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MINISTRY OF HEALTH OF UKRAINE
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QUALIFICATION WORK

on the topic «**INVESTIGATION ON MODERN APPROACHES TO IMPROVING THE RATIONAL USE OF MEDICINES IN CHILDREN»**

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ANNOTATION

The qualification work presents the results of a survey of pharmacists in Morocco, with the aim of identifying problems of rational use of medicines for the treatment and prevention of diseases in children. Modern approaches to organizing the rational use of medicines in children are analyzed.

The work is presented on 46 pages and consists of 3 chapters, general conclusions and a list of used literature from 32 sources. The results of the study are illustrated by 17 figures and 4 tables.

Key words: pharmacy, rational use, medicines, children's contingent, pharmacist, pharmaceutical care.

АНОТАЦІЯ

У кваліфікаційній роботі представлено результати опитування фармацевтів у Марокко з метою виявлення проблем раціонального використання лікарських засобів для лікування та профілактики захворювань у дітей. Проаналізовано сучасні підходи до організації раціонального використання лікарських засобів у дітей.

Робота представлена на 46 сторінках і складається з 3 розділів, загальних висновків та списку використаної літератури з 32 джерел. Результати дослідження ілюстровані 17 рисунками та 4 таблицями.

Ключові слова: аптека, раціональне використання, лікарські засоби, дитячий контингент, фармацевт, фармацевтична допомога.

CONTENTS

ABBREVIATIONS

AMO – Assurance Maladie Obligatoir

EU – European Union

WHO – World Health Organization

UN – United Nations

HS – Healthcare system

HCP – Haut Commissariat au Plan

HCI – Healthcare institution

NCDs – noncommunicable diseases

RUM– rational use of medicines

OTC – over the counter

INTRODUCTION

Actuality of topic. In the modern world, the civilization of society and the spiritual development of the nation are characterized by the attitude towards the younger generation. This applies, first of all, to the issues of well-being, health and vitality of children. According to WHO, only 3-5% of children who graduate from school can be considered completely healthy [6,22,28]. Children's health becomes especially important during an unfavorable demographic situation. Failure to ensure self-reproduction of the population is one of the main modern problems for many countries in Europe and the world with low and very low birth rates [7,14,16,17].

As world experience shows, to ensure rational pharmacotherapy in children, the availability of pediatric dosage forms, as well as the implementation of patient care standards in the provision of pharmaceutical care, is extremely important. The rational use of drugs in pediatrics remains a global problem due to the peculiarities of the physiological characteristics of children, limited clinical data, and the insufficient number of drug information systems specifically designed for children.

Rational pharmacotherapy in children is the key to reducing mortality and preventing severe side effects, which is one of the most pressing problems in modern pediatrics and pharmacy due to a number of physiological and ethical features [24,28].

The purpose of the qualification work to analyze modern approaches to improving the rational use of medicines in children.

To achieve the set goal, the following research tasks were defined:

– analyze the demographic situation and health status of the child population in the world and Morocco;

– to analyze the organization of medical and pharmaceutical care for children;

– to analyze the main approaches to the rational use of medicines in pediatrics to analyze the information needs of pharmaceutical workers regarding medicines for children.

Research objectives. Demographic statistics, morbidity and prevalence rates in children aged 0–16 in Morocco for 2019–2025, regulatory and legal acts regulating the provision of medical and pharmaceutical care to children in the world and Morocco; questionnaires for pharmaceutical workers.

The subject of the research is the search and study of the current state of approaches to improving the rational use of medicines in the pediatric population.

Research methods. To achieve the set goal and fulfill the tasks, we used the following research methods: historical, retrospective, logical - to study and analyze the regulatory framework regarding the state of pharmaceutical care for children. Questionnaire survey methods, statistical methods were used for conclusions, proposals and recommendations.

The practical significance of the work. The results of the research can be used to improve the quality of pharmaceutical care for children, as well as to improve approaches to the rational use of drugs.

Elements of scientific research. In the qualification work carried out at the Department of Social Pharmacy of the National University of Pharmacy, for the first time, the master, together with the scientific supervisor, conducted an analysis of approaches to the rational use of medicines in the pediatric population of Morocco.

Approbation of research results and publication. The research results were approved at the XI International Scientific and Practical Conference "SOCIAL PHARMACY: STATE, PROBLEMS AND PROSPECTS", which took place on April 30, 2026, in Kharkiv, Ukraine.

Structure and scope of qualification work. The work is presented on 46 pages and consists of 3 chapters, general conclusions and a list of references, which consists of 32 sources. The results of the study are illustrated by 17 figures and 4 tables.

CHAPTER 1 STATUS OF PHARMACEUTICAL CARE FOR CHILDREN IN MOROCCO AND THE WORLD

1.1 Analysis of the demographic situation of the child population in the world

When considering issues of understanding and evaluating health at a theoretical level, the focus usually shifts from a specific person to public health as a whole. At the same time, the concept of "children's health" is not just the absence of diseases, but a dynamic state that has specific features [3]. The Committee on the Assessment of Children's Health (USA) and the Health Monitoring Program (EU) have indicated different directions for developing a comprehensive definition of "children's health" [6,24,27,28,32]:

1. reflect the dynamic nature of childhood, taking into account the fundamental principle of growth and development;
2. be conceptually sound;
3. reflect the resource (positive) potential of health;
4. provide a basis for measuring and improving children's health.

It was proposed to determine the health of an individual child or a group of children according to the degree of capabilities and successful interaction with the biological, physical and social environment.

In the public health system, indicators of quantity and quality can be used to characterize the population — categories that reflect important aspects of objective reality.

Quantitative indicators reflect the statistical side: population, birth rate, mortality, age and sex structure and migration processes. This database is used to plan resources (beds in hospitals, the number of doctors).

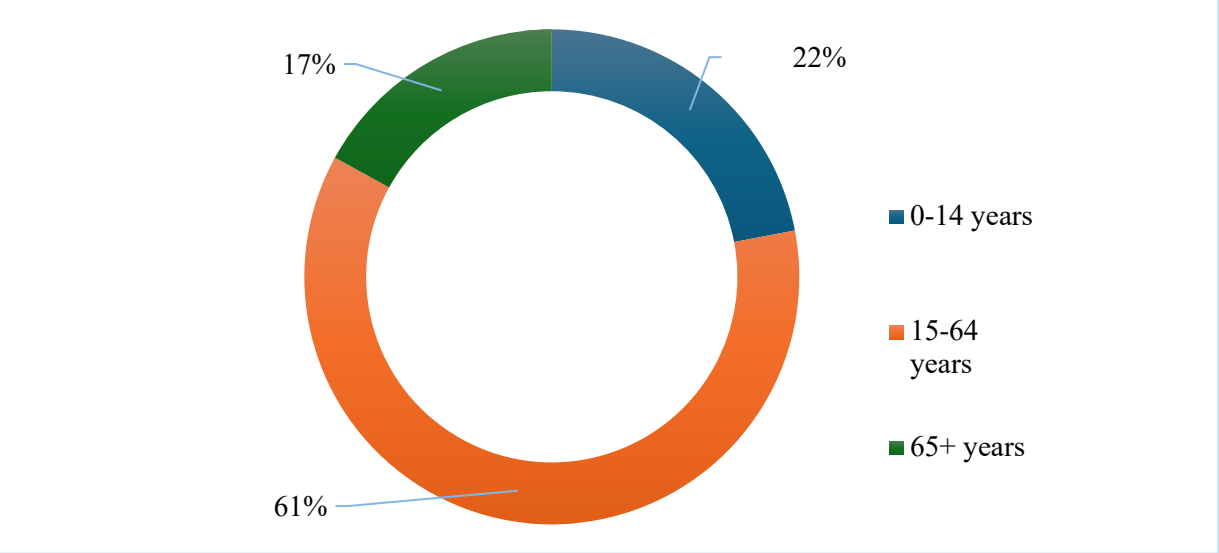
Qualitative indicators characterize the inner essence: the level of physical development, life expectancy, the level of morbidity and disability, as well as genetic potential and psychosocial well-being [28].

The combination of these data makes it possible not only to count people, but to understand their life potential and the efficiency of the healthcare system.

For the quantitative characterization of the population, first of all, medical and demographic indicators are used.

According to statistics at the end of 2025, the total number of people on the planet has approached 8.1 billion, with a tendency to slow growth due to a decrease in the birth rate in many regions (a global from 5 children per woman in the 1950s to 2.3 today). The analysis of statistics highlights how urbanization, migration, and population aging are shaping the future of economies and cultures [4].

