

CZU: 614.2:331.526(4)

ARGUMENTATION OF THE  
NEEDS IN HUMAN RESOURCES  
FOR PUBLIC HEALTH  
IN THE PROCESS OF COUNTRY'S  
ASSOCIATION TO EUROPEAN COMMUNITY

Valeriu PANTEA<sup>1</sup>, Aliona SERBULENCO<sup>2</sup>, Ion  
BAHNAREL<sup>1</sup>, Octavian GRAMA<sup>1</sup>, Victoria  
BUCOV<sup>1</sup>, Ion ȘALARU<sup>1</sup>, Larisa PANTEA<sup>3</sup>,

<sup>1</sup>Național Public Health Agency,

<sup>2</sup>Ministry of Health, Labour and Social Protection,

<sup>3</sup>Internațional Institute of Management "IMI-NOVA"

### Summary

The process of providing with human resources to a system or institution, including public health, depends on several factors: medical, social, economic, political etc. Periodically, along with the processes of development in society and the changes that occur, appears need to the adjust the forms of organization and functioning of these structures, including efficient and optimal assurance with a human resources. The article reflects the methodology and the results of the assessment study of the needs in human resource to ensure the realization of the 10 essential public health operations in the context of the development of the society and the community association of the country. For the public health service, the total human resource requirement of 4.68 functional units per 10,000 population was identified, including 3.76 units per 10,000 population - medical personnel (doctors, biologists, chemists, medical assistants) and 0,92 units per 10 thousand population - administrative-household and logistics personnel. This number of staff is distributed nationally, regionally and units designed for public health surveillance in administrative territories (district, municipality).

**Keywords:** public health, human resources, functional task, normative.

### Rezumat

**Argumentarea necesității în resurse umane pentru sectorul Sănătății publice la etapa de asociere a țării la comunitatea europeană**

Procesul de asigurare cu resurse umane a unui sistem sau instituție, inclusiv din domeniul sănătății publice, este dependent de mai mulți factori: medicali, sociali, economici, politici etc. Periodic, odată cu procesele de dezvoltare în societate și schimbările care intervin, apare necesitatea ajustării formelor de organizare și funcționare a acestor structuri, inclusiv de asigurare eficientă și optimală cu resurse umane. În articol sunt reflectate metodologia și rezultatele studiului de evaluare a necesității în resurse umane pentru asigurarea realizării celor 10 operațiuni esențiale ale sănătății publice, în condițiile de dezvoltare actuală a societății și de asociere comunitară a țării. Pentru serviciul de sănătate publică a fost identificată necesita-

tea totală în resurse umane de 4,68 unități funcționale de personal la 10 mii populație, inclusiv 3,76 unități la 10 mii populație –personal medical (medici, biologi, chimiști, asistenți medicali) și 0,92 unități la 10 mii populație personal administrativ-gospodăresc și de logistică. Acest număr de personal fiind repartizat eșalonat la nivel național, regional și unități destinate pentru supravegherea sănătății publice în teritoriile administrative (raion, municipiu).

**Cuvinte-cheie:** sănătate publică, resurse umane, sarcină funcțională, normativ.

### Резюме

**Обоснование потребностей в людских ресурсах для Общественного здравоохранения на этапе ассоциации страны в Европейское сообщество**

Процесс обеспечения человеческими ресурсами системы или учреждения, включая учреждения по надзору за общественным здоровьем, зависит от множество факторов: медицинских, социальных, экономических, политических и т.д. Периодически наряду с процессами развития общества и происходящими изменениями необходимо скорректировать организационные и функциональные формы этих структур, включая эффективное и оптимальное обеспечение человеческим потенциалом. В статье отражена методология и результаты оценки потребности в человеческих ресурсах для обеспечения реализации 10 приоритетных задач общественного здравоохранения, в контексте современного развития общества и европейской интеграции страны. Для службы общественного здравоохранения, было определено общее количество персонала в размере 4,68 функциональных единиц на 10000 населения, в том числе 3,76 единицы на 10000 населения - медицинский персонал (врачи, биологи, химики, медицинские помощники) и 0,92 единицы на 10 тысяч населения - для административно-хозяйственного и материально-технического обеспечения. Эти функциональные единицы были распределены на национальном и региональном уровнях, а также предусмотрены единицы для надзора за общественным здоровьем в административных территориях (районах и муниципиях). Ключевые слова: общественное здоровье, человеческие ресурсы, функциональные задачи, нормативы.

## Introduction

World Health Organization (WHO) experts underline that a strong health infrastructure in each country is the most effective strategy. This includes primarily health and human resources systems, the legal health infrastructure: laws and policies that fortify, and sometimes limit, governmental and private actions [18,23,26,36]. The public health workforce is vital, but in recent years most countries in the world have problems and difficulties that require adequate resolution. Challenges are complex, often involve factors of influence or multiple causal factors, and require appropriate solutions stemming from global objectives and strategies, prioritization and assessment of real conditions [8]. Building a surveillance system should be a robust process that begins with a gap analysis in each country, providing practical guidance how to establish health surveillance, identify responsibilities and set durable deadlines [10,28].

There are four key challenges in delivering optimal public health services with limited resources: insufficient human resources or labor capacities, insufficient education and training, inadequate infrastructure and quality, insufficient standards and accreditation can be identified in achieving the Sustainable Development Objectives [24,32,33]. It requires a special approach taken into account the general decline of the public health workforce as well as the current insufficient public health funding, both at the state level and at other levels [6,17,31].

The Global Health Security Agenda (GHSA) was launched in February 2014 to bring countries with limited capacity in line with the International Health Regulations (2005). Recent public health events such as the occurrence of coronavirus respiratory syndrome and the recurrence of Ebola in West Africa highlighted the importance of early disease detection and interconnection among countries. Surveillance systems that allow for rapid detection and recognition of reported events, a public health infrastructure that allows for rapid notification and the exchange of information inside and outside borders, a prepared workforce, including laboratory service, become critical components of a rapid alert and response system [1,3,4,16,19,22,25].

It is necessary to regard two areas of activity in public health, namely the prevention of non-communicable and communicable diseases. In recent years, several national programs have been developed for the prevention of non-communicable diseases, the achievement of which is related to the

provision of adequate medical knowledge and relevant knowledge in health education, psychological and behavioral interventions. Control (supervision) measures should focus on preventing and strengthening cross-sectoral collaboration, training opportunities in the implementation of research results to meet current needs. A broad partnership is required in the social, political and economic sectors [9,11,14,15,20,27].

To date, infectious diseases hold an important place for public health. It was estimated that over a period of five years in the European countries, one of 14 people had an infectious disease episode with a total burden of 1.38 million DALY (Disability-Adjusted Life Year). These results provide basic assessments for the evaluation of strategies for the prevention and control of infectious diseases [5].

