

## RESEARCH STUDIES

DOI: 10.5281/zenodo.1051116  
UDC: 616.24-002.5-08:614.2(478)

### The assessment of different tuberculosis-related features in Moldova regions

Lesnic Evelina

Department of Pneumophthisiology, Nicolae Testemitsanu State University of Medicine and Pharmacy  
Chisinau, the Republic of Moldova

\*Corresponding author: evelina.lesnic@usmf.md. Received April 28, 2017; accepted June 10, 2017

#### Abstract

**Background:** Tuberculosis represents a social-related disease and for identifying the priority interventions for reducing its impact must be identified the main disparity features of patients.

**Material and methods:** Global Competitiveness Report and Report of the National Centre for Health Management were used. The clinical study was retrospective, randomized, selective, and included 263 new pulmonary TB cases registered in three different Moldovan regions: Chisinau (center), Balti (north) and Cahul (south).

**Results:** Attributable risk identified that in Chisinau compared to Balti predominated patients in economical vulnerable state, without health insurance, GeneXpert MTB/ Rifampicin sensible and those who successfully finished the treatment. In Balti compared to Chisinau predominated chronic alcohol abusers, co-morbid patients, severe pulmonary tuberculosis, direct addressing to the hospital, patients infected with GeneXpert MTB/Rifampicin resistant strains of Mycobacteria. The major differences between Chisinau and Cahul groups, with predominance in Chisinau were homeless, co-morbid patients and those who successfully finished the treatment course. In Cahul predominated patients with rural residence, direct addressed to the regional hospital and severe forms of tuberculosis. Comparing the Balti and Cahul groups was established the predominance in Cahul of patients with rural residence, in economically vulnerable state and patient's detection by general practitioner. In Balti predominated co-morbid patients, alcohol abusers, patients with severe forms of tuberculosis.

**Conclusions:** Reduction of health care inequality will be achieved through social assistance of vulnerable groups and improvement of the general public life.

**Key words:** tuberculosis, risk factors, inequalities.

#### Introduction

Tuberculosis represents a social disease. "It reflects the problems that transcend the conventional medical approach...It is the consequence of gross defects in social organization and errors in individual behavior" [3]. Despite progress in tuberculosis control epidemic indices are concentrated in social vulnerable and marginalized populations that often have limited access to health care and are difficult to be reached by screening methods [1]. According to the WHO list of high burden countries in the post-2015 era the Republic of Moldova (MD) was included in 21 countries with the highest estimated number of incident multidrug-resistant (MDR-TB) cases [10]. The World Health Organization regional strategy to Stop Tuberculosis established that without focusing on the social determinants, high TB burden countries are unable to achieve success in the elimination of the disease [8]. There were identified a large number of upstream and downstream social determinants that contribute to the disease control. The document highlighted upstream determinants that extend the disease epidemics: rapid urbanization and migration, increasing socioeconomic disparities, social and financial insecurities. On the other hand downstream social determinants that permit to control the disease were high quality health services delivered for vulnerable populations [5, 9]. The well defined TB control programmers are those that emphasize the disease outcome in vulnerable populations and incorporate the health equity

in planning and implementation of the control activities [7]. The study was designed with the aim to assess tuberculosis-related features in the frame of country's disparity measures. The objectives were: 1. Comparative assessment of the national and regional socioeconomic, demographic and epidemiological data. 2. Evaluation of the risk factors, laboratory and radiological characteristics of patients from three selected different Moldovan regions (Chisinau, Balti and Cahul); 3. Establishment of the main tuberculosis-related features that differentiate the selected Moldovan regions.