The proportion of people in the world of working age (15–64 years) for 2025 was about 41%, while the proportion of children (0–14 years) is declining, making up less than a quarter of the population. The age structure of the world's population as of 2025 is shown in fig. 1.1 [4,15,18].



Source: https://maintenance.un.org

Fig. 1.1. Age structure of the world population (2025)

The World Health Organization (WHO) distinguishes 5 main age periods in the structure of the child population (from birth to 18 years). Each of these stages has its own physiological characteristics and medical care needs [17,22].

1. Neonatal period (0–28 days):

This is a critical stage in the child's adaptation to extrauterine life.

2. Infancy (from 29 days to 1 year):

A period of intensive physical development and the formation of basic immune functions.

3. Early childhood (1-3 years):

It is characterized by the active development of speech, motor skills and socialization.

4. Preschool age (3–6 years):

The stage of active skeletal growth and personality formation. At this time, children become more independent and begin systematic learning.

5. School age (6–18 years):

According to the WHO definition, it is this period that is key to puberty and the transition to adulthood [7,32].

Following to the updated WHO General Classification, the entire period from birth to 17 years inclusive is officially considered "childhood". It is worth noting that Unated Nation (UN) experts for demographic calculations often group all children in the group of 0–14 years, singling out separately the "early working age" (15–24 years). The proportion of children aged 0 to 14 years in the total population varies significantly depending on the region. In Central African countries, children make up up to half of the population. On the other hand, in countries with a high standard of living, their share barely exceeds a fifth of the population (fig.1.2) [15,20].

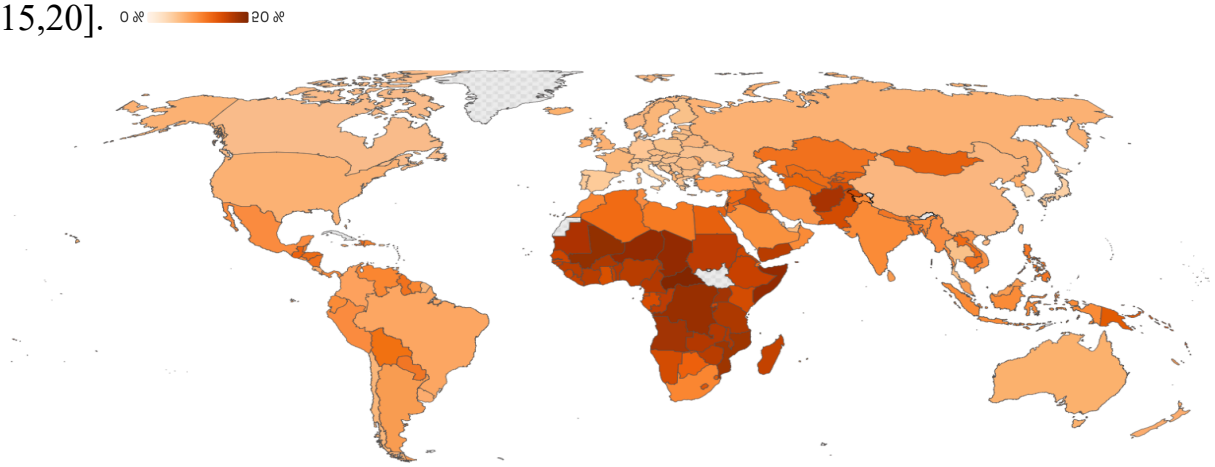
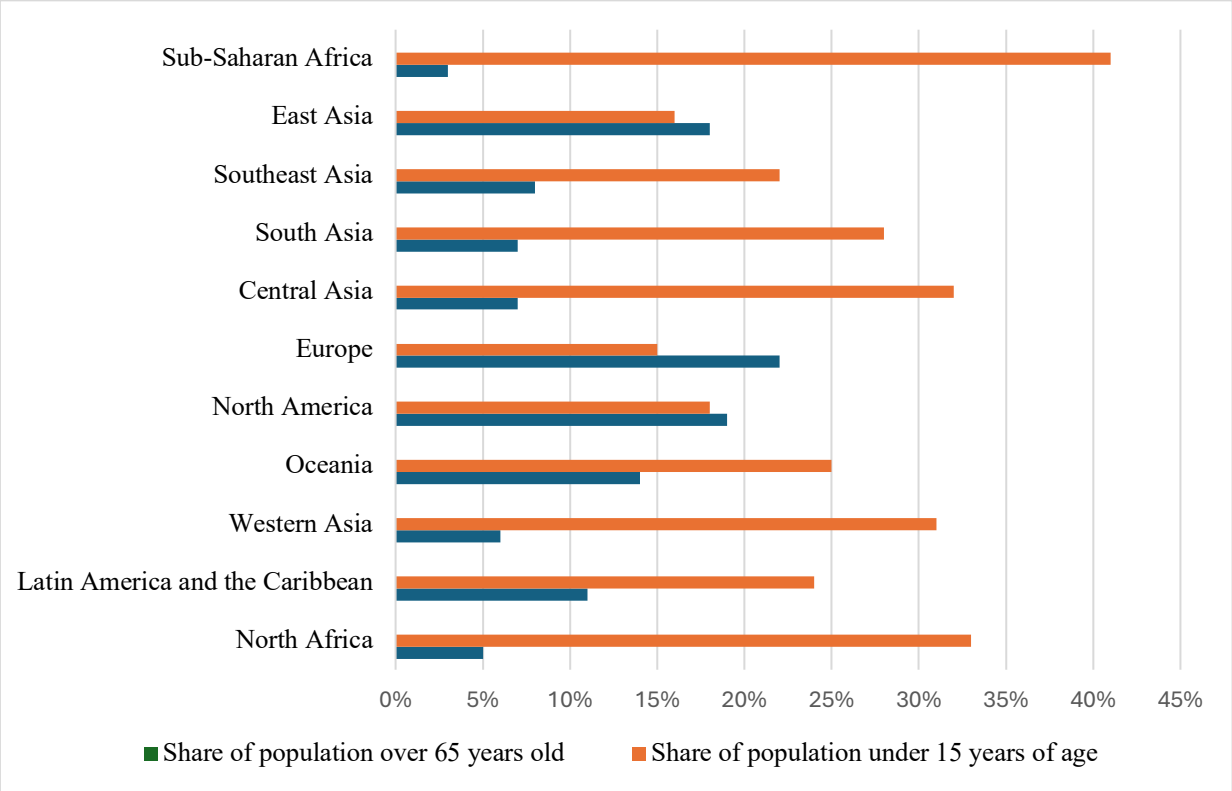


Fig.1.2 Share of children aged 0 to 14 in the total population of the country as of 2025 (Source: World Population Review)

Europe today is becoming an example of rapid changes in demographic indicators. In 2025, the proportion of people aged 65+ in the EU exceeded 21% of the population, and only 3.67 million children were born (fig.3.3). Eurostat data confirm that this birth rate is the lowest since statistics began in 1961 (6.8 million children annually) [13,18,20].



