



# Overview of the pediatric healthcare system in Romania

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## Abstract

Until 1989, Romania was one of the countries of the communist bloc in Europe and its healthcare system was characterized by centralized planning and severe underfunding, with low performance and low quality healthcare. Since 1998, Romania replaced the Semashko model with a social health insurance system, highly centralized under the management of the Ministry of Health as the central administrative authority. After joining the European Union, quality of life increased in our country and there were efforts to improve the quality of healthcare, including pediatric and neonatal care. Still, Romania has the lowest share of health expenditure of gross domestic product among the European Union Member States and the lowest level of expenditure per inhabitant. The Romanian health system is organized on three levels of assistance: primary, secondary and tertiary assistance. This overview presents the organization and the characteristics of pediatric and neonatal healthcare in Romania at all levels, the infrastructure and the human resources, the educational system from medical school to pediatric residency, professional organizations, national health programs, and the child health status in Romania. Infant mortality, the most descriptive single indicator of the quality of a health system, decreased constantly for the last 30 years in Romania, but is still the highest in the European Union. Even though there were great improvements in the healthcare for children, more efforts should be made to assure a better quality of care for the future of our nation, both on the human resources (in great danger due to the brain-drain of medical professionals during the last 12 years), and on the infrastructure plan.

**Keywords:** Children, healthcare system, medical education, Romania, primary care, school medicine

## Introduction

Romania, situated in the south-east of Central Europe, in the north of the Balkan Peninsula, is the 8<sup>th</sup> largest country of the European Union (EU). The population of Romania is the 7<sup>th</sup> largest in the EU but has been declining for the last 28 years.

Until 1989, Romania was one of the countries in the communist bloc in Europe and its healthcare system was characterized by centralized planning and severe under-

funding with low performance and low quality healthcare. Since 1989, the political changes brought improvements in life quality, mainly after joining the EU in 2007. One of the areas of improvement in Romania is the healthcare system, which was redesigned, but still faces many difficulties in providing healthcare for our population at the standards requested by the quality of an EU member state.

Based on economic performances, Romania is among the upper-middle-income countries with a GDP of 10,932

**Cite this article as:** Pop TL, Burlea M, Pecurariu OF, et al. Overview of the pediatric healthcare system in Romania Turk Pediatr Ars 2020; 55(Suppl 1): S69–S84.

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DOI: 10.14744/TurkPediatriArs.2020.7775

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**Table 1. Demographic and economic data of Romania compared with the European Union (1–5)**

	Romania		European Union
	1990	2018	(EU-28)
Surface (km <sup>2</sup> )	238.397	238.397	4,422.773
Population (millions)	23.20	19.64 (2017)	511.81 (2017)
Children 0–14 years (%)	23.56	15.56 (2017)	15.43 (2016)
Live births (/1000 inhabitants)	13.56	9.6	10.1
Infant mortality rate (/1000 inhabitants)	26.9	7.2 (2017)	3.7 (2015)
Maternal mortality rate	83.56	11.44 (2012)	
Natural increase (/1000 inhabitants)		-3.7	0
Average life expectancy (years)	69.79	75.6	81
Yearly average inflation rate (%)	–	1.1	1.7
Unemployment rate (%)	–	4.5 (2018)	7.6
Youth unemployment rate (%)	–	16.8 (2018)	15.6 (2018)
GDP per capita (US\$)	1.680	10.932 (2017)	29.950 (2017)
Relative poverty rate (%)	–	19.8 (2015)	10.8 (2015)
Share of healthcare expenditure in GDP (%)	3.2 (1995)	5 (2015)	7.2
Share of social protection expenditure in GDP (%)	–	14.6 (2015)	29
Share of the research and development expenditure in GDP (%)	–	0.48 (2015)	2.03
GDP growth rate (%)	–	4 (2017)	2.4

GDP: Gross domestic product

US\$, but with the 2<sup>nd</sup> highest rate of poverty among the EU Member States (1, 2).

The administrative organization of Romania's territory is based on 42 counties (including the capital city Bucharest), 103 municipalities, 217 towns, and 2861 communes (3) (Table 1).

### Healthcare system in Romania

The Romanian Constitution guarantees the right to health for all citizens. The healthcare system of Romania is a social health insurance system, highly centralized under the management of the Ministry of Health as the central administrative authority with its representatives, the County Public Health Authorities, in each of the 42 counties. The other main stakeholders in the public healthcare sector are the National Health Insurance House, the National Public Health Institute and the National Agency for Medicines and Medical Devices (under the authority of the Ministry of Health), and the National Authority for Health Quality Management. The scheme of the Romanian Health System is presented in Figure 1.

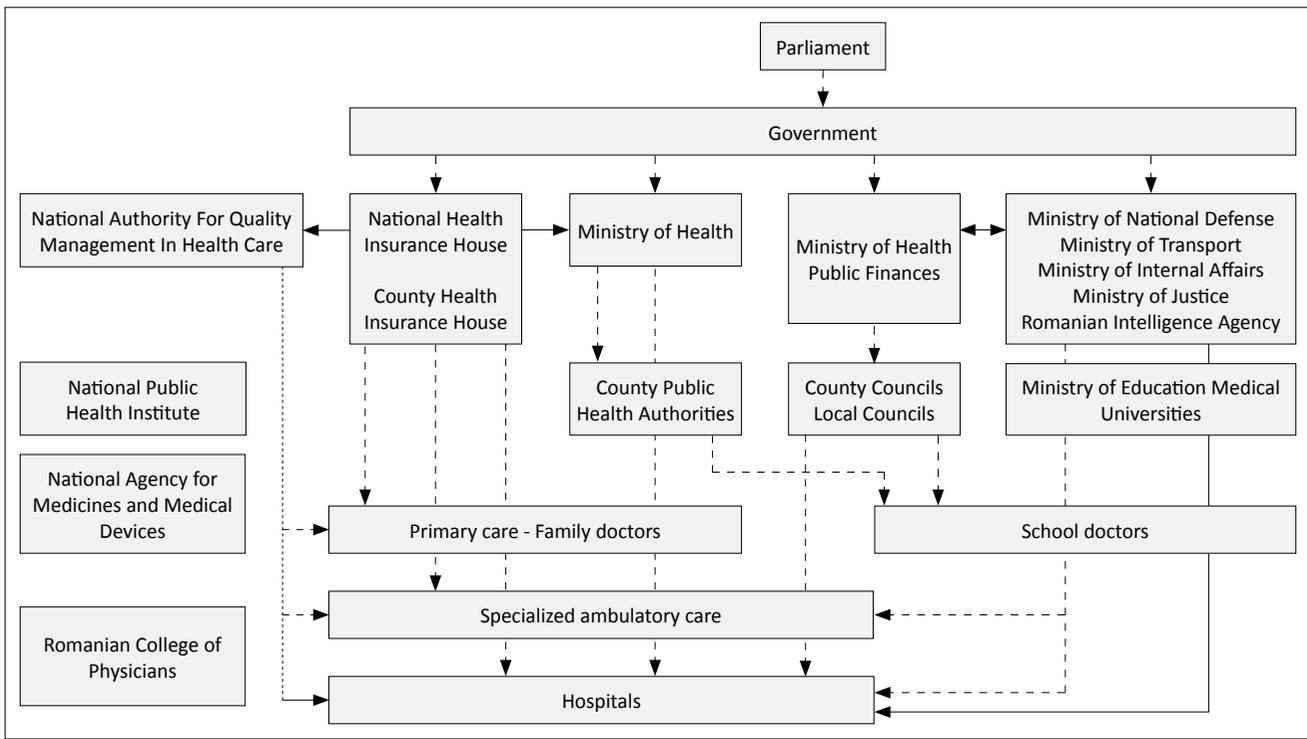
Since 1998, Romania replaced the Semashko model with a social health insurance system. The main source of funding is the National Health Insurance Fund, which consists of contributions paid by employees, as well as