#### Material and methods

For the evaluation of the national statistical data were used the reports of the Moldovan National Centre for Health Management and Global Competitiveness Report 2016 [11]. The clinical study was performed as a retrospective, randomized, selective, descriptive research targeting risk factors, microbiological and radiological peculiarities, as well as treatment outcome of 263 new pulmonary TB cases from three different Moldovan regions: Chisinau (center), Balti (north) and Cahul (south). Included criteria were: patients older than 18 years, new cases with pulmonary TB diagnosed through microbiological methods (including molecular-genetic methods), signed informed consent and patients registered in the period 01.01.2015-31.12.2015. The first Chisinau group included 185 patients diagnosed and therapeutically managed in the frame of medical specialized

organizations of Chisinau city (Chisinau group), the second group included 43 patients diagnosed and managed in the Clinical Municipal Hospital (dispensary of Phthysiopneumology) of Balti city (Balti group) and the third included 35 patients diagnosed and managed in the Cahul Regional Hospital (Cahul group). There were used social, epidemiological collection methods, statistical analysis, graphic representation and analytical assessment through Microsoft Excel XP soft. Accumulated material was tabled in simple and complex groups.

### Results

According to the Global Competitiveness Report of 2016 the Republic of Moldova (MD) occupied the 100-th place from 138 assessed countries worldwide by the determinants of long-term growth and scored 3,86 points (from 1 to 7). It declined 16 positions from the previous assessment in 2015. The low ranking was the result of the bad situation in the public finance, banking default and negative change in the macroeconomic environment due to the recession in the eastern neighborhood countries. Moldova was assessed as a country at the first stage of the economic development among the 35 poorest countries in the world. According to the basic requirements in health care and primary education MD ranks on the 95<sup>th</sup> place assessed with 5.39 points (from 1 to 7). The low level in health care was due to uncertain national health policies and declining security in the most of all health-related sectors. According to the tuberculosis incidence the Republic of Moldova was on the 104<sup>th</sup> place and the business impact of tuberculosis – on the 88<sup>th</sup> place from the 138 evaluated countries. Assessing the above data it was estimated that MD remains a high risk zone showing an inadequate concern regarding social determinants of poverty-related diseases that represent the main barrier to achieve the health related Sustainable Millenium Development Goals. Despite increasing by 5 times the national public budget, the funding of healthcare sector was low: 1.192 million lei in 2005, 3.846 million lei in 2010 and 5.890 million lei in 2015. Reported to the gross domestic product it demonstrated the low level of the health care financing: 3,9% in 2005, 6,1% in 2010 and 5,7% in 2015 [11]. Accumulated

evidence suggested that low health care funding contributed to the low screening of high risk and hard-to-reach groups (homeless, migrants, individuals living with HIV, drug users, poor persons), deficiency in performing an effective anti-tuberculosis treatment and lack of interventions to resolve social and economic problems of the patients [1].

The actual study was designed to incorporate health-related issues of TB morbidity into demographic measures. Statistical yearbook of the Republic of Moldova established a decreasing tendency of the most important social and demographic indices in the period 2013-2015 [1]. The stable Moldovan population decreased by 4.278 people from 3.559.497 in 2013 to 3.555.159 citizens in 2015. In 65 Moldovan towns, considered as the major infectious clusters were residing 1.492.165 Moldovan citizens (40,67% from the total population) in 2013, 1.502.996 (42,24% from the total population) in 2014 and 1.507.265 citizens (42,39% from the total population) in 2015. The urban population increased between 2013 and 2015 by 10.831 people, on the other hand the rural population decreased by 19.428 people at the same period of time. As a comparison the population of Chisinau city increased by 9.600 people, the population of Balti by 491 citizens and the population of Cahul decreased by 307 people at the same period of time. One of the most eloquent indices associated with the decreasing of the population was the emigration trend. The published data established the diminishing tendency of the emigration from the MD abroad. In 2010 emigrated 4.714 Moldovan citizens and in 2014 emigrated 2.374 persons. The most of the migrants were leaving the country for the Russian Federation: 3.110 persons in 2010 and 788 persons in 2014 and for Ukraine 2.663 persons in 2010 and 602 persons in 2014. The general mortality increased by 1.846 deaths in the MD and by 448 deaths in Chisinau. On the other hand during the same assessed period of time it was established the decreasing of mortality in Balti by 5 deaths and by 1.301 deaths in Cahul (tab. 1).