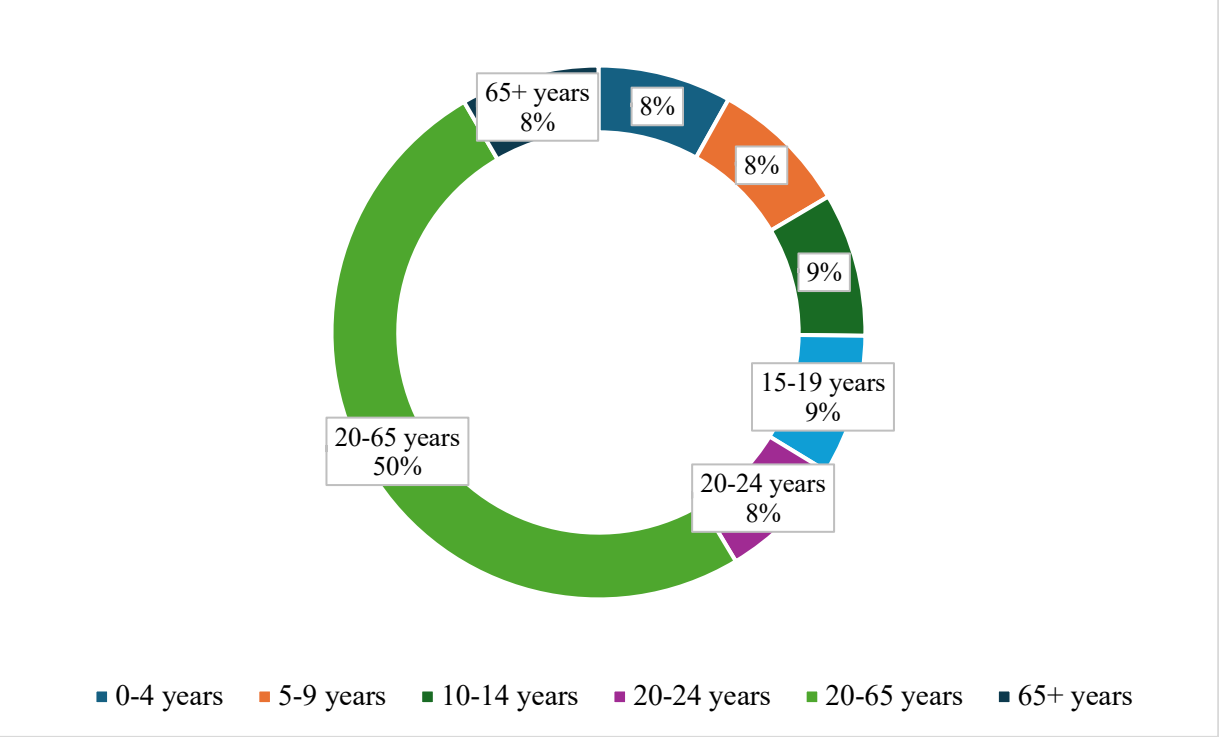
Source: Statista, 2025

Fig. 1.3 Share of individual age groups of the world population in 2025 by region

A declining child population means fewer people of working age, which has economic consequences; costs for medical and pension programs will increase rapidly. This chain of events places a significant burden on the health sector and the state as a whole.

Morocco is undergoing a rapid demographic transition. Morocco's fertility rate fell to 1.97 children per woman in 2024, down from 7.2 in the 1960s, below the replacement level. According to health statistics from the Moroccan Ministry of Health and Social Protection, the country's child population (0-14 years) is estimated to represent 25.2% of the total population (around 9.7 million) in 2026

(fig.1.4) [1,2]. The number of young people entering the labor market (15-24 years) is expected to decline by 8% by 2030 [4]. These changes result in a smaller, rapidly aging population, putting enormous pressure on education, healthcare, and the future workforce.



Source: UN World Population Prospects 2026

Fig.1.4 Child population of Morocco as of 2026

In 2025, the infant mortality rate in Morocco is estimated at 14.91 deaths per 1000 live births (children under 1 year of age) and under 5 years of age 16.6 deaths per 1000. This is 3.88% less than in the previous year, which continues the long-term downward trend in early childhood mortality [6,8].

The leading causes of neonatal deaths in Morocco include prematurity, perinatal asphyxia, and infections. Unfortunately, there is geographical inequality in the country, where in rural areas the infant mortality rate is much higher (26 per 1000) than in cities (19 per 1000) [2,5].

These positive developments, which reflect progress towards the Sustainable Development Goals, can be attributed to the implementation of a dedicated action plan to reduce neonatal mortality, as well as an action plan for priority regions for

2014-2019, which focused on key highly effective interventions in the health of newborns, infants and children [9].

At the beginning of 2026, Morocco exhibits a stationary population structure with a significant demographic group of young people. A comprehensive age breakdown reveals economic potential, workforce dynamics, and policy planning needs [1].

1.2 Analysis of the health status of the child population in Morocco and the world

A child's health can be described as a state of his vital activity corresponding to biological age, harmonious unity of physical and intellectual characteristics, as well as adequate formation of adaptive and compensatory capabilities of the body in the process of its growth. Providing conditions for the proper formation and development of the child's body involves constant monitoring of their health indicators, identification of features and trends in the state of health of children, identification of priority problems, justification of ways of prevention [14, 27].

According to the data of the scientific literature, the health of the child's body is considered as an integral indicator, which is formed because of the action of a complex complex of interrelated and interdependent internal factors and external influences [14, 27].

From the complex of factors affecting the health of children, three main groups can be distinguished: biological, environmental and socio-economic factors [18, 27].

The group of biological factors includes, first, unfavorable heredity, the nature of the course of pregnancy and childbirth [21, 29].

The group of factors that determine the peculiarities of the impact of the environment on the human body include unfavorable climatic and geographical conditions and the degree of environmental pollution with harmful chemicals.

Among the socio-economic factors that negatively affect the health of children

and adolescents, the leading ones are hypokinesia, inadequate nutrition, overload of schoolchildren due to stressful schooling, long-term stay at the computer and TV, non-compliance with the sleep schedule, insufficient time spent in the fresh air, lack of skills to harden the body, bad habits [7,16].

Scientists also note that the identified risk factors can act both in isolation and in combination. In the latter case, the most negative changes in health are observed. At the same time, under the influence of favorable socio-economic factors, even with unfavorable heredity, the disease in most cases does not develop [17,32].

The incidence and prevalence of the disease of the child population are the most important criteria characterizing the state of health in all age periods. Globally, the burden of disease in children (0–17 years) is shifting from mortality from infections to chronic disease and disability. Approximately 235 million children in vita (10.1%) suffer from moderate to severe diseases. Key trends include an increase in cases of type 1 diabetes and autism spectrum disorders, as well as endemic infectious diseases such as pneumonia and diarrhea, causing significant morbidity.

According to the latest 2024 census data and reports from the Haut Commissariat au Plan (HCP), the Moroccan population is experiencing a significant decline in the proportion of children amid a general aging society (the share of the population under 15 years of age fell from 28.2% in 2014 to 26.5% in 2024) [5,7].

Although the incidence of infectious diseases (poliomyelitis, diphtheria) is almost zero due to vaccination, there is an epidemiological shift towards chronic and noncommunicable diseases (NCDs).

Prevalence and incidence by category [5,9,10,19]

Non-communicable diseases

The most common chronic pathologies among Moroccan children (mainly aged 5-15 years) are respiratory diseases (23%), neurological disorders (22%), cancer (18%) and diabetes (17%).

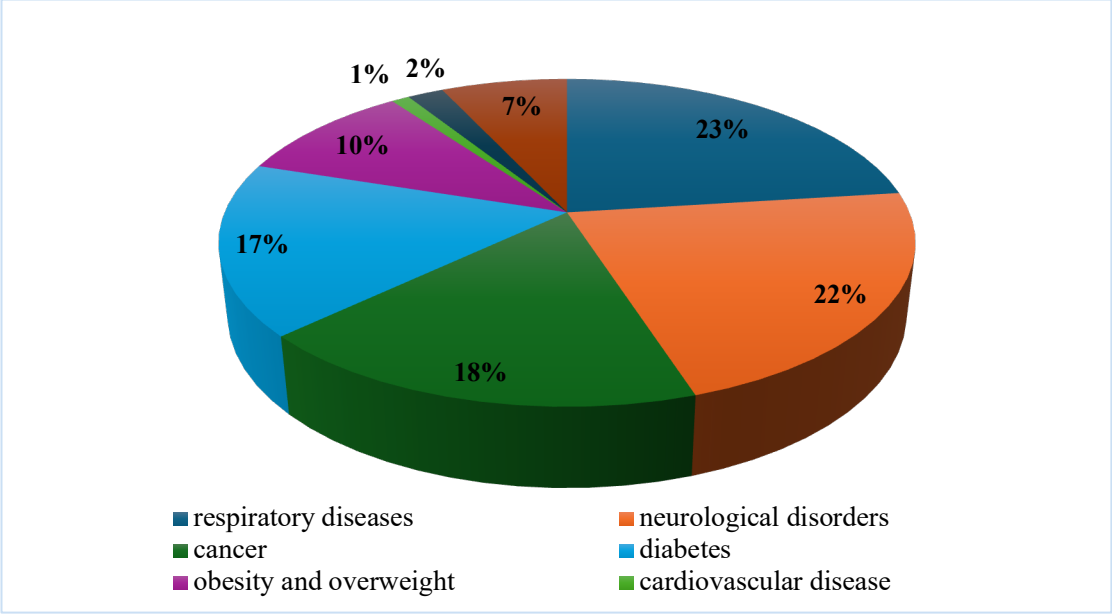
It is important to note that in Morocco more than 20,000 children and adolescents under the age of 15 are living with type 1 diabetes. The incidence is increasing, and the diagnosis is made earlier in children aged 0-5 years. The

prevalence of asthma among children (6-7 years) and 12% among adolescents (13-14 years) is estimated to be around 9%.

Obesity and overweight affect approximately 10.3% of boys and 9.9% of girls aged 5 to 19. The prevalence of obesity alone in schools is estimated at 1.9%, while overweight reaches 10.8%.