contributions paid by the state to certain categories of population (unemployed, retired). The National Health Insurance House administrates and regulates the social health insurance system and is represented at the county level. Other sources of funding are the state budget, external loans and non-reimbursable funds, and own revenues. Almost 80% of total health funds in Romania come from public sources, 64.5% from the National Health Insurance Fund, and 13.5% from Government schemes. In 2015, Romania had the lowest share of health expenditure in gross domestic product (GDP) (5%) among the EU Member States and the lowest level of expenditure per inhabitant (400 EUR) (1, 6) (Fig. 1).

The Romanian health system is organized on three levels of assistance: primary, secondary, and tertiary assistance (7).

### Primary pediatric care

Primary healthcare services are provided based on a contract with the National Health Insurance House by family physicians (general practitioners). They can be organized in individual, associated, grouped or private medical clinics. They are paid according to a mixed scheme: per capita (number of patients) and per service. Patients have the right to choose their family physicians, which encourages competition. There are healthcare issues in rural areas because there are not enough service providers. Depending



**Figure 1. Romanian Health system scheme [adapted after (1)].**

Small dotted line: Control relationship; Black full line: Collaboration; Dotted line: Subordination

on the insured status, patients benefit from different packages of preventive and curative medical services, but the entire population has access to free emergency services.

Primary care, under Law no. 95/2006 on the reform of the healthcare system (7), defines the provision of comprehensive first-line healthcare regardless of the nature of the health problem in the context of a continuous relationship with patients in the presence or absence of a disease.

The characteristics of the family physician’s assistance are as follows:

- the primary point of contact with the health system, providing non-discriminatory access for patients and dealing with all their health problems;
- efficiently using of resources of the health system, coordinating healthcare for patients;
- collaborating with other providers of primary care services and liaising with other specialties;
- oriented towards the individual, family, and community;
- relying on direct physician-to-patient communication that leads, over time, to a solid establishment of an inter-human relationship of trust in which the patient becomes a responsible partner of the physician for maintaining/restoring his/her health;
- ensuring the continuity of the medical act based on

the patients’ needs;

- solving acute and chronic health problems of patients;
- promoting the health and well-being of patients through appropriate and effective interventions;
- aiming to solve community health problems.

In Romania, although the activity of the family physicians is private, it is dependent on the contractual relationship with the National Health Insurance House and is based on a framework contract for the provision of services in primary care. Unfortunately, the framework contract and implementation rules sometimes change annually, which leads to disruption in the family physician’s work through a lack of legislative continuity.

At present, family physicians represent one-third of physicians in the public health system. Of the total family physicians, fewer than half sign up newborns, infants, and children on their lists. How has this happened? One possible explanation is the dissolution of the Pediatrics Faculty in Medical Universities at the beginning of the 1990s. As well, decreasing the time allocated to pediatric study at Medical School and during the Family Medicine Residency leads to insufficient training in pediatrics, which is a crucial activity for the family physicians.

On the other hand, child healthcare requires specialized human resources, a medical team consisting of a

physician, a nurse, a nursing assistant, as a large team with many responsibilities. In a family medicine practice with pediatric activity, over 40% of consultations of children are those for acute conditions. Also, there are consultations for neonate and infant care at home, periodical medical examinations up to the age of 18 years, counseling and administration of vaccines according to the National Immunization Program and optional vaccines for children, health education, and the identification of risk factors, which are priority activities for pediatric family physicians.

However, these duties take a great deal of time from the family physicians' team, which ultimately make considerable efforts, but given the limitation of the daily number of medical services that can be settled by the National Health Insurance House, there is a lack of motivation for physicians in enrolling children on lists. The necessity of appointment for consultation imposed by the order of the Minister of Health, even though the services provided in the case of acute illness to the child cannot be programmable services, may lead to deterioration of the physician - patient - patient's family relationship, and the overloading of the emergency services and the hospital on-call physicians, increasing the cost of hospital medical care over the costs in the family physician's offices. In rural areas, due to the shortage of school physicians, family physicians are also required to provide healthcare in schools without having a contract with the local authority.

The need of training of young family physicians in areas such as prevention of communicable and non-communicable diseases, vaccination, child care, medical care of children with acute illness and monitoring chronic diseases, pediatric emergencies, and the decision-makers' awareness of the importance of primary care medicine in the preventive measures for children and the growth of healthier generations, should be the reasons to emphasize the development of pediatric practice in the specialty of family medicine.

#### **Secondary and tertiary pediatric and neonatology care**

Outpatient (secondary) care is provided through the specialized ambulatory services, which can be independent or integrated within the hospitals, diagnostic and treatment centers, and specialized medical practices.

Tertiary assistance is provided through hospitals (preventive, curative, recovery and/or palliative care). Hospital units can provide services only after accreditation and sanitary authorization. The hospital is responsible, under the law, for the quality of the medical act, the compliance with the conditions of accommodation, hygiene, nutri-

tion and prevention of nosocomial infections, as well as for covering the injuries caused to the patients.

The competencies by type of hospitals are established following the criteria of the National Accreditation Commission of Hospitals and are approved by the order of the Minister of Health. The hospitals subordinated to different ministries and institutions with their own sanitary network are controlled and approved by the competent minister or the head of the institution (8).

According to the existing laws, hospitals may be classified as follows (9):

- by territorial criteria: regional, county, and local (municipal, town or communal);
- by the specific pathology: general, emergency, specialized and for patients with chronic conditions;
- by property regime: public hospitals, private hospitals or public hospitals in which private sections may also operate;
- by education and scientific medical research: clinical hospitals with university departments and institutes.

