimination of the positive testing animals are two important elements for the protection of human health.

- The awareness raising of the population remains an important element, especially in rural areas regarding the hygiene of livestock products' processing, frequent washing of hands, use of working clothes and other appropriate clothes at home, use of gloves and disinfecting of hands in calving animals, the use of pasteurized or heat processed milk, the use of duly processed meat etc.

### Summary Box

#### What is known about this issue?

Anthrax and brucellosis are two of the most important zoonosis in our country because of their direct and indirect impact on the health of individuals and livestock animals.

#### What this study adds?

This study gives a clearer picture about the incidence of anthrax and brucellosis in 2015 in different districts of our country. Based on it we can suggest that males in rural areas of certain districts of South Albania are predominantly affected by these diseases.

#### What are the implications for public health?

Data from this study highlight the fact that zoonosis are still present in some regions of our country, and therefore they can serve to reflect about the measures to be taken in order to improve the current situation as well as about strategies or policies to be developed by relevant authorities for reducing further the number of cases affected by these zoonosis.

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## **Waste containers and public health**

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### **Abstract**

Growth of global population leads to increased consumer demand, thus increasing the amount of waste produced by every household, industrial activity, agricultural or construction sector. According to our data, there is an increasing trend of urban waste producing in all regions of Albania during 2010-2014 period of time. Urban outdoor waste containers are not covered with a cap/lid and are often overfilled with urban waste. In terms of hygiene and sanitary aspects, no-lid waste containers might have a negative impact on public health. Therefore, some measures should be taken to protect public health and the environment. It is very important to continue the awareness raising efforts of the public opinion in the field of waste management, and additional efforts are needed towards strengthening and increasing the administrative structures at national, regional and local levels to further enhance urban waste management effectiveness. It is indispensable to enforce the existing laws for the treatment of such types of waste.

## Introduction

Increasing global population and demand for food and different items leads to an increase in the amount of waste produced every day from households, industrial activity, agricultural or construction sector. Referring to the annual Report on the State of Environment (Ministry of Environment 2014), in most cities of Albania, the waste collection and transportation services are carried out by private waste management companies, which are contracted by the municipalities. Rural areas are not yet covered by such services. Most of waste of these areas is deposited in rivers or on the roadsides which are then cleaned by water. In this way, they are displaced to another part of the land and finally into the water flows. Municipal waste has a high percentage of organic waste, and in our country they are currently not composted in order to reduce their amount in landfills. The amount of organic compostable waste accounts for 47-49% of the total waste. The most used method of waste treatment is landfill, although these sites do not fulfill hygienic and sanitary conditions, leading to environmental pollution.

Urban waste management in our country is decentralized. In most cities waste collection and transportation services are carried out by private waste management companies, which are contracted by municipalities (Ministry of Environment 2014).

Referring to the environmental report, in Albania there are some private recycling companies, which collect and process different types of waste: scrap metals, paper, plastics, textiles, used tires. There are about 12 000 individual informal collectors and about 60 collection companies for different recyclable waste. Individual collectors and companies face

difficulties in finding clean and separated waste. Most of recyclable waste is generated from urban and industrial sector (Ministry of Environment 2014).

The increased quality of life and the high rates of resource consumption have had an unexpected and a negative impact on urban environment.

Population growth and rural-urban migration has led to increased urbanization, natural growth, norms and industrialization, and therefore the services provided are not sufficient to control the high level of solid waste generated in urban areas. This has contributed to the gathering of large quantities of wires and different waste, which have harmful effects on the urban environment (Sule 2004). Environmental reports indicate that about 70% of heavy metals found in landfills originate from electronic waste (Toxics link, New Delhi, 2003). The environmental problem with heavy metals consists on the fact that they do not change during the decomposition of organic waste and might cause toxic effects on creatures when they exceed a certain concentration. Pollution from metal waste is also present in groundwater (Arneth and bp. 1989). Today, the rate at which urban waste is generated is at about 70% compared with the total rate at its disposal which is at 30% (Edu 2003).

## Classification of urban waste

Referring to Law no. 10 463, dated 22.9.2011 "For integrated management of waste", "Waste" is any substance or object which the holder discards or intends or is required to discard.

The Table below provides the classification of urban waste by origin, describing municipal waste, industrial waste and agricultural waste.