Recognizing that infectious diseases occurring at the interface between human, animal and ecosystem health, the 2010 Integrated Surveillance of Infectious Diseases Strategy of the World Health Organization is an effective direction in combating infectious diseases in an integrated manner. Appropriate human resources, infrastructure and coordination are needed to achieve it [23,24]. Local health departments are the „backbone” in the public health emergency response plan. The first line of training for emergency responses is workers. Perceptions about the role of staff strongly affect the likelihood and performance of the response. The workers knowledge of their responsibilities should be measured and used as an indicator of service quality [12,13,30].

The periodic assessment of the size and structure of the health workforce precision caused by the permanent modification of the tasks and the conditions of the social and economic environment represents a research task under the present conditions. It is necessary to develop a standardized methodology for continuous monitoring of the size and professional structure of the public health workforce. In this area it is necessary to consider the contribution of both the public sector and the private sector [2,28].

Therefore, the assurance and development of human resources at different stages is changing and mandatory to be adjusted to the requirements of time, both quantitatively and qualitatively. In state supervision of public health, can be identified several stages in the human resources provision, each of them being determined by the health status of the population, the volume of tasks required for accomplishment, the level of development of the science in the field, the training of specialists

and, of course, the level of economic development of the country. The changes that have been made dictate the necessity to approach a new organizational paradigm, to achieve a reform of the human resources adjustment and the pooling of the professional potential, consistent with the newly created conditions, including the community association of the country.

Thus, the purpose of this paper was to evaluate and substantiate the objective need into human resources to ensure optimal public health surveillance under the conditions of community association of the country.

#### Material and methods

An analytical and descriptive cross-sectional study was carried out, which included the general sample of statistical data from the Public Health Surveillance Service regarding:

- the dynamics of the human resources provision of the institutions in the Service (in 1990-2017);
- the volume of priority activities performed by service specialists (in 2013-2017), according to the annual statistical reports;
- type of activities, depending on the profile of the specialties;
- the time needed to carry out each task (activities, measures);

The methods used to assess the number of staff in the service were: statistics, epidemiology, expertise and brainstorming. In this way, the statistical method was used in the analysis of data on the dynamics and structure of staff in the service (age, gender, length of service and field of activity). At the same time was evaluated the volume and structure of the activities carried out, namely: in the field of health promotion, surveillance, evaluation and control of communicable and non-communicable diseases, laboratory activity (sanitary, hygienic, radiological, toxicological, sanitary-physical, microbiological, parasitic and virological). The epidemiological method has been applied in assessing the epidemiological situation regarding the spread of diseases registered in the administrative territories (transmissible and non-communicable), the number of cases, the spread rate and their structure.

Expertise and brainstorming procedures have been applied in assessing and identifying the volume, type and structure of tasks and activities in terms of their differentiation, both in the field of public health surveillance and in the state health control/inspection activities [25].

The activities that have been taken to estimate the required number of staff in public health are

necessary to cover all 10 essential public health operations identified by the WHO and included in the National Public Health Strategy for 2014-2020 [37].

The algorithm for calculating the number of units to perform the 105 tasks (names of measures, activities and / or actions required at different levels), according to the 10 essential public health operations, provided for the following steps:

a) development of the program of division and stratification of the activities of the Service with their parallel codification in the light of the 10 essential public health operations.

b) forming the database for information analysis, which includes::

- identifying the number of objectives (subjects, positions, nuptials, or cases of illness etc.) requiring public health activities -Data from the official statistics of the SSSP Service, including multi-annual average data, were used, years 2013-2015) = number ( $N^{ob}$ );
- the rate-of-turn calculation (FTE), which represents the ratio of the total number of hours for the activity, the task or the action (full-time - from Monday to Friday) / the number of working hours per year specific);
- the estimation of the number of units for the type of activity, respectively  $(FTE) \times (N^{ob}) = (X_{1,2,3...n}) // \text{sau } (X_{1,2,3...n}) = (FTE_{1,2,3...n} * N^{ob})$  – the number of units to achieve the type of activity is obtained;
- the assessment of the amount of tasks and / or unpredictable (intermediate) workload, estimated by consensus of experts, where the calculation formula includes the adjustment coefficient ( $k^{S/imp}$ ), therefore the above formula having the expression -  $(X_{1,2,3...n}) = (FTE_{1,2,3...n} * N^{ob} * k^{S/imp})$ ;
- the FTE and  $(X_{1,2,3...n})$  evaluation procedure is repeated for all 105 types of activities (tasks) identified by experts, according to the 10 essential public health operations, with inclusion in working matrix (Table 1);
- At the same time as the brainstorming process, the expert group identifies at what stage (level) this type of activity will be carried out (national, regional or district level), with the gradual distribution of these activities.
- calculating the number of units of personnel by specialized profiles, is obtained by integrating the obtained values of the number of personnel units limit  $\Sigma = (X_{1,2,3...n})$  for specific (joint) activities;

- Finally, the number of staff units (abs.X n) by areas and levels (staggered) reports to the number of population with assessment of the personnel norm for the department (P %oo,o), respectively national and/or staggered at national and regional level (level of public healthsurveillance institutions, or sanitary inspection);
- c) for the R & D sector in public health, the number of staff units is determined by the team of research projects approved on a competitive basis, according to the research programs approved for funding by the central body in research and innovation and the Ministry of profile;
- d) for laboratory activities carried out in the field of public health surveillance, the number of personnel units is estimated in relation to the volume of

investigations carried out, according to the requirements of assessment standards for the respective type of investigations (microbiological, virological, physico-chemical, radio-chemical and radiological, parasitological, etc.);

e) the estimation of the number of auxiliary-household units is estimated according to the institutional capacities, the field instructions and the norms in force.

Thus, the Calculation Program matrix, for estimating the required number of staff units in public health, included the criteria outlined in the table above (Table 1).