The following units with beds are also included in the category of hospitals: institutes and medical centers, sanatoriums, health centers, and medical-social assistance units.

The organizational structure of a hospital may include departments, laboratories, diagnostic and treatment services, compartments, technical, economic and administrative services or offices, pre-hospital assistance and emergency transport services, emergency units and other structures approved by order of the Ministry of Health. Hospitals may have structures that provide specialized ambulatory care, daycare, home care, and ambulatory para-clinical services.

During the last 30 years, the number of beds in hospitals decreased continuously. Now there are 576 hospitals (including institutes and medical centers with hospital beds) with a total number of 132,480 beds. Included in this number there are 209 private hospitals. There are also 99 specialty ambulatories, 144 polyclinics, and 184 dispensaries. According to the National Institute for Statistics, in 2016 there were 7666 pediatric beds and 4630 beds for neonates and premature babies (10).

The public health system has 11 pediatric hospitals, one institute for mother and child care in Bucharest, and three rehabilitation hospitals for children. In Bucharest, there is also a pediatric private hospital. In most of the counties and cities, single-specialty or private hospitals have a pediatric department (11).

**Table 2. Number of physicians in pediatric healthcare in 2014 based on pediatric specialties\***

	Romania 2014	Public system		Private system	
		n	%	n	%
Family physicians	12.655	6561	51.85	6094	48.15
Pediatrics	2525	2120	83.96	405	16.04
Neonatology	498	432	86.75	66	13.25
Pediatric neurology	148	121	81.76	27	18.24
Pediatric psychiatry	265	229	86.42	36	13.58
Pediatric surgeons	290	254	87.59	36	12.41
Total	54.929	40.658	74.02	14.271	25.98

\*Physicians and dental doctors working in school medicine network were not included. Source: National Institute of Statistics 2014 (10)

Since 2002, the public medical system for neonates was reorganized to improve the quality of health care. All departments of obstetrics-gynecology and neonatology were classified based on their competence in three levels:

- level I provides health care for pregnant women and newborn babies, as well as basic gynecologic medical assistance, without on-call duty after the normal work schedule;
- level II provides medical assistance to pregnant women and the newborn with a moderate degree of risk, as well as gynecological medical assistance in more complex cases; with on-call duty after the usual work schedule and can perform emergency surgery and during the care;
- level III provides medical assistance to pregnant women and newborn babies at increased risk; these centers can solve the entire range of specific pathologies and provide complex guard services after the usual work schedule. Since 2002, the number of level III maternities increased from 18 to 20 in 2006 and 23, according to last data (2016) (12–14).

The number of beds for pediatric care decreased from 25,860 in 1990 to 7666 in 2016, and the amount neonatal or premature beds decreased from 11,891 in 1990 to 4630 beds in 2016. The total number of maternity units in Romania is 177, down from 206 in 2006. There are also private maternity units; few could be classified otherwise than Level I, only one is officially Level III and one is Level II. Based on an analysis performed in 2013, there were 535 neonatal intensive care unit (NICU) beds in maternity units in Romania.

There are 1929 medical offices and 480 dental offices in schools and universities based on the National Institute of Statistics (2017) (10).

In Romania, in 2017, 58,583 physicians were registered (298/100,000 inhabitants) and 15,653 dentists (80/100,000

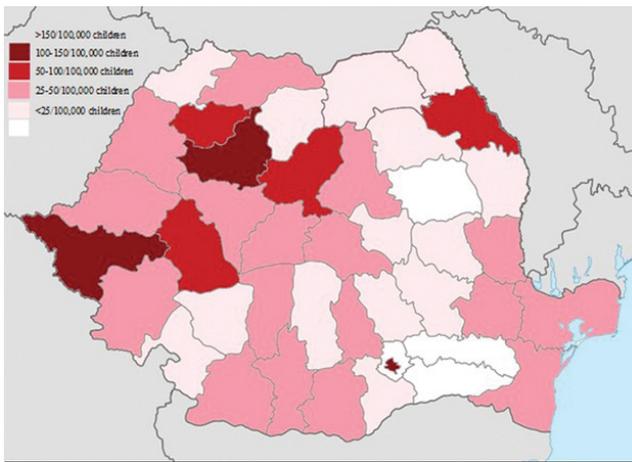
inhabitants). Compared with the numbers in EU countries, Romania has the second-lowest number of physicians reported to its population, after Poland (with 233/100,000 inhabitants). As in every country of the EU, the number of physicians increased in Romania during the last years from 180/100,000 in 1990 (10, 15).

Among the physicians, based on data for 2017, there were 12,185 family physicians (general practitioners). The number of physicians working in the private medical system (excluding family physicians) was 10,454, with a ratio public/private of 3.43. (10) The most recent data on the different categories of physicians is available only for 2014 (Table 2).

Based on the number of pediatricians registered at the College of Physicians in Romania, the geographic distribution of pediatricians is not uniform over the country territory. The number of pediatricians reported for the child population is 84.79/100,000 children. In 2016, there were 3524 pediatricians registered. In this number, even though the reporting year is different, it could include some pediatricians that are retired or left the country, because the number is different from the number from the National Institute for Statistics. Analyzing these data, there are counties well covered by pediatricians (Bucharest 282/100,000 children, Timis 212/100,000 children, and Cluj 195/100,000 children), but some of the counties lack the needed numbers of pediatricians (Ialomita 22.73/100,000 children, Calarasi 17.90/100,000 children, Ilfov 15.57/100,000 children, and Bacau 13.87/100,000 children). This unbalanced distribution of pediatricians follows the general distribution of physicians mainly in the areas with medical universities, leaving some counties without proper coverage of specialized pediatric personnel (Fig. 2).

#### Emergency care

In Romania, the national emergency system is organized as an integrated public system operating the europe-



**Figure 2. The unbalanced distribution of pediatricians in Romania, based on the data from the College of Physicians in Romania (2016)**

an emergency call number (112). The emergency service uses a three-color code system that will dispatch an ambulance equipped according to the severity of the health problem (1).

In hospitals, emergency care is provided in hospital emergency units financed directly from the state budget. Children can access these units directly, without a referral or by ambulance. If needed, they will be admitted to hospital departments. The physicians working in these units are pediatricians, emergency or intensive care specialists (1).

The SMURD system (Mobile Emergency Service for Resuscitation and Extrication) is a complementary rescue system, created in 1990 and covering most of the country. This system is integrated with the national emergency system, accessed by the emergency call number and it addresses the most difficult cases. It also includes a helicopter emergency medical system. Currently, SMURD is considered one of the best examples in the region (1).