The main social-economical indices characterizing the incomes and living standard of the Moldovan population established the increasing twice of the average nominal monthly earning of employees from 2.971 lei in 2009 to 4.089 lei in 2014, the average size of monthly pension from 810 in 2009 to 1.087 in 2014, the subsistence level 1.373 lei in

Table 1

Comparative demographic indices of three selected Moldovan areas

Index	2013		2014		2015	
	abs.	%	abs.	%	abs.	%
Population of MD	3.559.437	-	3.557.634	-	3.555.200	-
Urban population	1.492.165	40,67	1.502.996	42,24	1.507.265	42,39
Population of Chisinau	800.601	22,49	804.476	22,61	809.600	22,77
Population of Balti	149.709	4,2	149.784	4,2	150.200	4,2
Population of Cahul	124.907	3,51	124.700	3,50	124.600	3,5
Mortality in MD	38.060	1,06	39.490	1,11	39.906	1,12
Mortality in Chisinau	5.996	15,75	6.772	17,15	6.444	16,15
Mortality in Balti	1 366	2,28	1 338	1,97	1 361	2,11
Mortality in Cahul	2561	6,72	3071	4,53	1260	1,95

Note: reference of the National Bureau of Statistics of the Republic of Moldova. Demographic situation in the Republic of Moldova.

Table 2

## Comparative epidemiological indices of tuberculosis in three selected Moldovan localities

Index	2013		2014		2015	
	abs.	100.000 population	abs.	100.000 population	abs.	100.000 population
Total incidence in MD	3.656	102,7	3.305	92,9	2.870	80,7
Total incidence in Chisinau	755	94,1	659	81,7	579	71,7
Total incidence in Balti	192	128,2	141	94,0	156	104,0
Total incidence in Cahul	97	77,7	119	95,5	81	65,0
Prevalence in MD	3.904	109,7	3.450	97,0	3.073	86,4
Prevalence in Chisinau	1008	125,6	878	108,8	808	100,1
Prevalence in Balti	203	135,6	162	108,0	161	107,3
Prevalence in Cahul	125	100,1	120	96,3	99	79,4
Mortality in MD	657	16,1	373	10,5	314	8,8
Mortality in Chisinau	87	10,8	81	10,0	56	6,9
Mortality in Balti	14	9,3	28	18,7	24	16
Mortality in Cahul	6	4,8	14	11,2	9	7,2

2010 and 1.627 lei in 2014. The total expenditure for public health increased in 2015 compared with 2014 from 1.036 to 1.519 million lei.

The Moldovan health care system is based on the universal access to major services through mandatory health insurance mechanism [1]. Compulsory health insurance policy costs on average 300 Euros per year. The financing of most health organizations is performed by the National Health Insurance Company, but the uninsured part of the population ranges from 20 to 25%, and depends on the demographic residence (30% of the rural population are uninsured), on the ethnicity (minorities are more frequently uninsured), and other social disadvantaged conditions [1]. Despite the free of charge TB diagnosis and treatment, the lack of insurance in an insurance-based health care system determines a low medical coverage of high risk groups, deficient active screening and poor disease control. It is important to underline that all specialized health services, including detection, diagnosis, anti-tuberculosis treatment and hospitalization (during the intensive phase) are free of charge regardless of the health insurance status of the patient. Medical staff specialised in pneumophthysiology and involved in the health care of TB patients included 219 in 2013 and 216 in 2014 pneumophthysiologists, that corresponds to 0,6 specialists/100.000 population. On the opposite health care sector, considered the most important chain involved in the detection of symptomatic TB patients is continually growing with a total number of 1792 family doctors legally registered in 2014, corresponding to 6,7 general practitioners/100.000 population [2].

In the global epidemiological context the major indices describing the spread of TB disease in the general population are: the global incidence (number of new cases and relapses reported at 100.000 population), prevalence and mortality. According to the report of the Moldovan National Centre for the Health Management during the period 2013-2015 it was registered an important decline of all TB indices. The global incidence in MD decreased between 2013 and