**Results and discussions**

In the post-war period, the development of the human resources potential for public health

**Table 1**

*The matrix for estimating and evaluating the required number of staff units in public health (example)*

Name of the chapter on essential public health operations in - [EPHO-Essential Public Health Operations]	Name of activities	Activity code	Name of activity at national level	Name of activity at regional level	Detailed description of actions (sub-actions) at local level.
1	2	3	4	5	6
Example:EPHO2: Monitoring and response to health hazards and emergency situations // Emergencies in public health and extreme events.	Planning the set of activities to enable the country to implement the RSI2005 recommendations	2B1_100	Elaboration of draft regulations, emergency plans (generic, specific).- Perform the tasks of the focal point function within RSI2005.- Coordination of intervention methods.	Preparing the intervention team. - Response to threats	Specific intervention actions
n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>
continuation					
Number of goals(institutions, subjects, positions, jobs, sickness cases, etc.)	Calculating the value of the rate of (FTE <sub>1,2,...n</sub> ) <sup>1)</sup>	Adjustment or complexity / difficulty factor (k <sup>S/imp</sup> ) <sup>2)</sup>	Number of functional units (staff) calculated (full-time) to achieve the respective type of tasks / activities / actions (X <sub>1,2,...n</sub> )=(FTE <sub>1,2,...n</sub> *N <sup>ob</sup> );	Staggered level	Comments
7	8	9	10	11	12
5	1		5	National	Complex activity,adjustment / complexity factor = 0.2 (see box 9)
26	0,2	0,2 (*26)	5,2	Regional	
12	1		12	District	
n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>	n <sub>x...</sub> n <sub>x...</sub> n <sub>x...</sub>

<sup>1)</sup> FTE - The ratio between the total number of hours paid for the task (full-time, contracted from Monday to Friday) / the number of hours worked in this period / per year For example: We have three employees and work 50 hours, 40 hours and 10 hours a week - a total of 100 hours. Assuming that a full time employee works 40 hours a week, the full-time equivalent calculation is 100 hours divided by 40 hours or 2.5 FTE.

<sup>2)</sup> Coefficient of complexity / difficulty for additional (unpredicted) tasks, - appreciated by experts by consensus based on the application of the „Brainstorming” tehniqe

surveillance - a period characterized by the increased incidence of communicable diseases, outbreak of infectious diseases and epidemics, human resources provision takes place extensively, both by expanding its infrastructure capacities and by gradually increasing the number of specialists trained in the fight against infectious diseases. A significant increase in the number of specialists in the field was registered in the period of the 65s-80s of the 20th century - when the Government's leadership (read the Council of Ministers of the SSRM) and the Ministry of Health decided to intensify the training of specialists outside the Republic and its faculty departments (initially called the hygiene and sanitary faculty, then preventive medicine and finally public health). This historical decision subsequently contributed to the development of the professional potential of the service, being significant by increasing the number of specialists in the field, including highly qualified ones.

The extensive period of human potential development at work reached its „peak” at the end of 1989-1990. At this stage the number of personnel units in the service consisted of 6174 units, including medical staff about 4,500 individuals (epidemiologists, hygienists, laboratory physicians, biologists, chemists, doctors and assistants, disinfectants, laboratory workers, etc. - Statist Report of the 1990 Sanitary-Epidemiological Service (CNSP Statistical Database).

The period of the economic crisis in the society (after 1990) has negatively influenced the financial assurance of public health surveillance activities. During this period, the personnel outflow in the Service significantly increased, while the „voluntary” reduction of the state units took place, registering in the period 2014-2017 a total of only 2702 units, including medical staff (doctors and assistants) registering 1382 persons physical. Thus, lowering the number of staff units by 2.3 times in the field of public health surveillance, has led to an increase in the workload per unit of staff. At the same time, the new legislation and new health policies adopted during this period [38], public health is assigned a number of new tasks to be carried out according to the 10 basic public health operations (approved by the WHO), such as: monitoring of risk factors in the emergence of non-communicable diseases and determinants of health, promotion of healthy lifestyle, active participation in the elaboration and implementation of national health programs, coordination of intersectoral activities in the implementation of health policies at national and territorial level, etc. All these provisions are part of

the reform in public health, being included in the National Action Plan for the implementation of the Moldova-EU Association Agreement between 2014-2016 and 2017-2019. Therefore, it is necessary to resize the functional structure, to prioritize and to improve the efficiency of public health activities.

As part of the monitoring of public health surveillance, data and information are needed to develop decision-making proposals to improve the health of the population through measures and activities to prophylaxis and prevent diseases, protect and promote health by eliminating and / or reducing risks for health. Data and information that includes:

- health and prognostic analysis results;
- data on the volume of activities carried out and the number of supervised objectives;
- evidence of draft normative acts, methodological documents, methods and instructions;
- results of laboratory activity (volume, structure): data on nutrition and identification of pathogens, environmental status and risk factors, etc.

Following the algorithm set out in the above matrix (Table 1), the number of medical staff units in the field of public health surveillance, at the implementation stage of the reform and activity under the conditions of community association of the country was estimated for the first time. Thus, have been calculations made to estimate the number of human resources units for all directions and activities provided by the basic public health operational tasks (EPHO), which included: (a) surveillance and control of communicable diseases; (b) control of non-communicable diseases (c) health promotion, (d) health inspection (e) laboratory work and (h) research and innovation activity in public health.

In the surveillance and control of communicable diseases, including the control of health programs implementation, were estimated 239.9 staff units (Table 2) for the response to public health emergencies and the implementation of the provisions of the International Health Regulations (RSI 2005). The distribution of the latter, depending on the functional competencies and the level of organization, was staggered with a structural share of: 22.6% at national level, 51.2% - regional level and 26.2% territorial (district, municipality). Therefore, some staff units will be found only at national or regional level, such as supervision of healthcare associated infections, surveillance of biocide use, monitoring of contacts with tuberculosis, HIV and hepatitis but also implementation of RSI 2005.

**Table 2**

Number of staff units estimated to carry out surveillance and control activities for communicable diseases at national, regional and territorial level (absolute data)

Name of domain and activities (tasks)	Public health surveillance at the level			
	National	Regional	Administrative district	Total
A	1	2	3	4
Management sources and instruments of sanitary data, including:	4,0	16,0	15,0	35,0
Keeping and compiling registries for communicable diseases / managing database of communicable diseases and population immunization.	4,0	16,0	15,0	35,0
Surveillance of the implementation of health programs and of communicable diseases among the population, including:	38,3	94,8	42,6	175,7
Surveillance of communicable diseases	17,0	23,0	21,0	61,0
Surveillance of healthcare associated infections	3,1	13,8	x	16,9
Surveillance of biocidal use and licensing activity in the field.	2,6	x	x	2,6
Management of cases of communicable diseases, eruptions and epidemics	2,0	10,0	14,0	26,0
Coordination of communication and raising public awareness on HIV; TB and other communicable diseases.	11,8	17,0	5,0	33,8
Monitoring of contacts with tuberculosis, HIV and hepatitis (according to national programs)	0,2	17,0	x	17,2
Providing knowledge and epidemiological training. Public health education for stakeholders, communicating with the population in the field of communicable diseases.	1,6	14,0	2,6	18,2
Preparation and response to public health emergencies, including:	5,0	12,0	5,2	22,2
Drafting normative acts, regulations, emergency plans (generic, specific). Methodological Coordination of intervention activities. Responding to threats. The focal point function in implementing IHR 2005.	5,0	12,0	5,2	22,2
Implementation of the International Health Regulations (IHR 2005), including:	7,0	x	x	7,0
Strengthening and preparing national public health capacities for surveillance and response, in line with IHR 2005. The operation of the Information Center for poisoning, epidemic eruptions, etc.	7,0	x	x	7,0
<b>TOTAL</b>	<b>54,3</b>	<b>122,8</b>	<b>62,8</b>	<b>239,9</b>