There is an overuse of emergency services, both ambulances and emergency units in the hospitals, for situations that should be addressed by family physicians, mainly during the night and weekends when the family physicians' practices are closed.

During the last years, there was a successful reform of the emergency healthcare services system, supported by the World Bank and EU funds with the infrastructure improvement of hospital emergency units, staff training, and improved communication. The emergency services use a national telemedicine system. In the National Health Plan for 2014–2020, there are measures planned to develop community care to reduce the inappropriate use

of emergency services and to increase the accessibility of vulnerable groups to healthcare services (1, 16).

### Call-center system for pediatric care

Since 2014, a call-center system for pediatric healthcare emergencies and advice was founded in Cluj-Napoca. There are now two call-centers in function, ALO-PEDI (funded by the Emergency Clinical Hospital for Children Cluj-Napoca) and PEDITEL (funded by Parents from Romania Foundation). These services are used by parents to obtain medical recommendations in less severe situations that could not be presented as emergencies at hospitals. Calls are answered by medical physicians, specialists or residents in pediatric and/or emergency medicine, non-stop, 24/7. This system is well regarded by parents, and the number of 112 calls was reduced by 15% in 2014/2015 for this age group. Also, the number of presentations to the emergency departments or on-duty physicians in hospitals in Cluj County was reduced. One analysis performed on the ALO-PEDI call-center proved that this service had 5522 calls in the first 6 months of 2018 and 70% of calls were related to situations that were not severe and could be managed by different recommendations by phone. There were only six cases that needed the emergency system to be alerted, and in 11% of the cases, the parents were advised to present with the child to the emergency departments of a pediatric hospital. The system is not only used by parents from Cluj County, half of the calls are from parents from the rest of the country, mainly from Bucharest (12.5%) and Brasov (2.5%), but also from parents outside Romania (1.6%) (17).

### School medicine in Romania

For the last 15 years, the school's medical network has undergone a genuine destruction process and this specialty became the "Cinderella" of Romanian medicine. Although by 2000 there was a well-organized network, this change was due to the modification of the health system. More and more general practitioners chose family medicine and the medical staff in the school's medical network gradually retired, the positions were blocked for a long time due to the economic crisis, and then, when reopened, there were no candidates present due to low salaries. A quick analysis could identify the reasons for why physicians were abandoning school physician positions: major responsibilities of the medical act in poorly equipped cabinets (the lack of adequate equipment with medicines, sanitary materials, office equipment), a large number of educational units assigned to a physician, insufficient professional valorization due to the predominantly profitable activity in the health system, the impossibility to refer patients to specialists and laboratory

examinations, and to prescribe free prescriptions (as there is no contract with the National Health Insurance House), and finally the employers are local councils and not Ministry of Health or hospitals (18).

The most complex assessment of the school's medical network in recent years took place in July-September 2014, at the behest of the Ministry of Health. By correlating these data with data obtained from colleagues in the country, the situation of school medicine in 2014 was as follows:

- Number of physicians in school and university dispensaries: 738
- Number of medical nurses in school and university dispensaries: 2878
- Number of dental physicians in dentistry dispensaries for schools and universities: 475
- Number of nurses in dental dispensaries: 256
- Number of preschool and school-age children served: 2,012,109
- Number of students served: approx. 700,000

In addition to the positions funded by the Ministry of Health, there are 14 school physicians and 28 nurses paid by local authorities. It should be noted, however, that the distribution of school dispensaries is not uniform at the level of the counties, with 95% of them being in the urban environment (18).

Since January 2018, a Specialty Commission on School Medicine has been working at the Ministry of Health to develop protocols needed for activity in the school's medical offices, and also for reintroducing the competence of the school medicine in the complementary study certificate catalogue.

### Medical education in pediatrics

In Romania, medical degrees could be obtained in 12 public medical faculties or universities (six opened before 1989 in Bucharest, Cluj-Napoca, Timisoara, Iasi, Tg-Mures, Craiova, and six opened after 1989 in Oradea, Arad, Sibiu, Brasov, Galati, Constanta), one Military Medical Institute (with medical schools in Bucharest and Tg-Mures), and one private university in Bucharest. General medicine, dental medicine, pharmacology could be studied in long-programs and nursing, midwifery, radiology and medical imaging, clinical laboratory, balneo-physio-kinesiotherapy and rehabilitation, dental techniques, dental hygiene and nutrition and dietetics could be studied in short programs. International students can study medicine, dentistry, and pharmacy in Romanian, English or French languages and the number of foreign students in medical universities is increasing as the Romanian Med-

ical Physician Diploma is recognized in the EU and many other countries.

The duration of the studies for general medicine is 6 years: three years of preclinical studies and three years of clinical studies. During the last years, the period in which pediatrics is studied in medical school was decreasing, now including only eight weeks of pediatrics.

The number of graduates of medical schools in Europe varies very largely, comparing 12.4 medical physicians graduating in the EU-28, Romania with 19.6 graduates/100,000 inhabitants has the third-largest number of graduates after Malta (25.2 graduates/100,000 inhabitants) and Ireland (23.7 graduates/100,000 inhabitants) (15).

After obtaining the Medical Physician degree, to work in the health system one should be trained in one of the residency programs. Admission in residency is obtained after a national exam and the specialty is chosen based on the ranking in this exam. The residency program's duration is between 4 and 6 years. The following residency programs are available for medical physicians who intend to work for children healthcare and their duration is 5 years: pediatrics, neonatology, pediatric surgery, pediatric orthopedics (6 years), pediatric neurology, and pediatric psychiatry. Since 2016, five new residency programs were introduced for sub-specialties of pediatrics: pediatric cardiology, pediatric gastroenterology, pediatric nephrology, pediatric oncology and hematology, and pediatric pneumology. The syllabus is the same as in pediatrics during the first 3 years and then special training in a sub-specialty for 2 years. These specialties are not recognized in the EU, where there are only sub-specialties with special training after finishing the residency in pediatrics. The future will show the viability of this approach for increasing the specialization of pediatric care all over the EU.

The training in pediatrics should be obtained mainly in teaching hospitals in cities where the medical universities are located. During the 5 years of pediatric residency, there are rotations in general pediatrics (24 months), neonatology (6 months), infectious diseases (6 months), emergencies, neurology, psychiatry, surgery and orthopedics, genetics, endocrinology and diabetes, pneumology, oncology-hematology (3 months each) (19).

The number of resident positions varies during the last 7 years for pediatrics between 96 (in 2012) and 146 (in 2017) and for neonatology between 15 (in 2013) and 53 (in 2017). In order to fill the gap between the need for physicians all over the country and the actual number of specialists

that are working in the field, the Ministry of Health has a policy to increase the number of positions into residency training (also proved by the continuous increase of the total number of positions for the last years).