**Tabela 1. Classification of urban waste**

<b>Municipal waste</b>	<b>Industrial waste</b>	<b>Agricultural waste</b>
"Household waste" are the remains of the household sector (biodegradable waste from the gardens of houses and parks, food and cooking waste from homes, restaurants, catering and retail shops, and similar remains from food processing plants)	Industrial waste such as: wood, rubber, cardboard, scrap metal, plastics, fabrics materials, etc.	Farming waste
Waste produced by automobiles and tires	Solid waste: soil, gravel, mineral waste originating from mines, etc. These are solid waste and do not contain toxic or harmful materials.	Agro-food industry waste
Green areas waste; waste from cleaning activities	Special wastes: paints, wood treated with heavy metal oxides, clay of metal hydroxides, etc.	
Hospital waste		

### **Rationale for the monitoring of urban waste**

Urban waste is a constant concern for public health, as it may negatively affect the earth's surface where it is deposited and the quality of surface and underground water. In addition, they could become a source of various diseases to humans, as they create favorable conditions for the thriving of a variety of small animals and insects that serve as vectors of diseases to humans. Because of these undesirable effects it is important to study the trend of the total amount of waste during recent years, the

adverse health effects associated with this phenomenon and to detect the most vulnerable individuals. This information can be used to make the necessary recommendations in order to establish appropriate policies to improve the current situation and prevent the effects on health.

### **Trends of generation of urban waste**

Based on INSTAT data related to production of solid urban waste by regions in our country, the following chart is obtained for the period 2010-2014 (and the respective trend) [Figure 1].

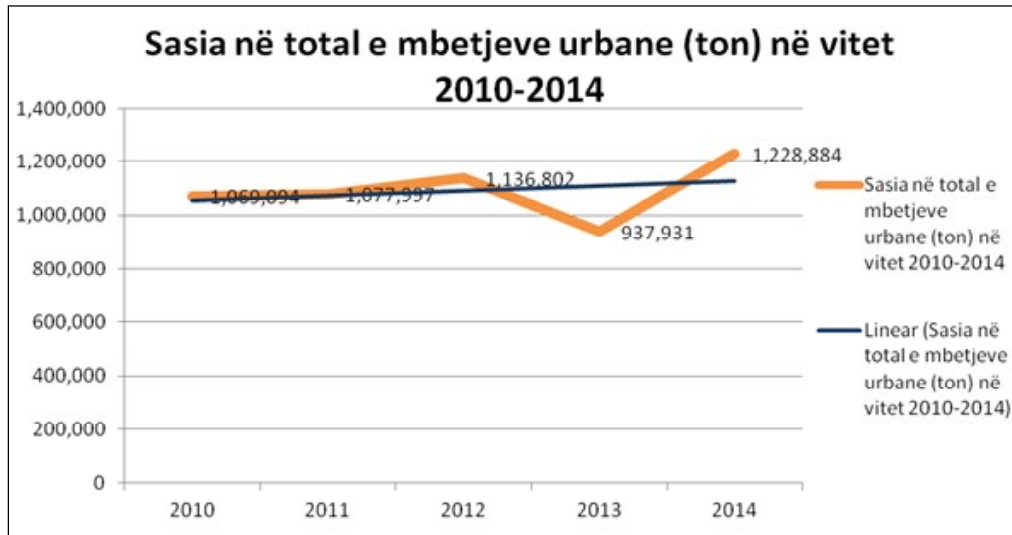
**Figure 1. The amount of solid urban waste (in tons) during 2010-2014 in Albania**

Figure 1 shows that there is an increasing trend related to the generation of total urban waste in all regions of Albania during 2010-2014 (despite the fluctuation noticed in 2013). From 2010 to 2012 there is a slight increase in the amount of urban waste (in tons), followed by a significant reduction in 2013 by 198 871 tons. In 2014 there follows a significant increase in the amount of waste from 937 931 tones in 2013 to 1 228 884 tons. The total amount of waste collected by local authorities in preset collection sites, is sent to its final destination in landfills, which represent the areas of final annihilation of solid waste on- or under-ground. If the amount of waste is discarded in areas which do not meet hygienic and sanitary conditions, then it poses a serious problem for the environment and public health.