An extensive and important field of public health surveillance is present through the activities of protecting the health of the population in relation to the environmental factors, including the occupational environment, which also include

sanitary control activities (inspection) in the accomplishment of sanitary legislation, assessment of the values of the environmental factors rules, hygiene standards, including powers to enforce administrative restrictions. In this area, were valued for this ac-

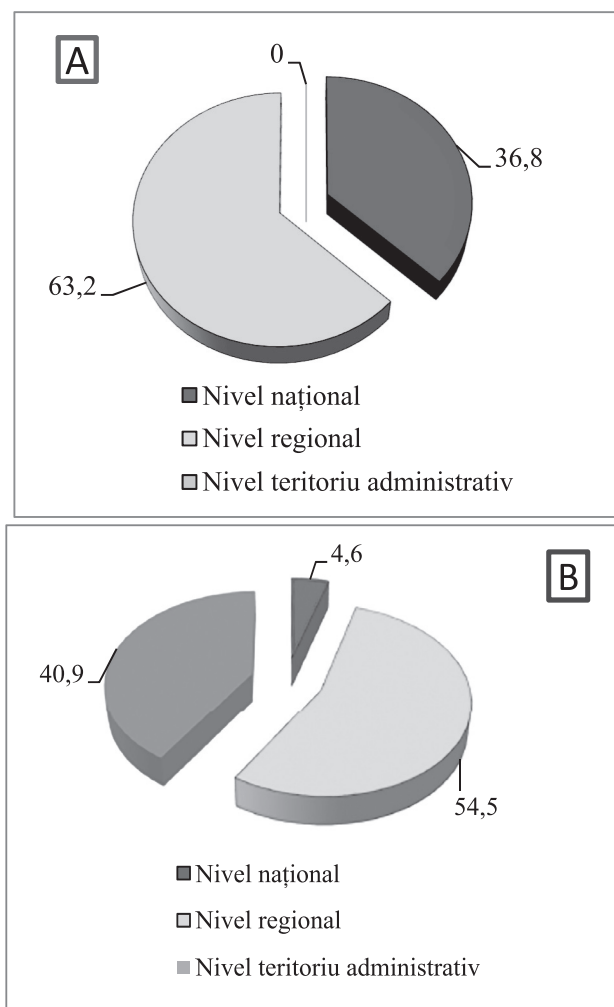
**Table 3**

*Number of staff units estimated for carrying out activities in the field of health protection related to environmental factors, including the occupational environment, at national, regional and territorial level (absolute data)*

Name of domain and activities (tasks)	Public health surveillance at the level				Sanitary inspection at level				TOTAL
	National	Regional	Administrative district	Total PHS	National	Regional	Administrative district	Total Health Inspection	
A	2	3	4	5	6	7	8	9	10
Health protection in relation to environmental factors, including:	42,0	59,5	0	101,5	10,0	114,8	72,1	196,9	298,4
Developing the regulatory framework in the field of environmental health	4,0	x	x	4,0	x	X	x	X	4,0
Methodological guidance, educational materials in public health	5,0	x	x	5,0	x	X	x	X	5,0
Risk assessment and intervention measures in planning, regular reporting of ecological health	29,0	46,5	x	75,5	x	X	x	X	75,5
Surveillance and inspection of drinking water and bathing water	x	x	x	x	2,0	32,3	17,0	51,3	51,3
Supervision of youth and social assistance institutions	x	x	x	x	1,0	11,7	9,1	21,8	21,8
Surveillance of chemical safety of products and services	x	x	x	x	1,0	29,0	x	30,0	30,0
Surveillance and control of physical factors (sonic pollution, vibration and ionizing and non-ionizing radiation)	x	x	x	x	2,0	17,8	20,0	39,8	39,8
Preventive environmental health surveillance, licensing / authorizing	x	9,0	x	9,0	x	x	x	x	9,0
Management of registers / databases on environmental factors, monitoring, data collection and assessment of the surveillance process.	4,0	4,0	x	8,0	x	x	x	x	8,0
Surveillance of air quality from exterior environment.	x	x	x	x	1,0	4,2	10,0	15,2	15,2
Supervision of waste management	x	x	x	x	1,0	6,8	4,0	11,8	11,8
Sanitary soil surveillance	x	x	x	x	1,0	7,3	4,0	12,3	12,3
Surveillance of the hygienic quality of surface and bathing water	x	x	x	x	1,0	5,6	8,0	14,6	14,6
Occupational health and health protection, including:	4,0	19,5	x	23,5	1,0	15,7	26,0	42,7	66,2
Developing policy projects, strategies, projects and action plans to promote health in the field	4,0	x	x	4,0	x	x	x	x	4,0
Coordination and implementation of projects for the promotion of occupational health, licensing activity in the field	x	7,5	x	7,5	x	x	x	x	7,5
Occupational health risk assessment and planning of surveillance and laboratory testing	x	12,0	x	12,0	1,0	0,0	x	1,0	13,0
Supervision of the health conditions at the workplace with the accomplishment of the sanitary inspection at the workplace	x	x	x	x	x	15,7	26,0	41,7	41,7
<b>TOTAL</b>	<b>46</b>	<b>79</b>	<b>0</b>	<b>125</b>	<b>11</b>	<b>130,4</b>	<b>98,1</b>	<b>239,5</b>	<b>364,5</b>

tivity 364.5 units of medical personnel, out of which 125 units or 34.4% for public health surveillance, and the rest of the medical staff, about 65.6% or 239.5 units, for sanitary inspection (Table 3).

It should be noted that by applying the methods of expertise and „brainstorming”, through the consensus of all experts, it was done for the first time the deduction of activities in this field. Thus, health surveillance in the field of health protection in relation to environmental factors will be accomplished in 8 task chapters by national and regional staff. And, the other tasks in the field of health protection in relation to the environmental factors, the activities will be carried out by the staff of the sanitary inspection. The latter will include with the sanitary inspection services the national, regional and administrative territory (rayon, municipality). The distribution structure of the 364.5 units of medical staff at organizational levels is shown in Figure 1 (A) and (B).



**Figure 1.** Structure of distribution of medical personnel units at levels of organizing health surveillance (A) and carrying out health inspection (B) in the field of health protection in relation to environmental factors, including the occupational environment (in%).