### National healthcare programs in Romania

National Health Programs are a set of multi-annual actions organized for evaluation, prevention, treatment and control of the diseases with a major impact on population health status.

In Romania, there are two categories of National Health Programs developed, conducted, and financed by the Ministry of Health (national public health programs) and by National Health Insurance House (national curative programs). Besides the financing of each authority mentioned before for the programs they are conducting, the national health programs may also be financed from other sources, including donations and sponsorships. The implementation of the national health programs is made by public institutions, public health services providers, private health services providers (for the services which are exceeding the capacity of public health services providers) and private companies selling pharmaceuticals and medical devices. The providers who are implementing national health programs are accepted after they meet the requirements established by the specialized committees of the Health Minister and if the budget allows them to be included (7, 20).

The public health national programs conducted and financed by the Ministry of Health are (20, 21):

- I. The national program for communicable diseases:
  1. The National Immunization Program (NIP)
  2. The national program for surveillance and control of main communicable diseases
  3. The national program for the prevention, surveillance, and control of HIV/AIDS infection
  4. The national program for the prevention, surveillance, and control of tuberculosis
  5. The national program for the prevention, surveillance, and control of associated infections of medical assistance and microbial resistance, and the monitoring of antibiotics usage
- II. The national program for monitoring the behavioral and workplace risk factors
- III. The national program of transfusion security
- IV. National programs for non-communicable diseases (NCD):
  1. The national program for early active detection of cancer (cervical cancer, breast cancer, colorectal cancer)

2. The national program for mental health and surveillance of psychiatric diseases
3. The national program for organ, tissues, and cells transplant of human origins
4. The national program for endocrine diseases
5. The national program for dietary treatment of rare diseases
6. The national program for the management of diseases registers

- V. The national program for evaluation, promotion, and education of health
- VI. The national program for children's and women's health

The national health programs conducted and financed by the National Health Insurance House are (20, 21):

- I. The national program for cardiovascular diseases
- II. The national program for oncology
- III. The national program for deaf treatment by an implantable hearing prosthesis
- IV. The national program for diabetes mellitus
- V. The national program for the treatment of neurologic diseases (treatment for multiple sclerosis)
- VI. The national program for the treatment of hemophilia and thalassemia
- VII. The national program for the treatment of rare diseases
- VIII. The national program for mental health
- IX. The national program for endocrine diseases
- X. The national program of orthopedics
- XI. The national program for organ, tissues and cells transplant of human origins
- XII. The national program for sustaining patients with chronic kidney failure
- XIII. The national program for intensive care of liver failure
- XIV. The national program for diagnostic and treatment using high-performance equipment

### The national immunization program in Romania

The vaccination schedule in Romania is established through the recommendation of the National Advisory Vaccination Group that was created in 2008 after the World Health Organization (WHO) recommended the Global Vaccine Action Plan (22). The decision regarding the implementation of a new vaccine is taken based on local epidemiologic data, disease-related and also the vaccine-related costs, health economic evaluations, and the vaccine availability.

Romania has one of the most basic vaccination schedules in the EU and also includes some unique particularities.

Recently, on August 1<sup>st</sup>, 2017, the 13-valent pneumococcal conjugate vaccine was introduced on the NIP.

The Romanian vaccination schedule, according to the National Institute of Public Health, starts from the first 24 hours of life when the hepatitis B vaccine is given followed by BCG between the 2<sup>nd</sup> and 7<sup>th</sup> day of life. Romania remains one of the countries that administers BCG due to the high epidemiologic risks for TB (23). At 2, 4, and 11 months of age, Romanian children receive the hexavalent vaccine, along with the 13-valent pneumococcal conjugate vaccine. At 12 months of age, they receive the first dose of the measles-mumps-rubella (MMR) vaccine. At 5 years of age, they receive the second dose of the MMR vaccine. At 6 years of age, at the moment of starting school, Romanian children receive DTPa-VPI, and at age 14 years, they receive DTPa.

There are some good points for the NIP and some debatable ones. The good ones are the coverage for all children with vaccines for most infectious diseases, and easy acceptance of the schedule, which is conducted according to the WHO recommendations. Also, the NIP encourages parents to buy the other vaccines such as the Rotavirus vaccine, influenza, and the meningococcal vaccine, vaccines that are not covered by the NIP. However, there are several issues that the Romanian NIP was not able to overcome in the past years.

Since 2016, Romania has faced one of the most challenging outbreaks of measles, affecting both children and adults. Based on the report of CNSCBT - National Center for Surveillance and Control of Communicable Diseases (August 3<sup>rd</sup>, 2018) there were 14,854 cases of measles and 59 deaths. Most of the cases were in patients aged under 19 years: 12,928 (87.03%), and, more importantly, 95.21% of the patients with measles during this outbreak were unvaccinated, including all infants (24, 25).

The most recent coverage data for MMR were available from 2015 (26). Since 2005 to the last published date regarding measles vaccine coverage for the second dose, there was an abrupt decrease from 96% to less than 88% for 2015. For the first dose, the coverage was less than 86%. Interestingly, the counties with the lowest MMR vaccine coverage were the those in the western part and northwestern part and also central Romania. In response, the national health authorities developed a plan for starting MMR immunization at 9 months of age and implicated family practitioners in an active vaccination campaign. Interestingly, the north part of Romania has a low coverage of MMR determining a high number of mumps cases in the teenage population that did not receive the second dose of MMR (27).

**Table 3. Vaccines coverage in Romania\***

	2010 (%)	2016 (%)
BCG	98.7	95.5
HepB	97.6	89.8
DTP	93.8	60.7
IPV	93.6	60.7
MMR	93.2	85.8
Hib	–	60.7

BCG: Bacillus Calmette-Guerin vaccine; HepB: Hepatitis B vaccine; DTP: Diphtheria tetanus pertussis vaccine; IPV: Polio inactivated vaccine; MMR: Measles mumps rubella vaccine; Hib: Haemophilus influenza B. \*2010–2016 according to CNSCBT - National Center for Surveillance and Control of Communicable Diseases (27, 32)

The Romanian NIP lacks any meningococcal vaccine even though there are still small outbreaks of meningitis and there is a need for this vaccine. *Neisseria meningitidis* remains one of the major pathogens for meningitis (28).

Romania is considered to be one of the top countries regarding mortality from cervical cancer among young women. The HPV campaign in Romania failed in its goal to implement HPV vaccination among school girls, due to several issues, one of the most important being the lack of knowledge regarding the vaccine and the fear of adverse effects (29).