2015 by 22/100.000, in Chisinau by 22,4/100.000, in Balti by 24,2/100.000 and in Cahul by 12,7/100.000. A similar vector was established regarding the prevalence (the total number of TB patients) which decreased between 2013 and 2015 in MD by 23,3/100.000, in Chisinau by 25,5/100.000, in Balti by 28,3/100.000, in Cahul by 20,7/100.000 population [1]. Multiple causes were involved in this rapid decline: low rate of high risk groups investigated by active screening (annual chest radiological examination), high rate of migrants inaccessible to screening procedures, low level of the health care seeking behavior of the population, high rate of citizens with the lack of the insurance policy and high rate of the rural population with low accessibility to health care services. Mortality due to the progression of TB was very high, despite the continuous decreasing tendency. During the period 2013-2015 mortality decreased twice from 16,1 to 8,8/100.000 population in MD and from 10,8 to 6,9/100.000 population in Chisinau. In the other two regions the mortality increased: twice in Balti from 9,3 to 16/100.000 population and in Cahul from 4,8 to 7,2/100.000 population [2].

Distributing patients according to the sex it was established the predominance of men 138 (74,6%) in comparison with women 47 (25,4%), with a male/female ratio=2,93/1 in the Chisinau group, 31 (72,09%) men vs. 12 (27,90%) women, with male/female ratio=2,58/1 in the Balti group and 29 (82,95%) men vs. 6 (17,14%) women, with male/female ratio=4,83/1 in the Cahul group. Distribution of patients in age groups according to the WHO recommendations identified the same distribution of patients in all selected groups. The biggest one was 35-44 years age group: 52 (28,1%) patients in the Chisinau group, 14 (32,56%) patients in the Balti group and 12 (34,28%) patients in the Cahul group. While redistributing patients in two age groups (18-44 years old and >45 years) it was established the predominance of young patients (18-44 years) in all groups: 112 (60,5%) cases in the Chisinau group, 26 (60,46%) cases in the Balti group and 20 (57,14%) patients in the Cahul group.

Distributing patients according to the demographic fea-

tures it was established that patients from urban areas were statistically more frequent in Balti comparing with the Chisinau group ( $p<0,05$ ) and Cahul groups ( $p<0,001$ ). The patients from villages were more numerous in the Cahul than in the Chisinau and Balti groups ( $p<0,001$ ). Extreme poverty at homeless patients was identified in the Chisinau group and no such cases were identified in the Cahul group. Summarizing the results of the biological characteristics of patients it was demonstrated that men from southern localities and young individuals from urban areas must be included in the lists of patients for active screening. In addition, extreme poverty as a risk factor identified mainly in the urban localities must be targeted by all social organizations for the improvement of the disease control (tab. 3).

Table 3

### Repartition according to the sex, age groups and demographics

Biological indices	Sex	Chisinau	Balti	Cahul
		N=185 (M%)	N=43 (M%)	N=35 (M%)
Sex	Men	138 (74,59)	31 (72,09)	29 (82,85)
	Women	47 (25,41)	12 (27,90)	6 (17,14)
Young age (reproductive groups)	15-24 years	24 (12,97)	3 (6,98)	0
	25-34 years	36 (19,46)	9 (20,93)	8 (22,86)
	35-44 years	52 (28,11)	14 (32,56)	12 (34,28)
>45 years old	45-54 years	42 (22,73)	5 (11,63)	7 (20,00)
	55-64 years	24 (12,97)	8 (18,61)	7 (20,00)
	>65 years	7 (3,78)	7 (16,28)	1 (2,86)
Demographics	Urban	139 (75,13)	38 (88,37)	8 (22,86) □ ■
	Rural	46 (24,86)	5 (11,63)	27 (77,14) □ ■
Others	Homeless	27 (14,59)	2 (4,65)	0 □

**Note:** ○ – statistical difference between groups of patients from Chisinau and Balti; □ statistical difference between groups of patients from Chisinau and Cahul; ■ statistical difference between groups of patients from Balti and Cahul.