#### **Cost of collection and treatment of urban waste**

The collection and treatment of urban waste should fulfill a standard that is costly. Referring to the “National Plan for the Approximation of the Environmental Legislation in Albania, the National Plan for Waste Management; Acceptance through achievements from 2010 to 2025”, it results that European standards

require approximately 5 Euros per m<sup>3</sup>, and considering midterm waste generation rates of 300 kg and 500 kg per capita yearly, as well as a storage of waste with a 15 years landfill lifespan, the total cost of waste disposal conditions in the country is calculated at around 50 million Euros.

During 2016 the Albanian government will approve a decision about the costs of integrated waste management, where municipalities will be responsible for the implementation of this decision.

#### **The public health impact of waste containers**

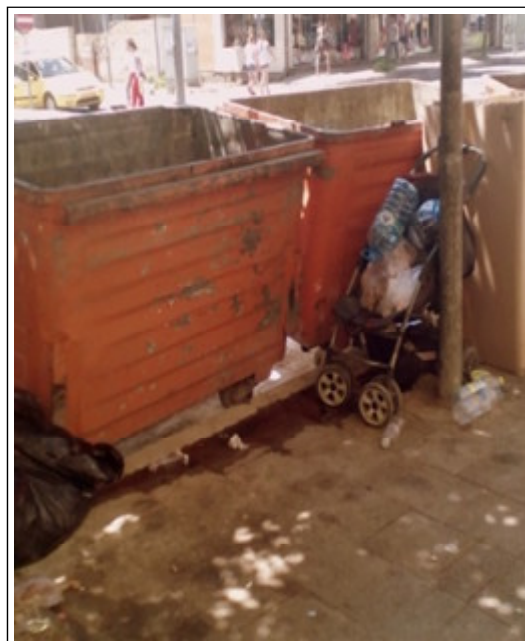
In our country, the urban waste containers are not covered with a cap/lid, which has an impact on public health. In 70% of cases the containers are overfilled with urban waste. This phenomenon intensifies even more during official holidays and summer season (Poga and colleagues, IPH Bulletin, 3-2015). Even though urban waste is discarded closed-up in plastic bags, these temporary containers might tear apart/be opened yielding an unpleasant view and bad odor (Figure 2). Often there are people who “dig” through these containers in search of plastic bottles, cans



or glass. These trash-seekers do not take any protective measures, and are vulnerable to

various diseases, some of which potentially deadly.

**Figure 2. Photo from urban waste containers**



One of the risks to which people are exposed is due to no waste separation at source, which exposes urban residents to harmful gases emitted from different waste in containers such as plastic, electronic waste, etc.

Also urban waste containers are usually overfilled during official holidays or summer season thus becoming thriving sites for various vectors (i.e. flies, small animals, etc.).

Public health problems and the environmental impact are mainly related to the indiscrimination of urban and other waste (including hazardous waste), as well as the uncontrolled dumping of waste in local areas of the city. Dumping of urban waste in free urban spaces within the city and especially in rural areas is a major problem for public health and environment. Decomposed organic waste poses a serious risk for public health. They can serve as basis for many diseases and epidemic outbreaks, as well as increasing the number of different insects in the environment. The existence of open collection points in the city or the current system of urban waste collection does not provide good hygienic and sanitary conditions. Waste collection points/sites in the city constitute a risk for the spreading of infectious diseases. In many cases, the containers are damaged and in poor hygienic and sanitary conditions. After emptying the containers lime powder is poured around them for disinfection purposes but washing of containers is not performed.

### **Diseases caused by waste**

Waste embeds three important problems in terms of hygienic and sanitary conditions:

1. The presence of small animals and insects in them (flies, mosquitoes, etc.), which serve as vectors for the transmission of germs and viruses from waste to humans, such as: hepatitis, dysentery, yellow fever, plague, polio, etc.

2. They serve as incubators for breeding and thriving of microbes and insect larvae eggs.

3. They serve as a source for fermentation and purifying processes emitting bad odors and harmful gases to humans into the environment (Luzati A 2011).

In addition, public health literature identifies some diseases that are spread from waste, such as: fungal infections, unspecified dermatitis, etc.

### **Who is at most risk?**

Most at risk are the people who work with waste, because their eyes can be damaged if they do not wear protecting masks. Also, another group of persons that are directly in risk by the containers are those who collect recyclable waste because they are in direct contact with the waste and usually do not take any precautions.