There has been an increase in the burden of NCDs, cardiovascular disease and chronic renal failure (CRF), in the age group of 0–18 years. Although the overall mortality rate from cardiovascular disease in the adult population of Morocco is about 38%, the prevalence among the child population is estimated at 1%. The main share here is congenital heart disease and rheumatic heart disease. According to studies and registries, the prevalence of CRF among children and adolescents in Morocco is approximately 2%. The main causes are congenital anomalies of the kidneys and urinary tract.

The structure of the incidence of NCDs in the pediatric population has not changed significantly in recent years (fig.1.5) [5,6,8,11,15,18].



Source: WHO Global Health Observatory

Fig. 1.5 Structure of the incidence of children with NCDs as of 2024 in Morocco

Infectious diseases

Approximately 18% of all deaths in the country are attributed to infectious

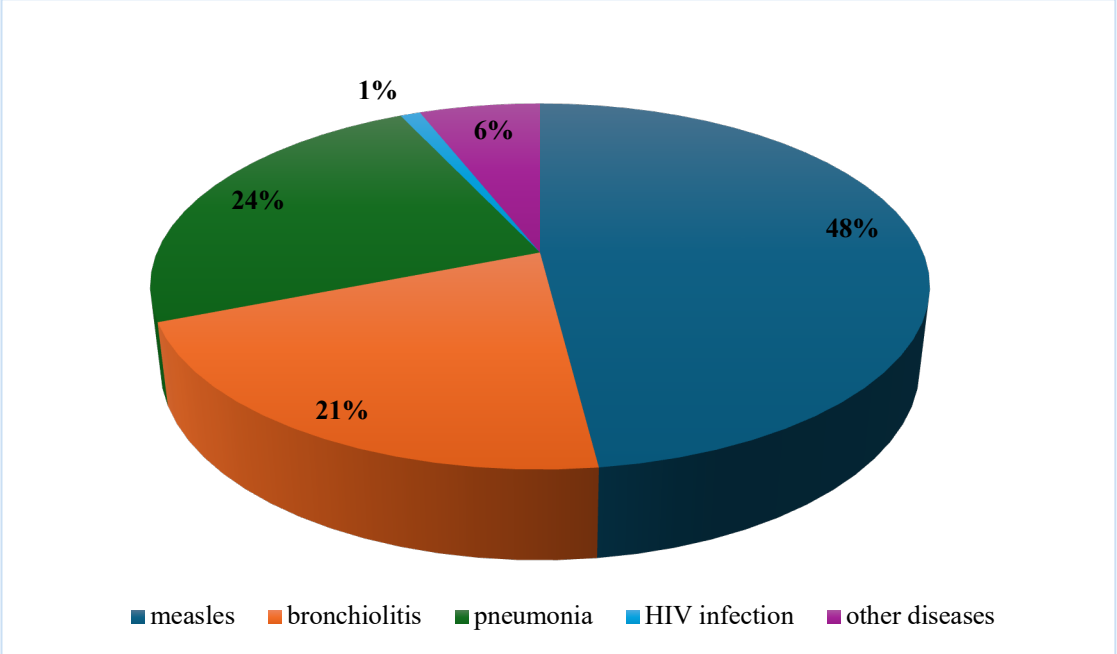
diseases and perinatal/eating disorders.

In 2024-2025, Morocco recorded an outbreak of measles, where 48% of cases occurred in people under the age of 18 [18].

Acute respiratory infections pose a significant burden on health care in general. The analysis of the study showed that bronchiolitis (21.1%) and pneumonia (24.4%) predominate in hospitalizations for respiratory reasons. Pnemonia also remains the leading cause of death among children under 5 years of age, and this significantly affects overall morbidity rates (fig.1.6) [5,6,8,11,15,18].

HIV infection. The incidence among young people (15–24 years) is stable and is about 0.1 cases per 1000 uninfected population.

Tuberculosis is still a public health problem in some regions, despite control programs.



Source: WHO Global Health Observatory

Fig. 1.6 Infectious disease prevalence structure for 2024

Congenital anomalies

The prevalence of congenital malformations is approximately 3.91 per 1000 live births. The most common are neural tube defects (21.1%) and cleft palate (10.3%). Key health and nutrition indicators include feeding problems.

Anemia affects a significant portion of the country's population, including

43% of women of reproductive age. Stunting is observed in 13% of children under 5 years of age (in rural areas this figure reaches 20.5%). In the age group 5–18 years, 21% of children are underweight [3,13,18].

Disability and mental health [20-24]

According to the International Classification of Functioning, Disability and Health with its additional variant for children and young people, "disability" is a collective concept that includes impairments, restriction of activities and restriction of participation and denotes negative aspects of the interaction between a particular person (with a certain health condition) and contextual factors (environment and personal) of that person. Disability is not just a biological or social phenomenon. According to the WHO, people with disabilities make up 10% of the world's population, of which 120 million are children and adolescents, and there is a tendency to increase the number of children with disabilities around the world [28, 32].

The findings of the World Health Survey indicate a higher prevalence of disability in countries with a low level of development compared to countries with a higher level of wealth. People with low incomes, unemployed, low level of education, women and the elderly are more at risk of disability. Childhood disability accounts for 5.1% of people, of which 0.7% have complex disabilities.

According to UNISEF, in the countries of Central and Eastern Europe, the share of children with disabilities is 2.5%, of which 1% are children with severe disabilities. The percentage of disabled children from the total number of children in different countries is 2-3-4% (USA – 4%, Great Britain – 2.5%, China – 4.9%, Ukraine – 2-3%). About 10-20% of children and adolescents have limited health opportunities and need constant medical and pedagogical support [20 24].

The status of children with disabilities in Morocco is regulated by the 2011 Constitution, which guarantees the right to free and compulsory primary education for all children, including children with disabilities. However, in practice, the country faces significant challenges. In Morocco, approximately 216,000 children under the age of 15 have a disability, representing 2.7% of this age group [18].

Among adolescents (15-18 years old), suicide is considered one of the main causes of death for girls [18].

In general, the current challenges to child health in Morocco are a decrease in the number of children, a number of problems with the provision of primary health care, insufficient awareness of the population about a healthy lifestyle and risk factors for the development of diseases, insufficient funding and equipment of the sector, as well as a shortage of medical personnel and their insufficient qualifications. The country lacks a unified policy and national program aimed at shaping and strengthening the health of the child population.

Conclusions to chapter 1

According to scientific literature, we analyzed the current demographic situation in Morocco. It was found that the country's child mortality rate has decreased in recent years. Domestic experience in providing medical and pharmaceutical care to the child population indicates the need to improve the level of perinatal care and introduce modern medical technologies.

It was found that the age structure of the population is characterized by a young population under the age of 15: 33.1% in 1999, in 2024 it did not exceed 23.6% of the total number.

According to state statistics, the dynamics of morbidity and the spread of diseases among the child population have a wave-like nature. Therefore, to improve children's health, it is necessary to implement national programs to inform the population about a healthy lifestyle, programs to finance and provide material support for medical institutions.

Overall, Morocco has seen a long-term trend of decreasing child mortality, but in recent years the country has faced new serious challenges that negatively affect overall child health indicators. Although Morocco has shown progress in improving health care, restoring vaccination coverage to prevent new outbreaks of infections remains a pressing challenge.

CHAPTER 2. CURRENT STATUS OF PROVISION OF MEDICAL AND PHARMACEUTICAL ASSISTANCE TO THE CHILDREN

2.1. Prevention of childhood diseases as a subject of state policy

From the point of view of shaping the country's potential for the future, it is important to take into account the social significance of the health of the child population and, above all, to pay attention to preventing health threats that can affect both childhood and adulthood. Therefore, in recent decades, the main focus in the field of children's health has been on preventive aspects - treatment and control of diseases. It is believed that individual health also ensures the health of the population.

Prevention of childhood diseases as a subject of state policy is a strategic direction, and to ensure the health of future generations, medical, social and legal measures are combined. State policy in this area is based on the principles of systematicity, accessibility and priority of preventive actions. A distinctive feature of state policy as a way of regulating social relations in the interests of children is that this process is carried out on the basis of a legislatively enshrined norm, which actually implements the priority provision of children's rights to health care [20, 32].

Children's health is a central issue in the Global Strategy for Child and Adolescent Health (2016–2030). The theme also features in the Sustainable Development Goals in their third edition, entitled "Ensure healthy lives and promote well-being for all at all ages" [16,17].