Distribution of the patients according to the economic status established that employed persons, in this way contributing to the health budget by paying taxes and health insurance policy were identified in a small number in all assessed groups. The largest group of unemployed patients without personal financial support for life was identified in the Cahul group, that statistically predominated compared to the Balti group ( $p<0,01$ ). Retired individuals statistically predominated in Balti compared with Cahul due to the highest rate of the old patients in the Balti group ( $p<0,05$ ). Patients with conventional income due to the disability constituted the smallest part of all groups. Patients without health insurance comprised two thirds of the Chisinau and Cahul groups, and statistically predominated compared to the Balti group ( $p<0,001$ ). The table 4 revealed exposed data. Con-

sidering exposed data, *mass media* must inform the general population that specialised health care, full access to all disease-related diagnostic tools and specific treatment for TB are free for all Moldovan patients regardless of their social, economical and insurance status.

Table 4

### Economical status of patients with pulmonary tuberculosis

Economical state		Chisinau	Balti	Cahul
N=185 (M%)		N=43 (M%)	N=35 (M%)	
Economically stable	Employed	25 (13,51)	8 (18,61)	6 (17,14)
Economically vulnerable	Unemployed	124 (67,03)	23 (53,49)	25 (71,43) ■
	Retired	15 (8,11)	8 (18,61)	1 (2,86) ■
	Students	7 (3,78)	1 (2,33)	0
	Disease disability	14 (7,57)	3 (6,97)	3 (8,57)
Patients without health insurance		139 (75,13)	23 (53,49) ■	26 (74,28) ■

**Note:** ○ - statistical difference between groups of patients from Chisinau and Balti; □ statistical difference between groups of patients from Chisinau and Cahul; ■ statistical difference between groups of patients from Balti and Cahul.

The distribution of risk groups identified that the largest group was represented by the patients in the economically vulnerable state (unemployed, retired and students), without health insurance and social protection. Economically vulnerable persons in the Chisinau group were 146 (78,92%) and in Cahul group - 29 (82,86%) patients, that statistically predominated compared to the Balti group ( $p<0,001$ ). The unemployed patients were more numerous in the Chisinau and Cahul groups comparing with the Balti group ( $p<0,001$ ). Younger patients aged less than 44 years old were similarly distributed in all groups. Patients living in extreme poverty and without a stable place of living were the sixth part of the Chisinau group, but no such individuals were identified in the Cahul group. Co-morbid patients were one half of the Balti group and one third of the Chisinau group, and statistically predominated compared with the Cahul group ( $p<0,001$ ). The co-morbid patients HIV-infected represented the fifth part of the Balti group and not a single HIV infected case was identified in the Cahul group. In this context Balti represented a locality highly affected by TB-HIV coinfection and it was twice more exposed than Chisinau. Diagnosis of chronic alcoholism was established in each third patient from the Balti group and statistically predominated compared with the Chisinau and Cahul groups ( $p<0,001$ ). Drug users and patients with mental disorders were in a small number in all groups. Despite the fact that the contact with an infected source is the most important factor influencing the risk of morbidity, the rate of patients from clusters was very low in all three localities, due to the poor quality of the cross-investigation. The highest rate of the patients from

the clusters was identified in Balti and it can be explained by their management in the frame of the pneumophthysiology dispensary. Former detained patients were in a similar proportion in all three groups (table 5).

Table 5

## Distribution of patients according to the risks

Risk groups		Chisinau	Balti	Cahul
N=185 (M%)		N=43 (M%)	N=35 (M%)	
Social	Vulnerable state	146 (78,92)	25 (58,14) ○ ■	29 (82,86)
	Young persons	112 (60,5)	26 (60,46)	20 (57,14)
	Extreme poverty	29 (15,68)	3 (6,96)	0
Co-morbid groups	Comorbid cases	50 (27,03)	23 (53,49) ○	3 (8,57) □ ■
	HIV positive	11 (5,94)	6 (13,95)	0
	Chronic alcoholism	13 (7,03)	12 (27,91) ○	2 (5,71)
	IDU	3 (1,62)	1 (2,32)	0
	Psychic diseases	4 (2,16)	3 (6,98)	0
Epidemiological risk groups	TB contacts	15 (8,11)	8 (18,61)	5 (14,28)
High risk groups	Migrants	24 (12,97)	7 (16,28)	6 (17,14)
	Former detained	9 (4,86)	2 (4,65)	1 (2,85)

**Note:** ○ – statistical difference between groups of patients from Chisinau and Balti; □ statistical difference between groups of patients from Chisinau and Cahul; ■ statistical difference between groups of patients from Balti and Cahul.