Another new field, stipulated in the local legislation (Law no.10 of 03.02.2009), provided also by the basic operational tasks of public health, is intended for the control of non-communicable diseases, determinants of health and health promotion. The need for medical staff to ensure the achievement of non-traceable disease control, health determinants and health promotion tasks was estimated in a total of 142.9 functional units, including: 82.0 staff in health surveillance, and 61 staffing in this chapter - for carrying out the sanitary inspection in the field (Table 4).

**Table 4**

Number of staff units estimated for non-communicable disease control, determinants of health, and health promotion at national, regional and territorial level (absolute data)

Name of domain and activities (tasks)	Public health surveillance at the level				Sanitary inspection at level				TOTAL
	National	Regional	Administrative district	Total PHS	National	Regional	Administrative district	Total Health Inspection	
A	1	2	3	4	5	6	7	8	9
Integrated health approach to behavioral, social and environmental determinants, namely:									
In the field of tobacco control (tabacism)	11,5	22,0	x	33,5	x	x	x	X	33,5
In the area of reducing alcohol consumption	5,0	4,5	x	9,5	x	x	x	X	9,5
In the field of healthy nutrition	14,0	20,0	x	34,0	1,0	36,9	23,1	61,0	95,0
In the field of children's health	1,0	x	x	1,0	x	x	x	x	1,0
In the field of accident prevention	2,0	2,0	x	4,0	x	x	x	x	4,0
Total	33,5	48,5	x	82,0	1,0	36,9	23,1	61,0	142,9

Thus, in the control of non-traceable diseases and surveillance of the health status of the population, in relation to the determinants of health, as well as for the promotion of health, the medical personnel units will be destined, for the realization of:

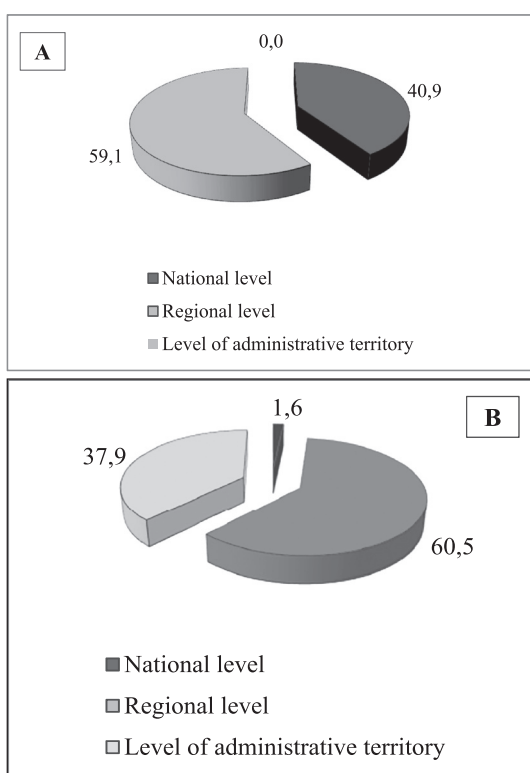
- tobacco control tasks (tabacism);
- activities to reduce alcohol consumption;
- the tasks of organizing and promoting healthy nutrition among the population;



- activities to strengthen and promote health among children, including healthy nutrition,
- accident prevention activities.

All of these are aimed at prevention, prophylaxis and reduction of incidence through non-communicable diseases.

Taking into account the specific nature of non-transmissible disease surveillance tasks, health determinants and health promotion activities, which are essentially oriented towards the elaboration and development of policy projects in the field, strategic planning and coordination of control programs; development and implementation of communication strategies for raising awareness of the population, media support and media relations in the field, development and maintenance of WEB-information tools and publications in the field, etc. - institutional staff will be allocated 40.9% nationally and 59.1% regional, coordinating the achievement of these activities up to the level of administrative territory and communities. In order to control the implementation of the normative acts in this field, the medical personnel will predominantly carry out health inspection activities, at national level with 1.6% of the personnel, at the level of the region 60.5% and for the administrative rayon territories - 37.9% units of personnel (Figure 2 (A) and (B)).



**Figure 2.** Distribution of medical personnel units at levels: (A) organization of health surveillance and (B) for health inspection, in the field of non-communicable diseases control, health determinants and health promotion (in %).

The effectiveness of disease prevention measures and the impact of these measures on reducing the socio-economic and social burden for society is indisputable. The number of medical staff estimated to perform these activities, according to the calculations made, by the expertise of the activities in this field, was 99,4 functional units (Table 5).

**Table 5**

Number of staff units estimated to carry out primary and secondary prevention activities at national, regional and administrative level (absolute data)

Name of domain and activities (tasks)	Public health surveillance at the level			
	National	Regional	Administrative district	Total PHS
A	2	3	4	5
Primary disease prevention (specific prophylaxis)	5,2	36,0	53,3	94,4
Vaccine management - Purchase, preservation and distribution of vaccines for the National Immunization Program.	0,4	18,1	26,9	45,4
Managing the National Vaccination Depot	0,8	x	x	0,8
Supervising and organizing the implementation of the National Immunization Program.	4,0	16,9	26,3	47,2
Developing information on immunization at regional level.	x	1,0	x	1,0
Secondary prevention of diseases	3,0	2,0	x	5,0
Planning and coordinating the implementation of screening programs (ex. breast, cervical and colon cancer, etc.) in cooperation with health insurance structures and the national statistical office.	2,0	2,0	x	4,0
Data collection, analysis and monitoring of progress of the indicators, surveys to assess the situation and quality of screening, reporting to MHLSP and other stakeholders.	1,0	x	x	1,0
Total	8,2	38	53,3	99,4

Most of these staff units are intended for the organization and implementation of primary prevention measures for immunodiagnosis, estimated at 94,4 units, with a national distribution of 5,2 points, 36,0 regional units at the regional level, and at the level of administrative territory – 53,3 functional units. The medical staff in the given field will have the following tasks: „*Surveillance and management of vaccines, their acquisition, preservation and distribution in territories for the implementation of the provisions of the National Immunization Program; coordinating, monitoring and reporting information on vaccine coverage of the population and achieving targets at territorial, regional and national level*„.