Romania also has a very low coverage during autumn and wintertime for influenza and there are very few cases of children with chronic diseases who should use the vaccine against influenza and are vaccinated. This happens despite the current guidelines that underlines the importance of flu vaccine given to all children above the age of 6 months during autumn time (30, 31).

Due to multiple causes (parental refuse of vaccinations due to religious beliefs or the increase of anti-vaccine ideas, lack of vaccines), we can witness a decrease in vaccine coverage in Romania, not only in MMR, but also for other vaccines with proved efficacy (Table 3, 4).

### Pediatric professional societies in Romania

Romanian Society of Pediatrics (Societatea Română de Pediatrie) was part of the Romanian Medical Association since 1926 and in 2001 acquired its legal status. Since 1951, the society has published the Romanian Journal of Pediatrics. Every two years the society organizes a National Congress of Pediatrics. The last congress, the 13<sup>th</sup> Congress, was organized in 2017 in Bucharest, together with the 8<sup>th</sup> Europaediatrics Congress of EPA-UNEPSA. Besides the

**Table 4. Vaccination schedule for Romania 2018\***

	First 24h, 2–7 days	2 m	4 m	11 m	12 m	5 yr	6 yr	14 yr	Every 10 yr
BCG	•								
Hep B	•	•	•	•					
DTPa		•	•	•			•	dT/DTPa	dT
IPV		•	•	•			•		
Hib		•	•	•					
PCV		•	•	•					
MMR					•	•			
Observations	Maternity	Family physician office							

BCG: Bacillus Calmette-Guerin vaccine; HepB: Hepatitis B vaccine; DTPa: Diphtheria tetanus pertussis acellular vaccine; DT: Diphtheria tetanus vaccine for adolescents and adults; IPV: Polio inactivated vaccine; MMR; Measles mumps rubella vaccine; Hib: Haemophilus influenza B. If the HepB vaccine is not available in the first 24h of life, if the mother is HBsAg positive the infant will receive DTPa-VPI-Hib-HepB vaccine at 6 weeks, then the other 2 doses at 30-day intervals and the 4<sup>th</sup> dose at 11 months. If the mother is HBsAg negative the infant will follow the schedule without the first HepB dose. \*According to CNSCBT - National Center for Surveillance and Control of Communicable Diseases (33)

congresses, the society is involved in many other educational events, workshops, conferences, summer-schools for the pediatricians and family physicians in Romania.

Romanian Society of Social Pediatrics (Societatea Română de Pediatrie Socială) was organized to emphasize the social aspects of caring for children in a society with many problems. Since 1993, ten National Congresses of Social Pediatrics were organized, where different aspects related to preventive medicine, vaccinations, adolescent medicine, transfer of care from children to adults, nutrition, ethical and social aspect of pediatric care were analyzed and debated.

Romanian Association for Pediatric Education in Family Medicine (AREPMF – Asociația Română pentru Educație Pediatrică în Medicina de Familie) was founded in 2014 to improve the pediatric knowledge of family physicians and the promotion of the education for health, mainly regarding the children. Since then, many congresses, conferences, symposia, workshops, national campaigns or humanitarian activities have been organized all over the country, including for family physicians and nurses. The topics of the activities included vaccination, infant care, nutrition, determinism, and chronic disease prevention, neurological and psychomotor development of the child, medical ethics, team communication and partnership with civil society, media, and decision-makers, and malpractice.

Society of Physicians in Children and Young People's Communities (Societatea Medicilor din Colectivitățile de Tineri și Scolari) was founded in 2000, bringing together the healthcare professionals from the school's medi-

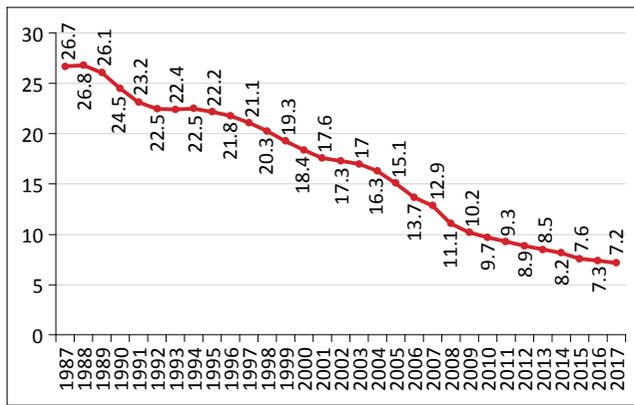
cal offices in most counties of the country, and pursuing the professional and administrative development of the school's medical network. Since 2010, the Society annually organizes the National Congress of School and University Medicine, which has reached its 9<sup>th</sup> edition this year. Since October 2014, the "School and University Medicine Journal" has published scientific papers on specific healthcare for children and young people in education.

Neonatology Association from Romania (Asociația de Neonatologie din România) was founded in 1996 to develop the neonatology and to improve the neonates and infants care in Romania. This association is involved in organizing the National Congresses and Conferences in Neonatology, publishing the Neonatology Journal and different books, training of the personnel working in the maternities and with the neonates and infants.

Besides these organizations, there are different sub-specialty professional societies involved in the better training of pediatric health care professionals including Romanian Society of Pediatric Nephrology, Romanian Society of Pediatric Gastroenterology, Hepatology and Nutrition, Romanian Society of Pediatric Rheumatology, Romanian Society of Pediatric Diabetes, Nutrition and Endocrinology, Romanian Society of Pediatric Neurology, Romanian Society of Pediatric Surgery, Romanian Society of Pediatric ENT and Romanian Society of Pediatric Infectious Diseases.

**Children health status in Romania - 2018**

Infant mortality, perhaps the most descriptive single indicator of the quality of a health system, decreased in Europe by almost 90% for the last 50 years and more



**Figure 3. The continuous decrease in infant mortality rate during the last 30 years in Romania**

than two-thirds for the last 30 years, reflecting the improvements of healthcare. This tendency was also clear in Romania where there has been a steady decrease in infant mortality, from 55.2 deaths per 1000 live births in 1968 to 26.1 deaths per 1000 live births in 1989, the last year of the communist regime. Still, our country has the highest infant mortality rate in the EU in 2015: 7.6 deaths per 1000 live births compared with 3.6 deaths per 1000 live births rate for the EU (4). Data for 2017 reported a decreased rate of 7.2 deaths per 1000 live births. This decreasing trend for the infant mortality rate is presented in Figure 3, based on World Bank data (34). Looking at the causes of infant mortality, perinatal conditions and congenital malformations are the most common. In Romania, diseases of the respiratory system are a relatively common cause of infant mortality compared with the other EU Member States. Romania, with 71.9 deaths per 100,000 children, has the highest crude death rate for children in 2015 in the EU. For young people, transport accidents are an important cause of death all over Europe. Romania is among the first four countries with the highest crude death rate from transport accidents (35).