Studying case-management and medical staff involved in the patient's detection and clinical-radiological forms it was established that the most of the patients from Chisinau were detected by family doctors, that statistically predominated compared to the Balti ( $p < 0,001$ ) and Cahul groups. Patient's detection by direct addressing to the general practitioner or specialist for long-lasting broncho-pulmonary clinical signs is defined the passive way of detection. It was used to detect the most of the patients from all groups: 147 (79.46%) cases of the Chisinau group, 37 (86.05%) patients of the Balti group and 34 (86,055) of the Cahul group. Two-thirds of the symptomatic patients from the Balti group were detected by specialists due to the case-management performed in the frame of pneumophthysiology dispensary of the clinical municipal hospital. Active way performed by radiological screening of high risk groups was used in the detection of the minor part of the selected patients that demonstrated the low quality of the disease control in the risk or hard-to-reach groups.

While assessing the microbiological results it was identified that one half of the Chisinau and Balti groups, and two thirds of the Cahul group were microscopic positive for acid-fast-bacilli (AFB), demonstrating their epidemiological danger to the healthy population. The highest rate of culture

positive at Lowenstein or BACTEC medium patients was identified in the Balti group, followed by the Cahul group. Multidrug-resistant strains of *Mycobacteria* were more frequently identified in patients from Balti and less frequently in Cahul. Resistance to rifampicin strains revealed by molecular-genetic examination GeneXpert MTB/Rif was statistically more frequently identified in the Balti group compared to the Chisinau group. Lung infiltrative opacities complicated with destruction and extended more than three lung segments statistically predominated in the Balti group compared to the Chisinau and Cahul groups. Acute disseminated tuberculosis as well as pulmonary tuberculosis with extrapulmonary localization was identified in a low proportion of assessed groups (tab. 6).

Table 6

## Case-management and disease-related characteristics of Moldovan groups

	Management characteristics	Chisinau	Balti	Cahul
		N=185 (M%)	N=43 (M%)	N=35 (M%)
Detectional way	Detected by GP (passive way)	103 (55,67)	8 (18,61) ○	14 (40,00) ■
	Detected by GP (active way)	28 (15,13)	6 (13,95)	1 (2,86)
	Detected by SP (passive way)	34 (18,38)	14 (32,56)	8 (22,86)
	Others	10 (5,41)	15 (34,89) ○	12 (34,28) □
Laboratory features	Microscopic positive	101 (54,59)	25 (58,14)	27 (77,14)
	Culture positive	99 (53,51)	34 (79,07) ○	21 (60,00)
	Conventional sensible TB	135 (72,97)	28 (65,12)	24 (68,57)
	Culture DST MDR-TB	36 (19,46)	13 (30,23)	5 (14,29)
	DST mono/poli-resistant TB	14 (7,56)	2 (4,65)	2 (5,71)
	GeneXpert Rif sensible	147 (79,46)	25 (58,14) ○	24 (68,57)
	GeneXpert Rif resistant	38 (20,54)	18 (41,86) ○	11 (31,43)
	Extensive TB in 1 lung	80 (43,24)	23 (53,49)	21 (60,00)
	Extensive TB in 2 lungs	26 (14,05)	20 (46,51) ○	7 (20,00) ■ □
	Lung destruction	106 (57,29)	28 (65,16)	28 (80,00) □
Disseminated TB	15 (8,11)	4 (9,32)	3 (8,57)	
PTB with extrapulmonary localization	2 (1,08)	0	1 (1,33)	

**Note:** GP - general practitioner, SP-specialist in pneumophthysiology, DST – drug sensibility testing, Rif – rifampicine, PTB- pulmonary tuberculosis; ○ – statistical difference between groups of patients from Chisinau and Balti; □ statistical difference between groups of patients from Chisinau and Cahul; ■ statistical difference between groups of patients from Balti and Cahul

Treatment outcome was assessed using the standardized indices. The highest success rate was established in the Chisinau group and statistically predominated compared to the Balti and Cahul groups. The highest rate of died patients was established in the Balti group. Failed and lost to follow-up patients represented the lowest proportion of the selected groups. Patients from the Balti and Cahul groups were still continuing the treatment more frequently. The highest rate of non-available treatment outcome data was established in the Balti group (tab. 7).