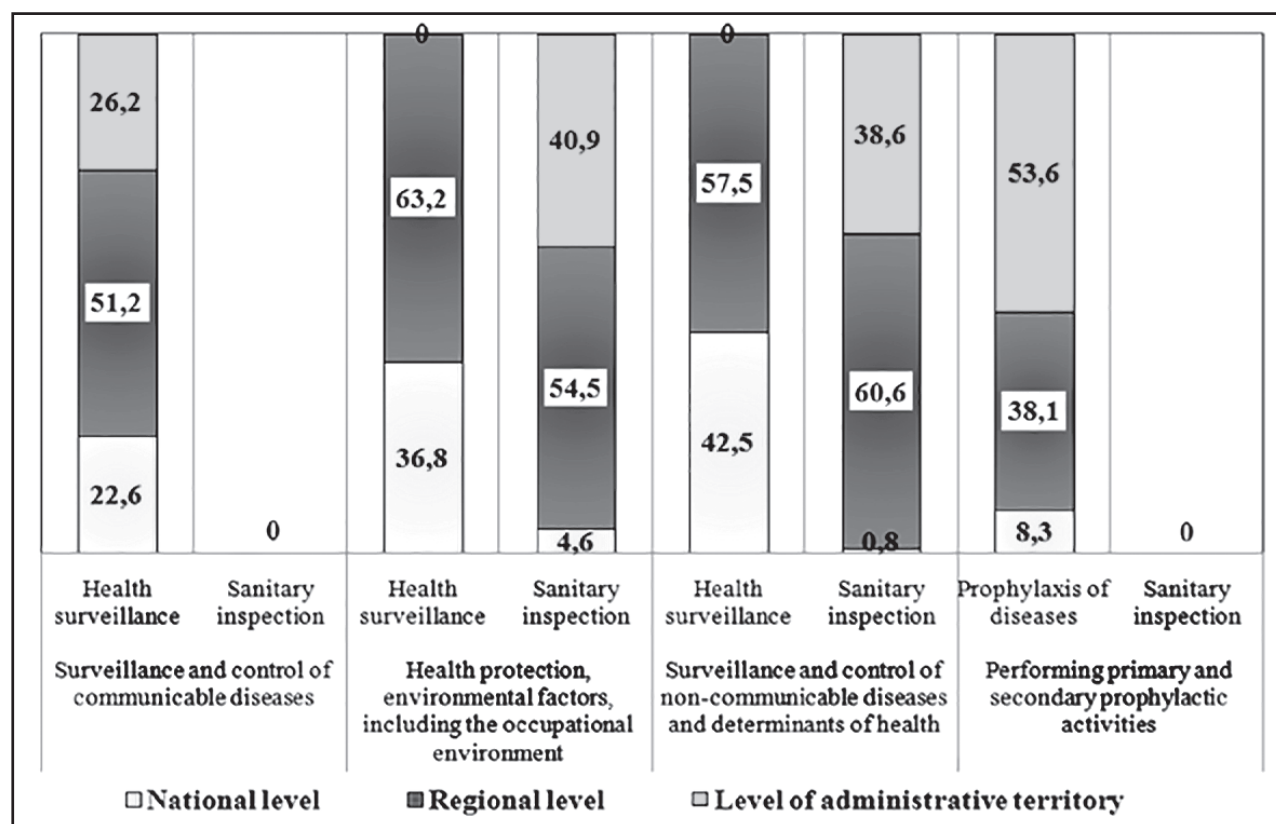
For the implementation of secondary disease prevention measures are provided 5 units of personnel, of which 3 units at national level and 2 units at the regional level (with one in the two cities: Chisinau and Balti). It is their task to implement measures „*Planning and coordinating the implementation of screening programs (eg breast, cervical and colon cancer, etc.) in co-operation with health insurance and with the national statistical office; collecting data, analyzing and monitoring*

*progress indicators, conducting surveys to assess the situation and quality of screening, reporting to MHLSP and other stakeholders, etc.*„

An integral view of the distribution structure of the number of medical personnel units for public health surveillance denotes the placement of the functions of organizing the public health surveillance processes from the national level to the regional level - empowered with the implementation of the disease prevention, protection and promotion measures of health (Figure 3).

The national level, represented by the central body - the National Public Health Agency (HPHA), subordinated to the Ministry of Health, Labor and Social Protection, is empowered with the tasks of arguing and elaborating the public health policies, elaborating the normative and methodical support in the supervision of state of public health, health inspection coordination activities, and expertise based on evidence from scientific research and highly specialized laboratory diagnosis.

The regional level, present through the 10 territorial structures of the NPHA, has specialized subdivisions with a sufficient number of medical staff units - capacities capable of carrying out public health surveillance measures in the service areas.

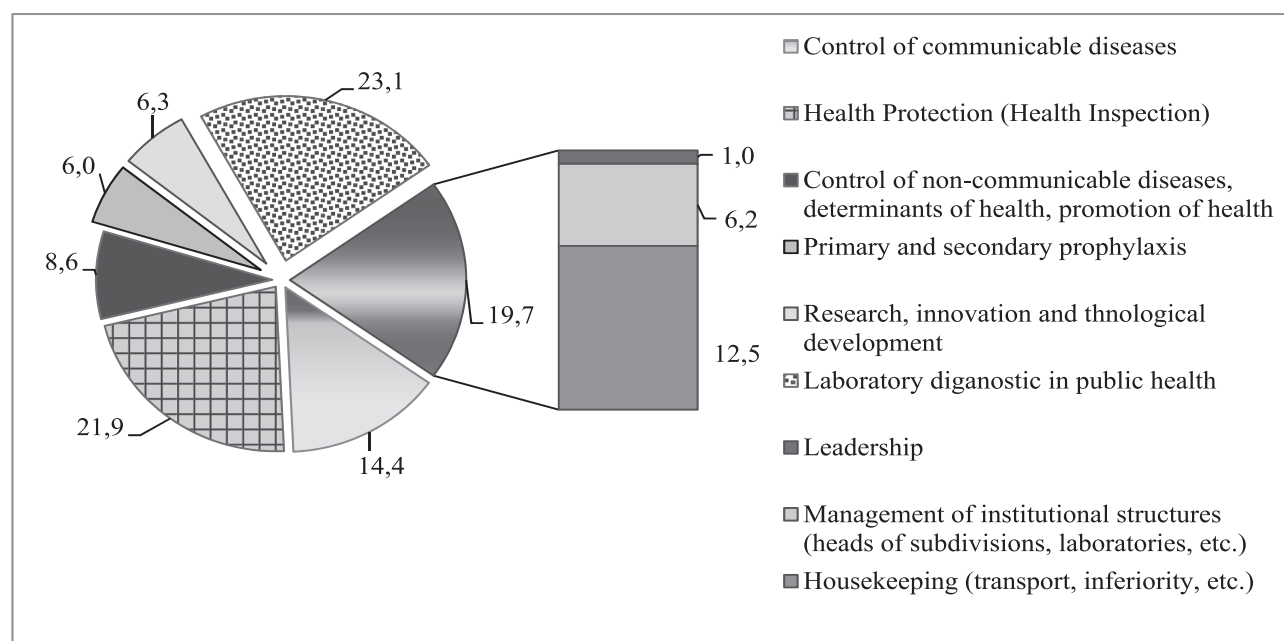


**Figure 3.** Structure of the distribution of the number of medical personnel units at the stages of organizing state public health surveillance, in terms of the fields of activity (in %).