### **Recommendations**

In the current situation, for an improvement of waste collection in urban areas in terms of hygienic and sanitary aspects, it is recommended as follows:

- Use of lid covered containers covers in order to avoid the presence of vectors.
- Frequent disinfection of the site where containers stand and disinfection of containers themselves (washing them), especially during summer.
- Strengthening the measures for the preservation of public waste containers from damage by other persons.
- Provision of protective masks to the employees who work with waste by cleaning companies.
- Raising of public awareness regarding the separation and selective collection of urban waste and keeping the environment clean.
- Implementation of the Waste Management Plan 2010-2025.

- Strengthening and increasing the administrative structures at national, regional and local levels in order to further strengthen waste management.

- Strengthening cooperation between the Environmental Inspectorate and Health State Inspectorate, for improving the management of

hygienic and sanitary conditions of urban waste collection.

- Undertaking regular studies on national level in the context of increasing trends of urban waste, in order to assess the composition of the urban waste and, based on this, to determine the way of treatment for different urban waste types.

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## **Interventions to prevent iron deficiency anemia in pregnant women.**

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### **Abstract**

Iron deficiency anemia is one of the most common health conditions during pregnancy. This disorder is associated with increased need for maternal iron as it is needed for the healthy growth of the fetus and placenta; growth of the erythrocyte mass and increased circulatory volume in the third trimester. Still there is no clear evidence to show that routine supplementation during pregnancy can improve pregnancy outcomes. But there is evidence that these supplements can improve hematologic indicators of women. Therefore, some questions are raised regarding iron deficiency control program during pregnancy. What are the feeding practices of women, in order to assess the situation regarding the chosen intervention; the objectives we want to achieve over the control program? What could be side effects that we can expect in case of inappropriate use of iron and which is the appropriate time for intervention? The answers to these questions will help to increase the effectiveness of intervention programs.

## Introduction

Anemia is one of the most common conditions during pregnancy. Iron deficiency is the one of the main causes of anemia in pregnancy. Iron deficiency occurs when the level of stored iron decreases (WHO 2006; Scholl 2005).

Measurement of serum ferritin is useful for the diagnosis of iron deficiency in pregnant women, who present a high level of serum transferrin even in the absence of iron deficiency.

Physiological anemia, otherwise known as “dilutional anemia”, is quite normal in healthy pregnant women and is caused by the increase of circulating plasma volume to help the growth of fetus and this is associated with a slight decrease of hemoglobin level (Hoffman et al. 2012).

Some clinical signs of iron deficiency anemia in pregnant women include paleness, weakness, fatigue, tachycardia and dyspnea. Iron deficiency with subclinical manifestation is as widespread as iron deficiency anemia (WHO 2006; Hoffman et al. 2012).

Risk factors for iron deficiency anemia in pregnant women might include:

- Diet containing limited iron-rich food;
- Low iron absorption due to gastrointestinal disorders,
- Short time span between pregnancies;
- Intestinal parasites.

More than 50% of pregnant women identified with anemia are associated with iron deficiency intake through diet (WHO 2006).

Iron deficiency anemia may affect the health of mother causing toxemia and birth complications as well as complications for the fetus health resulting in low birth weight, premature birth or nervous system malformations.

However, a slight decrease of the hemoglobin concentration might be physiological. Hemoglobin can reach a minimum level in the middle of first trimester and then increases again in the third trimester and in these cases there are no problems

for mother's and baby's health. The link between maternal hemoglobin level and infant health outcomes is graphically represented by an U-shaped curve, with an increased risk for poor results of infant health when the mother has a very high or very low hemoglobin level. This is why it is very important to prevent severe anemia, especially to avoid its negative consequences for the normal development and functioning of the nervous system.

The strength of association between iron levels and adverse health effects on women and babies is still controversial. Although some observational studies (transversal studies) have shown a link between levels of iron and adverse outcomes in pregnancy (such as low birth weight, preterm delivery, perinatal death), some other more methodologically robust studies did not evidence such a relation (Institute of Medicine 1993; WHO 2006, Amy G. Cantor 2015).

## What does scientific research suggest about this topic?

The demand for iron during pregnancy is estimated to be 1 000 mg / dl, and because many women have low iron reserves during pregnancy, additional intake of iron may be included in prenatal care. Primary prevention for the average-risk population includes taking iron through diet and low dose supplements (30 mg / dl) early in pregnancy. Whereas primary prevention in high-risk populations recommends a dose of 60-100 mg of iron per day (Institute of Medicine 1993).