Table 7

## Treatment outcomes

	Outcomes	Chisinau	Balti	Cahul
		N=185 (M%)	N=43 (M%)	N=35 (M%)
SO	Success	109 (79,46)	23 (53,48)○	20 (57,14) □
	Died	11 (5,95)	7 (16,28)	2 (5,71)
	Treatment failure	2 (1,08)	1 (2,33)	2 (5,71)
	Lost to follow-up	2 (1,08)	0	2 (5,71)
Others	Continuing IR	6 (3,24)	2 (4,65)	0
	Continuing DOTS-Plus	23 (12,43)	9 (20,93)	9 (25,57)
	Non-available results	32 (17,29)	24 (55,81)○	0 □ ■

**Note:** SO – Standardized outcome according to the WHO definitions; ○ – statistical difference between groups of patients from Chisinau and Balti; □ statistical difference between groups of patients from Chisinau and Cahul; ■ statistical difference between groups of patients from Balti and Cahul; continuing IR – continuing individualized regimen, Continuing DOTS-Plus – continuing treatment for MDR-TB according to the DOTS-Plus regimen.

An important research outcome was the attributable risk (AR) for identifying the main disparities between selected regions. In the table 8 were represented only risk factors and features which exposed statistical difference between the selected areas. It was established the hierarchy of the major differences between the Chisinau and Balti groups, with their predominance in the Balti group: chronic alcohol abuse or diagnosis of chronic alcoholism, extensive pulmonary tuberculosis, patient's co-morbid status, direct addressing to the hospital, infection with GeneXpert MTB/Rifampicin resistant strains of *Mycobacteria*. As to the Chisinau group there predominated patients in the economical vulnerable state, without health insurance, infected with GeneXpert MTB/Rifampicin sensible strains of *Mycobacteria* and those who successfully finished the treatment.

The major differences between patients from the Chisinau and Cahul groups, with predominance in the Cahul group were: rural residence, direct addressing to the Cahul regional hospital and tuberculosis complicated with lung destruction. In the Chisinau group predominated homeless, co-morbid patients and those that successfully finished the treatment. The differences between patients from the Balti and Cahul groups, with predominance in the Cahul group were: rural residence, economical vulnerable state, unemployment and patient's detection by general practitioner. In the Balti group predominated co-morbid patients, alcohol abusers or diagnosed with chronic alcoholism, patients with severe extensive tuberculosis complicated with lung destruction (tab. 8).

Tabel 8

## Main differences between Chisinau, Balti and Cahul according to the characteristics of the patients

	Factors Chisinau-Balti	Attributable risk (%)		
		Chisinau-Cahul	Balti-Cahul	
Demographics	Urban	N/appl	70,66	75,00
	Rural	N/appl	N/appl	85,71
Social features	Lack of insurance	28,00	N/appl	21,00
	Economical vulnerable state	26,30	N/appl	29,82
	Unemployment	N/appl	N/appl	17,51
	Homelessness	N/appl	75,98	N/appl
Biological features	Co-morbid state	49,47	68,29	83,97
	Chronic alcoholism	74,81	N/appl	79,54
Case-management	Detected by GP	37,06	N/appl	21,39
	Direct addressing to the hospital	29,48	28,87	N/appl
Microbiological features	GeneXpert Rifampicin sensible	26,83	N/appl	N/appl
	GeneXpert Rifampicin resistant	21,32	N/appl	N/appl
Radiological features	Extensive TB in 2 lungs	69,79	N/appl	56,99
	Lung destruction	N/appl	22,71	N/appl
Outcome	Treatment success	25,98	28,09	N/appl

**Note:** N/appl - non applicable.

### Discussion

Summarizing the data it can be concluded that the Republic of Moldova showed a continuous decreasing of the long-term growth determinants according to the Global Competitiveness Report. It is evaluated as a country at the first stage of the economic development placed among the 35 poorest countries in the world. Tuberculosis burden placed the country on the 104<sup>th</sup> place with a financial impact of the disease on the economy – on the 88<sup>th</sup> place.