In 2006, the WHO Regional Office for Europe formed a set of strategies and principles aimed at strengthening disease prevention:

• expenses for the prevention of diseases in childhood – there is an investment in the health and development of the country;

• society should create a living environment conducive to children's health, which contributes to their need for a healthy lifestyle;

• state measures in the field of children's health care should be adequate to modern problems of childhood;

• each family should be presented with all the necessary opportunities to improve children's health;

• the state ensures the general availability of health care services to improve the health of children, prevent diseases and receive medical care for them;

• the government implements state policy in the field of childhood disease prevention and is responsible for ensuring the effectiveness of [17, 27-29].

Taking into account the advice of the WHO, we have identified the main directions of state policy on the prevention of childhood diseases (table 2.1)[12,22].

Table 2.1

Main directions of state policy

Orientation	Content
National immunization programs	The basis of prevention is the establishment of mandatory vaccination schedules against dangerous infectious diseases. States are implementing vaccination requirements for attending kindergartens and schools.
Integrated management of childhood diseases	WHO and UNICEF strategy helps government agencies implement a systematic approach to child health, including prevention and early diagnosis of the most common diseases.
Support for nutrition and physical development	Government initiatives to promote breastfeeding, fortification of foods with micronutrients and school feeding programs.
Social and Legal Protection and "Juvenile Prevention"	Interaction of law enforcement agencies, social protection and health care bodies to prevent negative factors affecting the health of minors.

The main goal of prevention in pediatrics is to create optimal conditions for the comprehensive development of the child and increase the body's resistance to harmful factors. The preventive direction is a priority, as it allows you to prevent diseases before they occur or in the early stages. Implementation is implemented through the organization and implementation of an effective set of measures that lead to the preservation, strengthening and restoration of children's health, ensuring the normal growth and development of the child from the moment of family planning until he reaches the age of majority [27]. The main stages of prevention include:

• antenatal and intranatal prophylaxis;

• preventive work with children of the first year of life and young children;

• preventive work with children of preschool and adolescence.

Depending on the state of health of the child, the presence of factors of biological and social risk of developing diseases, congenital pathology, three types of preventive measures can be distinguished are shown in fig. 2.1 [20, 32].

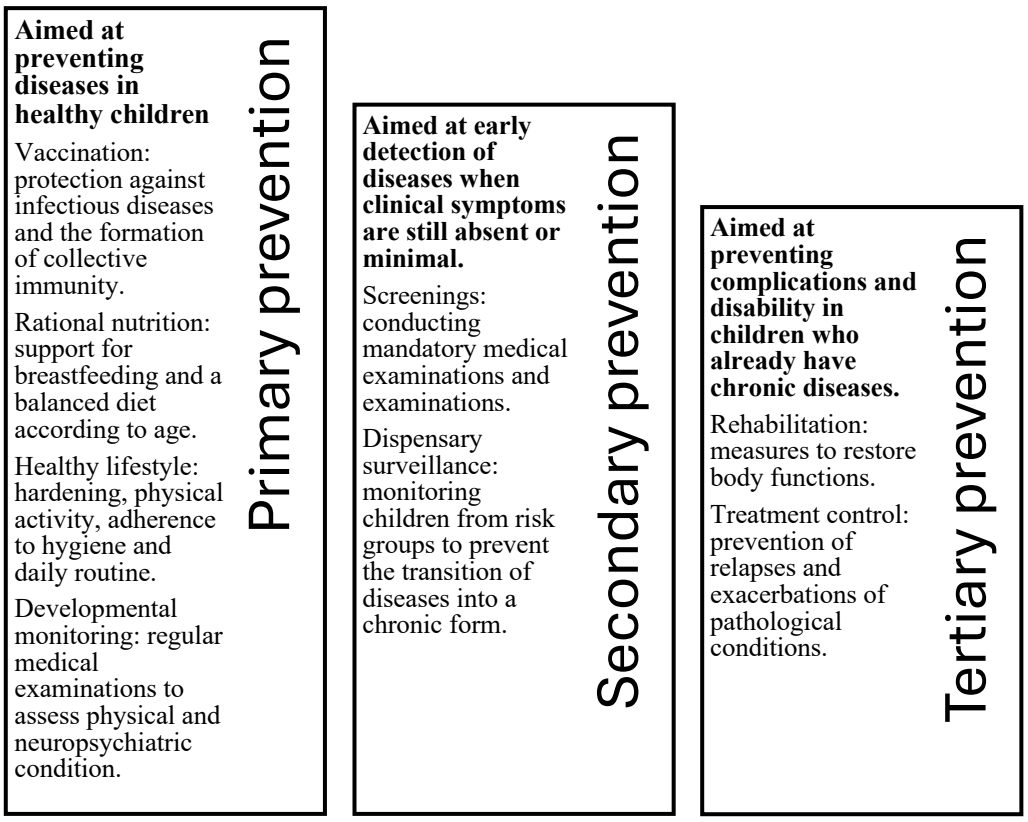


Fig.2.1 Types of preventive measures for children

It should be noted that primary prevention interventions aim to reduce the likelihood of certain diseases or disabilities in individuals, families and communities. These interventions, which aim to change lifestyles that promote health in childhood, require the joint action of many institutional, local and family actors with a common goal for the entire age group.

2.2 Legal regulation of children's health care during the provision of preventive services

A distinctive feature of state policy as a way of regulating social relations in the interests of children is that this process is carried out based on a legally enshrined norm, which ensures the right of children to health care. On November 20, 1989, at the 44th session of the United Nations General Assembly, the Convention on the Rights of the Child was adopted. According to Article 24 of the Convention on the Rights of the Child: “Children have the right to the highest attainable standard of health, to clean drinking water, to healthy food and to a safe environment in which to live. All adults and children should receive information on how to live safely and maintain their health” [17,20,23,26].

The practical application of these rights means that the doctor must simultaneously adhere to the legal framework for the development and legislative consolidation of any direction of state policy in the interests of children, including in the field of their health. Legal regulation of the provision of preventive medical care to children is based on a multi-level system of legislation that ensures the child's right to health protection and disease prevention.

The rights of the child to health care are a synthesis of norms at the international, national and regional levels. The rights of the child in the field of health care do not exist in isolation; they are formed through a multi-level system of legal acts:

- National law (consent procedures).
- Regional standards (quality and humanity).

– International principles (priority of the child's interests over the interests of science or society).

The basis of this unity is several international acts that establish fundamental standards, the main ones of which we have highlighted in table 2.2 [19-23,26-28].

Table 2.2

Key implementation tools

Global Standards	Main directions
International level	
UN Convention on the Rights of the Child (1989)	Recognizes the right of the child to use the most advanced services of the health care system and means of treating diseases and restoring health
Convention for the Protection of Human Rights and Dignity (Oviedo Convention, 1977)	Regulates the issue of agreement medical intervention and the protection of individuals who cannot consent during biomedical research
Declaration of the Rights of the Child (1959)	For the first time, the principle of equality of rights of all children without exception was enshrined
Regional level (European standards)	
European Social Charter (1961, revised in 1996)	Enshrines the right to health protection and social assistance
European Convention on the Exercise of the Rights of the Child	Aimed at protecting the interests of children in legal procedures related to their life and health
Charter of EACH (European Association of Children in Hospitals)	Enshrines the child's right to stay in the hospital with the parents
European Charter of Patients' Rights	Enshrines the right to prevent suffering and pain, which is critical in pediatrics

Each country is obliged to implement the norms of international treaties in national legislation, create conditions for the protection of children in the field of education, healthcare, social security and justice.

The purpose of the state policy in the field of prevention of childhood diseases is the legally enshrined regulation of social relations aimed at eliminating economic, social, environmental and other determinants that lead to childhood diseases. The formulation of the problem of developing state policy in the field of prevention of childhood diseases has the necessary legal basis.

After processing the documents that determine the rights of children to health care, the key principles of international standards can be identified [16, 28]:

- *Equality and non-discrimination*: all children have the same rights.
- *The best interests of the child*: at the center of any decision.
- *The right to life and development*: the state must create conditions for harmonious education.
- *The right to be heard*: the child has the right to express his opinion and be taken into account.
- *The principle of the best interests of the child*: any medical intervention should take into account the benefits to the child as a matter of priority.
- *The right to express an opinion*: the child must be heard in matters of his treatment according to his age and maturity.

Due to the combination of international and national norms, a child patient receives a special legal status:

- *The best interests of the child*: all decisions of doctors should be made based primarily on the interests of the child.
- *Right to information and opinion*: the child has the right to express his views on treatment, which must be taken into account according to his age and maturity.
- *Autonomy of the minor*: the legislation allows adolescents from the age of 14 to independently choose a doctor and consent to treatment that is in line with trends in international law.