Still there is no clear evidence that routine supplements of iron for anemia during pregnancy can improve pregnancy outcomes, but there is evidence that these supplements can improve hematological indicators. Therefore there is need for high quality studies in order to confirm whether screening program would effectively reduce maternal and infant morbidity.

However in current literature there are different

opinions and attitudes about the benefits of such control programs (i.e. what will be considered the main objective(s) to be achieved during these programs) and at what stage of pregnancy (trimester) would iron supplements be more effective (considering in this case the improvement of growth and development of the baby as the main objective).

Until robust scientific evidence regarding the effectiveness of iron supplements in pregnant women will be in place, several questions will be raised every time a control program is about to be implemented (Beard 2000):

*1. What are the goals to be achieved for a control program to be considered successful?*

- to prevent anemia;
- to prevent the reduction of serum ferritin;
- to improve fetal growth and pregnancy outcomes;
- to reduce maternal and infant morbidity and mortality.

The goal often is in concordance with the feeding practices of the pregnant woman and whether the diet is rich enough in iron, considering that often such practices are not sufficient to meet the iron needs during pregnancy.

*2. Are there any potential toxic risk from iron overuse during pregnancy?*

A question that is often discussed relates to the fact that excess iron is an active component in the Fenton's reactions that results in the production of free radicals and oxidative stress. A high dose of iron during fortification or as a supplement in the diet may be associated with increased formation of oxidative products and the start of pathogenic processes such as: cardiovascular and nervous system diseases and cancer. Therefore the addition of a large amount

of fortifying iron in food consumed predominantly by pregnant women, or prescription of high dose iron supplements, should be carefully considered during the development of control programs and early treatment of iron deficiency anemia during pregnancy (Institute of Medicine 1993).

In this context, it is indispensable to first discuss about the consequences of iron deficiency or iron overuse on the welfare of the mother and child.

*3. Is it better to improve iron reserves during the antenatal period in order to have sufficient reserves at the critical stage?*

The third important question is about the time of iron deficiency appearance and its major adverse effects on the development of fetus. Scientific evidence suggest that iron deficiency during the first trimester is more frequently and associated with considerable harm to fetal growth, whereas anemia in the second or third trimester has less effect on fetal growth.

In this context, many interventions regarding iron during perinatal stage are based on the first medical visit of the pregnant woman at around 10<sup>th</sup>-15<sup>th</sup> week of pregnancy. After this time the opportunity of benefits from iron interventions in preventing fetal growth harms diminishes greatly (WHO 2006, Institute of Medicine 1993). Lastly, another approach for the prevention of anemia in pregnant women is the increase of iron intake through diet.

According to the Institute of Medicine of the United States, the recommended amount of iron in diet should be 27 mg / day for pregnant women. Foods rich in iron include some kind of fruit, vegetable, meat and poultry. *Non hem* iron found in fruits and vegetables is less absorbed than *hem* iron and therefore pregnant women who are vegetarians have a twice as high demand for iron. Also, fortified flour can be considered as an important source of iron

(Institute of Medicine 1993; Amy G. Cantor et al 2015).

## Conclusions

Iron deficiency anemia occurs when the level of iron in the body is so low that it can cause anemia. It is one of the most common disorders affecting women during pregnancy. Because of the consequences that iron deficiency can have on fetus development or maternal health, it is important to recognize and apply relevant interventions that can help to improve iron deficiency and prevent adverse effects on health.

## Recommendations

1. Due to the high and persistent burden of anemia in morbidity, the World Health Organization (WHO) since long time ago has recommended iron supplements during pregnancy in low or middle

income countries, and nowadays this is also recommended in many high income countries as well. In pregnant women with poor iron diet, iron supplementation should start with a dose of 30 mg iron per day.

2. To encourage pregnant women to use iron-rich foods and foods that increases iron absorption

3. When the doctor detects anemia in pregnant women, iron should be given orally at doses 60-120 mg / day and the woman should be advised to a diet rich in iron products.

4. There is need to undertake programs for early control and treatment of iron deficiency anemia in pregnant women, including: supplements, fortification, dietary modification and control of parasitosis.

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