Low public financing contributed to the poor screening of high risk and hard-to-reach groups, deficiency in performing the effective anti-tuberculosis treatment and lack of interventions to resolve social and economical patients' problems.

Official statistical data established the decrease of the general population of the Republic of Moldova, increase of the urban population and the mortality rate. The obtained results proved that the inequalities are due to poor distribution of the financial resources for the public health care.

The uninsured part of the Moldovan population ranged from 20.3% to 24.5% (30% in the rural areas in 2008). Lack of the health care insurance contributed to the polarization of the health care services, low medical coverage of the high risk groups, deficient active screening and poor public health care control.

Although it was established a decreasing vectors of main tuberculosis epidemiological indices (incidence, prevalence and mortality) the epidemiological state of tuberculosis in the Republic of Moldova remains endangered.

### Conclusions

Attributable risk identified the main disparities between Moldovan regions. In the Chisinau group compared to the Balti group predominated patients in economical vulnerable state, without health insurance, GeneXpert MTB/Rifampicin sensible and those that finished the treatment with success. In the Balti group predominated chronic alcohol abusers or patients diagnosed with chronic alcoholism, co-morbid patients, severe pulmonary tuberculosis, patients addressed to the hospital due to broncho-pulmonary signs, infection with GeneXpert MTB/Rifampicin resistant strains of *Mycobacteria*.

The major differences between patients from the Chisinau and Cahul groups, with predominance in the Chisinau group were: homeless, co-morbid patients and those that successfully finished the treatment and in Cahul - rural resi-

dence, direct addressing to the regional hospital and severe tuberculosis. The differences between patients from the Balti and Cahul groups, with predominance in the Cahul group were: rural residence, economical vulnerable state and patient's detection by general practitioner. On the other hand in the Balti group predominated co-morbid patients, alcohol abusers or diagnosed with chronic alcoholism, patients with severe extensive tuberculosis complicated with lung destruction.

For reducing the impact of tuberculosis as a factor contributing to the country's low health care standards, there were recommended several measures, such as: social assistance of vulnerable groups, improvement of the general public life style, reducing the harmful habits (tobacco smoking, alcohol use and illicit drug use) and improvement of the community conditions.

Tuberculosis defined as a social-related disease associated with the defects in social organization needs implementation of the well established priority interventions included in new sustainable development goals.

### References

1. Biroul Național de Statistică a Moldovei. Accesul populației la serviciile de sănătate. Rezultatele studiului în gospodării [National Bureau of Statistics of the Republic of Moldova. Population accessibility to the health care services. Study results in households]. Chisinau, 2011.
2. Centrul Național de Management în Sanătate. Indicatori preliminari în format prescurtat privind sănătatea populației și activitatea instituțiilor medico-sanitare. [National Center for Health Management. Preliminary indices in shortened form regarding the public health and activity of medico-sanitary institutions] Chisinau, 2015.
3. Dubos J. The white plague, 1952.
4. Hargreaves J., Boccia D., Evans C. et al. The social determinants of tuberculosis from evidence to action. *Am J Public Health*. 2011; 101(4): 654–662.
5. Lonnroth K, Jaramillo E, Williams BG, Dye C, Raviglione M. Drivers of tuberculosis epidemics: the role of risk factors and social determinants. *Soc Sci Med*. 2009; 68(12): 2240–2246.
6. United Nations. Report on Millennium Development Goals. The Republic of Moldova. Chisinau, 2013.
7. World Health Organization. Commission on Social Determinants of Health. Action on the social determinants of health. Geneva, 2005.
8. World Health Organization. Human Rights, Health and Poverty Reduction Strategies. Geneva, Switzerland; 2008.
9. World Health Organization. Equity, social determinants and public health programmes, Geneva, 2010, 219 – 241.
10. World Health Organization. The global plan to stop TB 2011-2015: transforming the fight towards elimination of tuberculosis. Geneva, 2011.
11. World Economic Forum. The Global Competitiveness Report 2016-2017.