– *Free of charge and accessibility*: the state is obliged to ensure access to medical care regardless of the family's income by ratifying the relevant international obligations.

To ensure the right to access health services under the Convention, States Parties have undertaken to take effective and necessary measures to eradicate traditional practices that negatively affect the health of children.

The main areas that need to be addressed to achieve these goals are:

– reducing infant and infant mortality;

– ensuring that the necessary health care and health care are provided to all children, with priority given to the development of primary health care;

– combating disease and malnutrition, including in primary health care, by, inter alia, the use of readily available technology and the provision of sufficient nutritious food and clean drinking water, considering the dangers and risks of environmental pollution;

– provision of adequate health services to mothers in the prenatal and postnatal periods;

– providing information to all sectors of society, in particular parents and children, on children's health and nutrition, the benefits of breastfeeding, hygiene, sanitation of the child's environment and the prevention of accidents, as well as access to education and support in the use of this knowledge;

– development of preventive health measures, guidance for parents and education and family planning services.

Conventionally, the legal regulation of social relations in the prevention of the population can be divided into three blocks.

The first block is general. It combines legal norms that establish general guarantees of the child's right to health care and medical and pharmaceutical assistance. It establishes the system and legal status of health care institutions; establishes the principles, defines general legal concepts that regulate activities within the framework of the relationship – doctor (health care institution) - child -

parents (legal representatives), and determines legal liability for violations committed in the field of providing medical care and services [16, 32].

The second block is civil law. It defines the special status of a child as a subject of the right to medical care, in particular preventive care, and other personal non-property rights related to them. In this context, the need to define the concept of civil legal capacity and the legal capacity of an individual - a child as a subject of law becomes of particular importance.

The third block is special. It reflects the legal status of public relations in the field of preventive pediatric care, unites legal norms that regulate special interactions at different levels of providing such care to children. The list includes norms that contain legal regulation of the provision of special preventive medical care, in particular, but not exclusively, to children in difficult life circumstances, children with limited vital functions, medical care as a component of preventing and combating domestic violence, etc.

2.3 Analysis of the legal regulation of children's health care in Morocco

The legal framework for child health in Morocco is based on a combination of constitutional guarantees, international obligations and recent major social protection reforms. The main principle of the legislation is the best interests of the child. The right to health is a fundamental right recognized for all children between the ages of 0 and 18 in the country. The regulation of child health is based on a number of legal texts and international conventions integrated into national legislation [1].

The lack of a single “Code of the Rights of the Child” in Morocco is compensated by a broad legal framework based on constitutional guarantees and sectoral legislation. Instead of a single code, the right to health of the child is implemented through a system of laws and national strategies. The 2011 Constitution of Morocco laid the foundation for the protection of children’s rights.

In table 2.3, we list the main normative and legal acts that regulate the right of the child to health [9,10,19].

Table 2.3

Results of retrospective analysis of legislative acts

Legal basis	Established norms
Constitutional foundations	
CM Article 31	Guarantees equal access to medical care, social protection, and health insurance for all citizens.
CM Article 32	Places an obligation on the state to provide legal protection, as well as social and moral support to all children on an equal basis.
CM Article 54	Obliges parents and the state to protect the life and health of children from conception to adulthood.
Sectoral legislation and implementation of the right to health	
Framework Law No. 06-22	Modernizes infrastructure and improves the quality of services, which directly affects the availability of pediatric care and develop prevention policies.
Basic Health Insurance Code (Law No. 65.00)	Allow children to automatically use the best one-parent health insurance plan (AMO).
Law No. 09-21 on Social Protection	Introduces general health insurance (AMO) for all citizens, including children.
Kafala Law (No 1-02-172)	Regulate medical and educational care for abandoned children.
Family Code (Moudawana) Article 54; Article 209	Defines the responsibilities of parents to ensure the normal growth of the child, preserve his/her physical and psychological integrity and take care of health through prevention and treatment. Establishes the age of majority at 18 years old.

Morocco has ratified the UN Convention on the Rights of the Child, which is a key benchmark for national strategies. The convention was ratified in 1993, and commits Morocco to guaranteeing the highest attainable level of health care, with an emphasis on primary and preventive health care. In accordance with the State's obligations under the Convention on the Rights of the Child, the country has taken all necessary legislative measures to implement the rights recognized in the Convention, in addition to the recommendations of the Committee on the Rights of the Child to harmonize national legislation with the provisions of the Convention on the Rights of the Child. Thus, the Kingdom of Morocco has enacted laws that comply with the four fundamental principles of the Convention on the Rights of the Child [3].

It must be determined that the Moroccan Constitution of 2011 recognizes the supremacy of international conventions, duly ratified by Morocco, over the domestic legislation of the country [19].

In recent years, the Ministry of Health has been implementing specific strategies to translate these laws into concrete actions [9,19]:

National Comprehensive Children's Health Policy. This comprehensive framework aims to reduce child mortality and ensure equal access to quality medical care.

Health insurance coverage and services. From 2025, mothers can independently register their children in their insurance system for better coverage without the mandatory consent of the father. The age limit for children as dependents in the insurance system has been raised from 26 to 30 years.

National Agency for Child Protection. A newly created body (Law No. 29.24) that coordinates the work of child protection centers and social institutions.

Private kindergartens and nurseries. Regulated by Decree No. 2-08-678, which establishes strict standards of hygiene, safety (minimum of 2.75 to 4 m² per child) and medical supervision, including the mandatory presence of a pediatrician to monitor health. Adoption of laws on sanitary and epidemiological well-being, protection of the population from infectious diseases and the rights of the child [19].

Prevention of childhood diseases. In Morocco, it is based mainly on the National Immunization Program, which has significantly reduced infant mortality and eliminated diseases such as polio and neonatal tetanus. At the state level, free access to vaccines, preventive examinations and basic health services within the framework of primary health care will be provided. Creation of a data collection system to track vaccination coverage and outbreaks. Educational work with parents to overcome mistrust of vaccinations and raise health awareness.

The Ministry of Health is implementing a multisectoral strategy (Health Plan 2025) aimed at overcoming infectious, respiratory and foodborne diseases. This document was aimed at ensuring the optimal functioning of a holistic system for the protection of children's rights in Morocco in accordance with the requirements of the UN Convention on the Rights of the Child and taking into account the Development Goals proclaimed by the UN Millennium Declaration and the outcome document of the Special Session on Children of the UN General Assembly "A world fit for children". To implement this program, the government annually approved the Action Plan [9,19].

The main measure to improve the quality and increase the volume of medical services according to the Plan was the development of standards for the provision of medical care; unified clinical protocols and their use in the process of advanced training of general practitioners and family medicine in terms of providing medical care to children. Therefore, the next stage of our work is an analysis of the children's vaccination plan for 2025. All vaccines included in the National Vaccination Schedule are free in dispensaries and public health centers and are aimed at 95% coverage [10,12].

The program currently contains protection against 12-13 diseases, including tuberculosis, polio, diphtheria, tetanus, pertussis, hepatitis B, haemophilus influenzae type b, measles, rubella, pneumococcal and rotavirus infections. In recent years, human papillomavirus vaccination for girls aged 11 years and over has been added to the program to prevent cervical cancer. The included vaccines protect against a number of diseases (fig. 2.2) [2,10,12].

Tuberculosis (BCG) and hepatitis B	from birth
Diphtheria, tetanus, pertussis, poliomyelitis	administered in several doses (at 6, 10 and 14 weeks)
Haemophilus influenzae type B (Hib) and rotavirus	administered in several doses (at 6, 10 and 14 weeks)
Pneumocok	for the prevention of meningitis and pneumonia
Measles and rubella	administered at 9 months, with revaccination at 18 months. A catch-up campaign has been launched by January 2025 to counter the historic measles outbreak.
Human papillomavirus vaccination	

Fig.2.2 National immunization program

The Moroccan Ministry of Health regularly holds national vaccination weeks to raise awareness among parents and maintain a high level of herd immunity. Regulations support free primary health care in public centers, including vaccination and malnutrition control.

In addition to vaccination, national protocols regulate the prevention of common diseases [19]:

- Acute respiratory infections: 42.8% of children under 5 years of age in Morocco have cough symptoms. Prevention includes improved hygiene and vaccination against pneumococcus and Hib.
- Diarrhoeal diseases: Prevention consists of vaccination against rotavirus and hygiene (hand washing, drinking clean water).
- Nutrient deficiencies: Taking vitamin A and iron to prevent growth stunting and boost immunity.