The infant mortalities rate varies among the Romania counties, from the highest rates in Călărași (13.1 deaths per 1000 live births), Mehedinți (12.5 deaths per 1000 live births) and Tulcea (11.8 deaths per 1000 live births) to the lowest rates in Ilfov (3.5 deaths per 1000 live births), Bucharest (4.4 deaths per 1000 live births), Cluj, Prahova and Timiș (4.7 deaths per 1000 live births). The most important causes of infant mortality in 2016 were perinatal causes (35.7%), respiratory diseases (26.3%), and congenital anomalies (22.1%) (36).

Preterm birth complications are a leading cause of neonatal, infant, and child mortality under the age of 5 years globally and were involved in 27.2% of neonatal deaths in Romania in 2016 (36). The premature birth rate in Roma-

nia varies between 7% and 12%, depending on the source and year of the report (14, 37). Based on data from the European Perinatal Health Report 2010, the rate of births before 32 weeks was 1.2%, and between 32–36 weeks it was 7%. Congenital anomalies are an important cause of perinatal mortality. In 2010, congenital anomalies caused 7.8% of fetal deaths and 29.7% of neonatal deaths (38).

Based on the analysis of the Ministry of Health and Save the Children Romania organization, one-third of infantile deaths could have been prevented through programs of support for mothers and children and by the improvement of the equipment of the maternities and neonates' departments. (Save the Children). Aiming for that improvement of care, since 2010, Save the Children Romania supported 78 maternity units from Romania with equipment, by its program "Every Child Matters" (14).

Mortality in children aged under 14 years has decreased continuously from 7.1/1000 in 1997 to 2.4/1000 in 2016. The most frequent causes of death in children aged 0–19 years were respiratory disorders in 2016 (22%), trauma and external causes (21%), perinatal diseases (20%), congenital malformation and chromosomal disorders (14%), and tumors (6%) (36).

Health is defined by the WHO as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." One of the key indicators of health status is self-perceived health. Based on Eurostat data, self-perceived health status in good or very good in 97–98% of young people in Greece and Romania, compared with 91% of the EU-28's young population aged 16–29 years. In 2016, Romania was among the lowest four EU member states as the percentage of young people reporting a long-standing health problem (under 5%) compared with 16% in all EU member state populations. The study mentioned that the differences among EU states could be due to cultural differences in self-perception and to different standards of diagnosis and management of the diseases, but also self-reporting is linked with the income level of the people (35).

Smoking in children is an important indicator knowing the high risk of morbidity due to tobacco use. Romania has the lowest share of children (15–19 years) who are daily smokers (4%) among EU member states compared with a share of 9% for all EU. However, it has the largest increase in relative terms of daily smokers from under 19 years to 25–29 years (35).

According to the ESPAD report, the availability of cigarettes for young people was the lowest in Romania among

**Table 5. Overweight and obesity prevalence in adolescents in Romania (36)**

	14 years (%)	15 years (%)	16 years (%)	17 years (%)	18 years (%)
Girls					
Overweight	13.89	7.50	9.45	7.92	5.86
Obesity	1.85	1.20	0.85	1.10	0.78
Boys					
Overweight	21.28	14.24	19.06	15.01	15.20
Obesity	2.13	2.12	2.57	3.55	2.68

all countries included in the study (37% of young people in Romania declared that they would find it fairly or very easy to get cigarettes if they wanted, compared with the 61% average in Europe). Also, the availability of alcohol, cannabis, and ecstasy for young people in Romania was much lower compared with the average perception in Europe, 60% compared with 78%, 14% compared with 30%, and 6% compared with 12%, respectively (39). Regarding the consumption of alcohol in harmful quantities during the last year in young people aged 15–16 years, 75% of Romanian youth reported not having been drunk for this period (35).

The consumption of illicit drugs or psychoactive substances is an important concern of the European Council due to risks for the health and social life of young people. The lowest rate of cannabis consumption among young people was reported in Romania (3%, data from 2013), compared with the highest rate of 27% in the Czech Republic and France. Also, Romania was among the countries where the ESPAD study revealed that 93–95% of young people aged 15–16 years had not used cannabis during the last year before the study (35).

The national report on “Evaluation of chronic diseases in children and young communities – the school year 2015–2016” showed that the most prevalent disorders in children and teenagers were vision problems (4.72%), obesity (1.64%), and postural deficiencies (1.63%), the remaining disorders having under 1% prevalence: asthma, malnutrition, skeletal disorders, speech problems (36).

Obesity is a serious health problem all over the world, being considered now like an epidemic phenomenon, increasing the risk of cardiovascular diseases, diabetes, cancer, and others. At the EU level, 3% of young people age between 15–19 years were obese and the share of obese young people is increasing with age. Romania registered the lowest share of obese young people among EU members states in 2014: 1% for 15–19 years and 4% for 25–29 years (35).

In Romania, during 2013–2014, a rate of self-reported overweight and obesity in 10% in girls and 21% in boys were registered, based on the study Health Behavior in School-

Aged Children 2013–2014 (40). However, based on one study performed in Romania in 2016 (“Identifying, measuring and monitoring at-risk behavior in school children in Romania”) in teenagers, the obesity prevalence varied from 0.78% in 18-year-old girls to 1.85% in 14-year-old girls, compared with 3.55% in 16-year-old boys. Overweight is more prevalent in younger teenagers (13.89% at 14 years old girls and 21.28% in 14 years old boys) (36) (Table 5).

According to UNICEF, breastfeeding is a vital part of a healthy start in the life of children all over the world. Based on two studies performed in 2016 and 2011, the exclusive breastfeeding rate for 6 months increased to 29.8% in 2016 from 12.6% in 2011. The mean duration of exclusive breastfeeding increased from 2.43 to 3.7 months. The rate of breastfeeding during the first month is 80% (41, 42).

The mother’s level of education and prenatal training are the most important factors in favor of breastfeeding. Fifty-one percent of mothers with university degrees breastfed their children for more than 6 months, compared with 23% of mothers with 8 years of education. Thirty-two percent of the mothers who exclusively breastfed up to 6 months were prenatally counseled. In Romania, this prenatal training is given by many organizations, one of them being SAMAS (Health for Mothers and Infants), which is working to increase the rate of breastfeeding, educating future mothers on the benefits of natural alimentation (41). Based on this study performed in 2016, 48% of neonates were born by C-section and only 16.8% were exclusively breastfed up to 6 months, compared with 24.6% of those born naturally (41).