**Table 6**

Number of staff units estimated for ensurance state public health surveillance (absolute data and to 10 thousand population)

Fields of activity in public health surveillance	National level		Regional level		Level of administrative district		Total		
	abs. no.	to 10 thousand population	abs. no.	to 10 thousand population	abs. no.	to 10 thousand population	abs. no.	to 10 thousand population	
Surveillance and control of communicable diseases	54,3	0,15	122,8	0,35	62,8	0,18	239,9	0,68	
Health protection in relation to environmental factors, including	57	0,16	209,4	0,59	98,1	0,28	364,5	1,03	
- health surveillance	46	0,13	79	0,22	0	0,00	125	0,35	
- health inspection	11	0,03	130,4	0,37	98,1	0,28	239,5	0,67	
Control of non-communicable diseases and determinants of health and promotion of health, including:	34,5	0,10	85,4	0,24	23,1	0,07	142,9	0,40	
- health surveillance	33,5	0,09	48,5	0,14	0	0	82	0,23	
- health inspection	1	0,003	36,9	0,10	23,1	0,07	60,9	0,17	
Primary and secondary prophylaxis	8,2	0,02	38	0,11	53,3	0,15	99,4	0,28	
Subtotal 1.	154	0,43	455,6	1,28	237,3	0,67	846,7	2,38	
Research, innovation and technological development	105	0,30	0	0	0	0	105	0,30	
Laboratory diagnosis in public health	98	0,28	270	0,76	0	0	385	1,08	
Subtotal 2.	203	0,57	270	0,76	0	0	490	1,38	
Sum of subtotals =1+ 2	357	1,01	725,6	2,04	237,3	0,67	1336,7	3,76	
Personnel Units for Institutional Management in Public Health Surveillance									
Management of Public Health Institutions							17	0,05	
Institutional management (coordination, analysis, planning, financing, control, audit ...)							104	0,29	
Administrative-household service (maintenance and logistics personnel).							207,3	0,58	
TOTAL:							1665	4,68	



**Figure 4.** Structural distribution of staff for the provision of public health services (in %)

The population at the territorial-administrative level (rayon, municipium) will be provided with public health services, provided mainly by the regional structures and under their coordination, the latter will organize the public health surveillance, health inspection, and prevention, prophylaxis and health promotion.

Thus, by reporting the units of personnel obtained (at each of the stages of organizing public health measures), to the number of the population of the country, it allowed to identify for the first time the normative of the personnel units required for the state public health surveillance (Table 6).

Thus, by final decisions, total medical personnel (doctors, assistants) constituted 3.76 units per 10000 inhabitants, and in common with the management, maintenance and logistics (household) staff, the level of human resources insurance in public health surveillance of the population, is made up of 4.68 units of personnel per 10 thousand inhabitants. Although, initially these units of 4.68 were intended only for medical staff. Therefore, the staggered distribution of medical staff is 1.01 units 10 thousand population - to carry out activities at national level, 2.04 units per 10 thousand inhabitants - at regional level, and 0.67 units per 10 thousand population for supplying public health services - at the level of administrative territory (district, municipality). Full staff structure - see Figure 4.

### Conclusions:

1. In the context of the austerity budgeting of public health services, the methodology for estimating the optimal need in human resources, means oriented towards the priority assurance of the 10 essential public health operations, was first applied.

2. The application of the expertise method and the brainstorming procedure in assessing the volume of public health surveillance activities has led to the argumentation and optimization of the human resources need by distributing in a staggered manner the number of personnel units in the health surveillance structures public.

3. The results of the brainstorming expertise and procedure played a key role in arguing that public health surveillance measures should be deduced by identifying separately the potential human (medical) values for public health surveillance and sanitary inspection, including the stages of provision of public health services for the population.

4. Implementation of the estimated norm of medical personnel according to the deduced criteria

will contribute to the elimination of the inequality and voluntary assurance of the population of the country with staff in public health.

### Reference bibliography:

1. Balajee SA, Arthur R, Mounts AW et al. Global Health Security: Building Capacities for Early Event Detection, Epidemiologic Workforce, and Laboratory Response. *eHealth Secur.* 2016 Nov/Dec;14(6):424-432.
2. Beck AJ, Boulton ML, Coronado F. Enumeration of the governmental public health workforce, 2014. *Am J Prev Med.* 2014 Nov;47(5 Suppl 3):S306-13.
3. Beck AJ, Leider JP, Coronado F, Harper E. State Health Agency and Local Health Department Workforce: Identifying Top Development Needs.
4. Bernstein JA, Friedman C, Jacobson P, Rubin JC. Ensuring public health's future in a national-scale learning health system. *Am J Prev Med.* 2015 Apr;48(4):480-7.
5. Cassini A, Colzani E, Pini A et al. Impact of infectious diseases on population health using incidence-based disability-adjusted life years (DALYs).. *Euro Surveill.* 2018 Apr;23(16).
6. Chung C, Fischer LS, O'Connor A, Shultz A. CDC's „Flexible” Epidemiologist: A Strategy for Enhancing Health Department Infectious Disease Epidemiology Capacity. *J Public Health Manag Pract.* 2017 May/ Jun;23(3):295-313. 01
7. Deokar AJ, Dellapenna A, DeFiore-Hyrmer J et al. State Injury Programs' Response to the Opioid Epidemic: The Role of CDC's Core Violence and Injury Prevention Program. *J Public Health Manag Pract.* 2018 Jan/Feb;24 Suppl 1 Supplement, Injury and Violence Prevention:S23-S31.
8. Drehobl P, Stover BH, Koo D. On the road to stronger public health workforce: visual tools to address complex challenges. *Am J Prev Med.* 2014 Nov;47(5 Suppl 3):S280-5.
9. Engelgau MM, Narayan KMV, Ezzati M et al. Implementation Research to Address the United States Health Disadvantage: Report of a National Heart, Lung, and Blood Institute Workshop. *Glob Heart.* 2018 Apr 28. pii: S2211-8160(18)30059-0.
10. Estenssoro E, Alegria L, Murias G et al. Organizational Issues, Structure, and Processes of Care in 257 ICUs in Latin America: A Study From the Latin
11. Gostin LO, Abou-Taleb H, Roache SA, Alwan A. Legal priorities for prevention of non-communicable diseases: innovations from WHO's Eastern Mediterranean region. *Public Health.* 2017 Mar;144:4-12.
12. Hadler JL, Lampkins R, Lemmings J et al. Assessment of epidemiology capacity in state health departments - United States, 2013. *MMWR Morb Mortal Wkly Rep.* 2015 Apr 17;64(14):394-8.
13. Hanin MCE, Queenan K, Savic S et al. A One Health Evaluation of the Southern African Centre for Infectious Disease Surveillance. *Briss P Front Vet Sci.* 2018 Mar 16;5:33. 5(1):40. *Am J Public Heal-*