Despite all the achievements in krpain, there are challenges for state policy:

- Inequality in access: Difficulty reaching children in remote areas or in low-income families.
- Refusal to vaccinate: An increase in the number of parents who refuse vaccinations due to misinformation, which threatens the formation of herd immunity.
- Sustainability of funding: The dependence of prevention programs on a stable state budget or international assistance [10].

Conclusions to chapter 2

According to scientific sources, it has been established that the elimination of economic, environmental, social and other factors that lead to an increase in the incidence of childhood diseases is the main goal of state policy in the field of childhood disease prevention.

An effective policy in the field of prevention of childhood diseases can significantly reduce the cost of treatment in the future and ensures the economic development of the state through the preservation of human capital.

The legal regulation of prevention and medical care for children can be structured into three main blocks, depending on the nature of the norms and their direction. The international legal block includes fundamental acts that determine the rights of the child to the highest attainable level of health. The UN Convention on the Rights of the Child and the Declaration of the Rights of the Child are key. They establish the obligation of the state to ensure access to medicine and develop preventive (preventive) health care.

In Morocco, a number of public health strategies have been implemented in recent years that relate to the child. Morocco is implementing several initiatives to strengthen prevention. Systematic medical examinations and vaccination status checks are organized in schools. Emphasis is placed on the education of parents in the field of healthcare.

CHAPTER 3 ANALYSIS OF CURRENT APPROACHES TO IMPROVING THE RATIONAL USE OF MEDICINES IN CHILDREN

3.1 Analysis of new directions for improving the rational use of medicines in children

The current situation in the sphere of circulation of medicines in the context of modernization of the healthcare system necessitates the justification and search for approaches to optimizing the provision of medicines to children based on rational use, taking into account WHO recommendations and the targeted development of new directions in this matter [20, 24].

An analysis of international recommendations in the field of circulation of medicines, to which the World Health Organization certainly belongs, showed that in 1985, WHO experts defined this concept as follows: "medicines that meet their clinical needs, in doses that meet their individual needs, for a sufficient period of time and at the lowest cost to them and their community." WHO characterizes rational use of medicines (RUM) as the foundation of safety. RUM has several significant advantages for improving the health of the population and the state. It saves money for the individual and the country, prevents waste of resources, and promotes justice [26,30].

But in our work we are looking at the issue of RUM in the pediatric population, and there are many complexities in this issue. The market faces an acute shortage of pediatric drugs, where the vast majority of available drugs are intended for use by adults, which complicates the provision of pharmacological care to children. WHO has determined that the percentage of drugs developed for the pediatric age group remains below 50% [23, 26-28].

Despite legislative initiatives in the EU and the US, a large part of the drugs are still used in pediatrics outside of approved indications, as clinical trials in children are more complex, expensive and have more ethical restrictions. As a result, doctors often have to calculate the dosage of adult drugs for children on their own,

which increases the risk of side effects. The practice of outside the approved indications in pediatrics is a growing phenomenon worldwide. According to various sources, the frequency of prescribing drugs outside the approved indications ranges from 33% in outpatient practice to 70-90% in neonatal intensive care units. One of the factors that negatively affects the quality of medical care for children is the insufficient number of special children's dosage forms [16,17,26-28].

Literature evidence suggests that clinical trials of drugs in children are complicated by a number of problems. It is much more difficult to form a research group of children, which may be due to the small number of patients with a certain disease. A specific problem in scientific research is the allocation of age groups among the child population, so separate studies are needed for each of them. Drug therapy in children is complex due to age-related differences in pharmacokinetic processes such as absorption and metabolism. Not all drugs cause the same reaction in different age groups. Studies show that 30-40% of pediatric patients experience at least one medication-related problem, resulting in treatment failure, increased follow-up visits, the need for additional treatment, and increased costs. Pediatric pharmacology requires a special approach for RUM in the child [27, 30]. For the effectiveness of the drug, it is important to consider the stage of development of the child: this requires the development of available dosage forms that allow for easy dose adjustment according to the size and condition of the child. The pediatric population is more vulnerable to adverse reactions than adults, which poses ethical and moral challenges for researchers during the trial process, such as obtaining parental consent for the study [18,21]. The lack of information on clinical trials on adverse reactions in children leads to a lack of reliable data on the safety profiles of liquid drugs.

The situation with the shortage of children's dosage forms is complex and is due to several critical factors.

Having studied the relevant sources, several main factors that complicate the development of drugs in pediatrics can be identified (fig.3.1) [25,26,29].

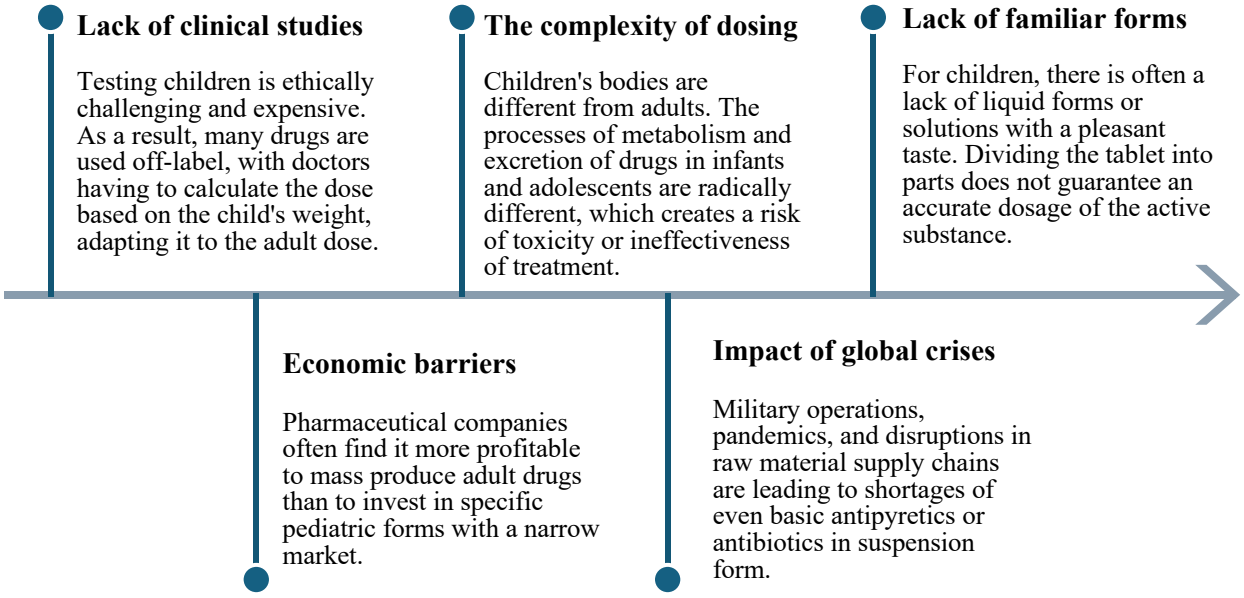


Fig.3.1 Main critical factors leading to shortages of dosage forms in pediatrics

The lack of availability of medicines that meet these criteria for children is the main cause of irrational practices. Together, these factors increase the risk of medication prescribing errors, which can reduce their effectiveness. When prescribing medications, errors can occur that are related to a lack of knowledge and training among health professionals, different patient characteristics, environmental factors and lack of communication with parents. In adult practice, the use of the drug beyond indications is often based on strong evidence for such conditions. In younger patients, this is often a forced step due to a lack of alternatives, which tilts the scales towards a higher risk, which is justified only in severe or life-threatening conditions.

Therefore, WHO has formulated the main directions for improving medical care for children, among which an important role is given to the study of appropriate dosage forms and concentrations of drugs for children, assistance in their production and licensing. Children often have therapeutic needs that require specialized medicines and formulations to maximize efficacy, appropriate dosage, limit toxicity, and promote adherence to the treatment regimen [7,16,23].

In 2007, the World Health Assembly was held and the Resolution "Better Medicines for Children" was adopted, which addressed some aspects related to pediatric medicines in emergency lipid systems. In the resolution, WHO Member States called for "many measures to be taken, such as improving research, regulation, access and rational use of paediatric medicines" and "to promote access to essential medicines for children by including, as appropriate, these medicines in national medicines lists, procurement and reimbursement schemes, and to develop measures to monitor prices" [25,31]. This prompted the WHO to publish the first Model List of Essential Medicines in 2007. This list is updated every two years, and the last 9th revision was published in 2023. Each revision includes some important new pediatric medications or the introduction of new dosage forms or dose revisions [24].