The United Nations Children’s Fund (UNICEF) is working to promote breastfeeding through the Baby-Friendly Hospital Initiative, and the International Code of Marketing of Breast-milk Substitutes. In Romania, most maternity units were included in the “Baby-friendly” classification of UNICEF, where breastfeeding is promoted and supported. Also, the room-in system after birth has an important role in increasing breastfeeding rates. Sixty-three percent of children benefitted from this room-in system

in 2016, up from 57% in 2011. Seventy percent of mothers who breastfed for more than 4 months were hospitalized in the room-in system, compared with 57% of those who breastfed for less than 4 months (41, 42).

Rickets prophylaxis is one of the objectives of the National Program, by administering vitamin D supplements after one week of age till the age of 18 months. Some 92.3% of children aged up to 2 years received vitamin D supplementation, but only in 68.3% of the cases, the initiation of vitamin D supplementation was performed correctly. Also, only 55% receive vitamin D for the full 18-month duration (42).

In Romania, there is a neonatal screening program for hypothyroidism and phenylketonuria currently conducted through the National Health Program funded by the Ministry of Health in four regional centers (Bucharest, Cluj, Iași, and Timișoara). The screening is based on dry blood spots, with blood samples being collected from the infants' heels. The measurement is performed using immunofluorometric assays and then the diagnosis is locally confirmed. Two studies reported that between 87.87% and 92.76% of newborns were screened. Neonatal screening tests for other disorders can be provided by demand in private clinics or laboratories and also under the framework of research programs (hearing loss, metabolic disorders) (43, 44).

Teenage pregnancy is a public health problem in the EU. Even though the rate has decreased during the last years, the numbers still keep Romania among the first places in the EU. Abortions, stillbirths, and miscarriages are important problems of teenage pregnancy. Sex education programs in school, attitudes towards discussing these matters within families, and cultural differences regarding marriage and family could lead to these. Based on data from the World Bank, the fertility rate in Romania (the number of live births per 1000) in young women aged 15–19 years decreased from 70.21 in 1982, 54.94 in 1989, the year of the fall of communism, to 39.06 in 2007, the year of joining the EU, and to 33.72 in 2016. For comparison, the fertility rate in young women aged 15–19 years in the EU was 10.5. The fertility rate was relatively high in Bulgaria and Romania (41.3 and 36.6), compared with the EU (10.7) in women under the age of 20 years (35, 45).

Unfortunately, based on the Euro Health Consumer Index 2017, Romania has the weakest public healthcare system in Europe (439 points of 1000), excluding Cyprus without a real European public healthcare system in meaning. The authors concluded that the public sector of the health system has severe problems with the management and is suffering from an antiquated healthcare structure

with very high in-patient care costs as a percentage of total healthcare costs. The same report, based on data from ECDC, placed Romania with the highest percentage of methicillin-resistant *Staphylococcus aureus* (MRSA) resistance (more than 50%) (46).

In the National Plan for Health 2014–2020, there are measures planned to improve the health status of mothers and children, reducing the risk of maternal and infantile death, to improve preventive care, the access of the population to proper health care services by improving the medical network, including the infrastructure (emergency, primary care, ambulatory, and hospital), and to improve access to diagnostic and treatment in rare diseases and transplant procedures. This plan includes measures for sustainable improvement of healthcare human resources, the quality of health care, and medical research (16).

#### **Brain-drain of physicians and nurses from Romania to developed EU countries**

During the last years, mainly after Romania joined the EU in 2007, the most important problem of the Romanian Healthcare System seems to be the deficits of physicians and nurses. The EU recognition of the medical degree obtained in Romania, relatively low salaries compared with other countries, inadequate working conditions, and difficulties related to career opportunities have led to the “fourth wave” of migration from Romania after 1989, mainly of the professional elite of physicians. According to data from the Romanian College of Physicians, in 2017, more than 15,700 physicians and more than 28,000 nurses left Romania to work in different countries from Europe. Based on a study performed by the Romanian Association for Health Promotion, in 2016, more than 4000 physicians were working in France, 4285 in Germany, 2675 in the United Kingdom, 753 in Belgium, almost 400 in Italy and Spain, and 343 in Sweden. There are also Romanian physicians working in the United States, Australia, Canada, and other countries. The correct number for each country is difficult to determine; the number of conformity certificates and good standing certificates needed to work outside Romania is much higher than the numbers of actual working physicians. The most important specialties of the physicians asking for conformity certification during 2007–2016 were family medicine, anaesthesiology, pediatrics, and general surgery (47).

In a study performed among Romanian medical students in 2013–2015, 84.7% planned to seek employment in another country of the EU after graduation (48).

During the last year, 2017, there were changes in the salary policy for physicians, with a significant increase in

wages. Ministry of Health has developed a Multiannual Plan for the Strategic Development of Human Resources in Health for 2017–2020. To stop this brain-drain of the medical elite and to cover the gap of medical professionals in Romania's health system, there is an acute need for structural reforms, improvement of health infrastructure based on a clear and correct strategy for the long term, not only in human resources but a strategy with a more enlarged vision.

Romania needs a coherent and long-term strategy for pediatric healthcare to improve all aspects that are suffering today.

The strengths of the pediatric healthcare system in Romania:

- Free access to treatments for all children aged under 18 years;
- Free basic vaccination schedule;
- Good access to all types of pediatric specialties and a good collaboration between primary care physicians and pediatricians;
- Screening activities in children during the periodic medical examinations in family physicians activity;
- Access to the prophylactic therapeutic measures under the framework of the National Health Programs (prevention of vitamin D deficiency and iron-deficiency anemia in children, prevention of iron deficiency anemia in pregnant women).

The weaknesses of the pediatric healthcare system in Romania:

- The great deficit of pediatric medical personnel at all levels. The lack of nurses and community assistants makes it hard to provide optimal care to mother and child and preventive interventions, including vaccinations. One solution to overcome this problem could be the use of mobile vaccine units.
- Change of the primary care pediatric system to the family physician system and lack of pediatric training. The number of family physicians with pediatric training is decreasing and they have a large number of children on their lists. This limits the time spent by the physician on education for health and prevention during the consultation.
- Variability of healthcare personnel and the professional performance on Romania's territory. It is necessary to periodically train the medical staff to have good quality healthcare and to implement the national health programs. Lack of proper training in different pediatric subspecialties.
- Lack of screening programs for many pediatric disorders, lack of national registries for chronic diseases

and orphan disorder, making very difficult any strategy for these diseases.

- Lack of protocols and poor compliance with the existing disease protocols for both family physicians and specialists.
- Communication shortcomings between health officials and the public, even in the case of health professionals, in many aspects of healthcare; lack of adequate education programs for child health in the population.

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**Conflict of Interest:** The authors have no conflicts of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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