- th. 2017 Sep;107(9):1418-1424. America Intensive Care Network. *Crit Care Med.* 2017 Aug;45(8):1325-1336.
14. Hattori K, Uda H, Hitomi Y et al, The current situation and agendas in the prevention and control of non-communicable diseases in Vietnam. *Nihon Koshu Eisei Zasshi.* 2018;65(4):170-178.
  15. Hotărârea Guvernului nr.1032 din 20.12.2013, cu privire la aprobarea Strategiei naționale de sănătate publică pentru anii 2014-2020./ Publicat : 27.12.2013 în Monitorul Oficial Nr. 304-310 art Nr : 1139 și [The 10 Essential Public Health Operations-EPHO/Europe] <http://www.euro.who.int/en/health-topics/Health-systems/public-health-services/policy/the-10-essential-public-health-operations>
  16. Jiao M, Ning N, Wu Q et al. Determinants of emergency response responseability perceptions in the local public healthworkforce after China's health sector restructuring *BMC Health Serv Res.* 2015 Aug 21;15:339..
  17. Kenefick HW, Ravid S, MacVarish K et al. On your time: online train On the road to a stronger public health workforce: visual tools to address complex challenges. *Health Promot Pract.* 2014 Mar;15(1 Suppl):48S-55S-p
  18. Khan S, Shea CM, Qudsi HK. Barriers to Local Public Health Chronic Disease Surveillance Through Health Information Exchange. *J Public Health Manag Pract.* 2017 May/Jun;23(3):e10-e17.
  19. Latshaw MW, Degeberg R, Patel SS et al. Advancing environmental health surveillance in the US through a national human biomonitoring network. *Int J Hyg Environ Health.* 2017 Mar;220(2 Pt A):98-102.
  20. Lovelace KA, Aronson RE, Rulison KL et al. Laying the groundwork for evidence-based public health: why some local health departments use more evidence-based decision-making practices than others. *Am J Public Health.* 2015 Apr;105 Suppl 2:S189-97.
  21. Low WY, Lee YK, Samy AL. Non-communicable diseases in the Asia-Pacific region: Prevalence, risk factors and community-based prevention. *Int J Occup Med Environ Health.* 2015;28(1):20-6.
  22. Mahmoud MA, Al-Zalabani AH, Bin Abdulrahman KA. Public health education in Saudi Arabia: Needs and challenges. *Med Teach.* 2016;38 Suppl 1:S5-8.
  23. Mandyata CB, Olowski LK, Mutale W. Challenges of implementing the integrated disease surveillance and response strategy in Zambia: a health worker perspective. *BMC.C Public Health.* 2017 Sep 26;17(1):746.
  24. Marks-Sultan G, Tsai FJ, Anderson E, et al. National public health law: a role for WHO in capacity-building and promoting transparency. *Bull World Health Organ.* 2016 Jul 1;94(7):534-9.
  25. Andres Rannamäe, Rein Parelo, Martin Nurmik. Feasibility Study to Determine the Feasibility of Developing a Tool for Human Resource Capacity Assessment. September – October 2016
  26. Marucci-Wellman HR, Lehto MR, Corns HL. A practical tool for public health surveillance: Semi-automated coding of short injury narratives from large administrative databases using Naïve Bayes algorithms. *Acid Anal Prev.* 2015 Nov;84:165-76.
  27. Nuttall I, Miyagishima K, Roth C, de La Rocque S. The United Nations and One Health: the International Health Regulations (2005) and global healthsecurity. *Rev Sci Tech.* 2014 Aug;33(2):659-68.
  28. Perovic O, Schultsz C. Stepwise approach for implementation of antimicrobial resistance surveillance in Africa. *Afr J Lab Med.* 2016 Oct 31;5(3):482.
  29. Phalkey RK, Butsch C, Belesova K et al. From habits of attrition to modes of inclusion: enhancing the role of private practitioners in routine disease surveillance. *BMC Health Serv Res.* 2017 Aug 25;17(1):599.
  30. Phiri SC, Prust ML, Chibawe CP, Misapa R. An exploration of facilitators and challenges in the scale-up of a national, public sector community health worker cadre in Zambia: a qualitative study. *Hum Resour Health.* 2017 Jun 24;1,
  31. Qi X, Wang Y, Xia L et al. Cross-sectional survey on public health informatics workforce in China: issues, developments and the future. *Public Health.* 2015 Nov;129(11):1459-64.
  32. Reese SM, Gilmartin HM. Infection prevention workforce: Potential benefits to educational diversity. *Am J Infect Control.* 2017 Jun 1;45(6):603-606.
  33. Singh GK, Daus GP, Allender M et al. Social Determinants of Health in the United States: Addressing Major Health Inequality Trends for the Nation, 1935-2016. *Int J MCH AIDS.* 2017;6(2):139-164.
  34. Wilson ML, Fleming KA, Kuti MA et al. Access to pathology and laboratory medicine services: a crucial gap. *Lancet.* 2018 May 12;391(10133):1927-1938.
  35. Yang S, Santillana M, Brownstein JS et al. Using electronic health records and Internet search information for accurate influenza forecasting. *BMC Infect Dis.* 2017 May 8;17(1):332.
  36. World Health Organization. [Internet]. Self-assessment tool for the evaluation of essential public health operations in the WHO European Region. 2015 [cited 23 October 2016]. Available from: [http://www.euro.who.int/data/assets/pdf\\_file/0018/281700/Self-assessment-tool-evaluation-essential-public-health-operations.pdf?ua=1](http://www.euro.who.int/data/assets/pdf_file/0018/281700/Self-assessment-tool-evaluation-essential-public-health-operations.pdf?ua=1)
  37. Government Decision No. 1032 of December 20, 2013, regarding the approval of the National Public Health Strategy for the years 2014-2020./ Published: 27.12.2013 in the Official Gazette no. 304-310 art Nr: 1139 and [The 10 Essential Public Health Operations - EPHO / <http://www.euro.who.int/en/health-topics/Health-systems/public-health-services/policy/the-10-essential-public-health-operations>]
  38. Law on Public Health Surveillance / no. 10-XVI from 03.02.2009 / Official Monitor no.67 / 183 of 03.04.2009.