Today, there is a gap between the availability of appropriate medicines for children and the need for them. Types of irrational use of medicines in children [26]:

– Prescribing and using excessive amounts of medications (polypharmacy). It has been proven that if 5-9 medications are used to treat a child, the risk of side effects due to their interaction increases 5 times compared to using 1-4 medications. And when using 10 or more medications, the risk of side effects increases 50 times;

– Inappropriate use of antimicrobial drugs;

– Excessive use of injections (when effective oral dosage forms are available);

– Prescribing drugs without considering evidence-based medicine;

– Improper self-prescription of medicines (self-medication);

– Prescribing "old" permitted, but toxic and insufficiently effective medicines, refusing to prescribe new effective drugs [25,31].

The rational use of drugs in pediatrics is not just the correct dosage, but a whole strategy aimed at minimizing the risks of "off-label" prescription and increasing adherence to treatment protocol. Rational use of medicines in paediatrics is the administration of medicines according to clinical need, in the correct doses (according to age/weight), for the required period, ensuring safety and efficacy,

while minimizing adverse reactions. The main approaches of 2026 focus on safety, age-appropriateness, and the use of digital technology to minimize errors [29,31].

Having studied the modern literature on this issue, we have identified the main current approaches that now dominate in world practice (tabl. 3.1) [24-28,30].

Table 3.1

Basic principles of rational pharmacotherapy in children

Current approaches	Characteristic
1	2
Pharmacogenomics-based personalization	Instead of a standard approach, doctors take into account the genetic characteristics of the child. This allows you to predict how the body will break down drugs and avoid toxic reactions or ineffective treatments.
Implementation of electronic decision support systems	Integration into electronic medical records of special algorithms that: ▪ automatically calculate the dose according to weight and body surface area; ▪ warn of drug incompatibility; ▪ block the appointment of antibiotics for viral diagnoses.
Age-appropriate formulations	WHO is actively promoting the development of medicines in child-friendly forms: ▪ Dispersible tablets (dissolved in the mouth); ▪ Flexible dosage (mini-tablets, syrups with precise dispensers); ▪ Improvement of organoleptic properties (taste, smell), which is critical for the child not to spit out the medicine.
Antibiotic administration	Strict control over the use of antibiotics to prevent resistance. Use of rapid diagnostic tests (e.g. C-reactive protein test or rapid streptococcus test).

Continuation of table. 3.1

1	2
Patient-centered education	Educating parents not only on how to administer medication but also on why to stop taking medication prematurely. Using mobile reminder apps and visual dosing charts significantly increases therapeutic efficacy.
Individual approach	The dose is calculated strictly on body weight (kg) or body surface area. Taking into account the immaturity of enzyme systems, kidneys and liver in newborns and infants.
Evidence-based medicine	Use of drugs with proven effectiveness, according to state formularies and protocols.
Pharmaceutical Care	The pharmacist should instruct parents on the correct storage of medication at home and eliminate the risks of errors in administration.
Multidisciplinary approach	Establishing national and hospital committees bringing together physicians, clinical pharmacists, and pharmacologists to develop treatment strategies and evaluate their effectiveness.
The concept of "P-drug"	Training physicians to select a limited list of first-line drugs based on efficacy, safety, and cost (pharmacoeconomics).
Enhanced pharmacovigilance	Active monitoring and registration of adverse reactions in children, as they are more likely to have allergic reactions to excipients (dyes, flavors).
Formulary system and Essential Medicines List	Using the WHO Model List of Essential Medicines for Children to ensure access to the most essential and safest medicines.

The problem of developing and producing pediatric dosage forms is quite acute in many countries, including Morocco. This is explained by the need to conduct clinical trials in each age group of the pediatric population, the high cost of production, and the need for moral and ethical solutions to problems with parents of sick children [24,25].

The integration of these areas is based on a model that recognizes that technological tools, pharmacist expertise, and supporting health systems must work together in a coordinated manner to optimize medication use in children. This model provides a framework for identifying key pathways needed to address current challenges and improve the quality of pediatric care (fig. 3.2) [29-31].

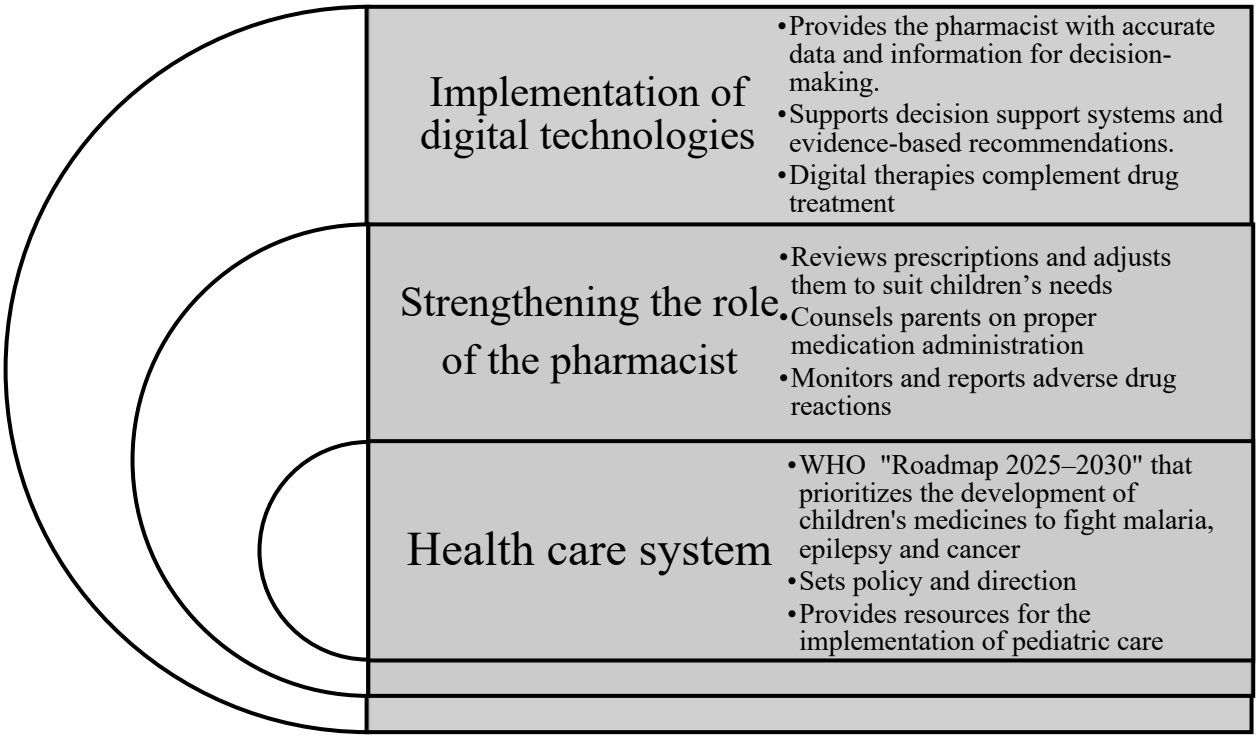


Fig.3.2 Interaction between modern approaches to rational pharmacotherapy of children

In today's environment of new technologies, new dosage forms in pediatrics, and the growing role of the pharmacist, healthcare processes are interconnected, and each dimension influences the effectiveness of the others. Digital tools provide pharmacists with the data they need to make informed decisions. Similarly, even the

most skilled pharmacists can struggle to achieve results if healthcare policies and institutional structures do not support their integration into the team.

3.2 Study of the information needs of pharmaceutical workers on improving pharmaceutical care for the pediatric population

Pharmacists play a significant role in the healthcare team through their expertise and knowledge of medicines, so research into their interventions worldwide can help reduce medication errors in children and promote their rational use. The “Role of the Pharmacist” profile highlights their important contribution to ensuring the safe and rational use of medicines, especially in paediatrics. This dimension is critically important as the pharmacist acts not simply as a dispensing specialist but as a key element of the patient safety system. Pharmaceutical care in paediatrics can significantly reduce the risk of medication errors and improve the effectiveness of therapy. Key interventions include prescription review, medication monitoring and patient education [28,31].

In order to study the information needs of pharmaceutical workers regarding the improvement of pharmaceutical care for the pediatric population, we conducted a survey of pharmacists in pharmacies in Morocco. The survey was conducted from 01.09.2025 to 01.12.2025.

The instrument of the method was a questionnaire we developed, consisting of three blocks:

– informational (the purpose of the survey and the guarantee of anonymity);

– data about the respondents of the sociological survey (mandatory part);

– the main part (a list of questions characterizing the subject of the survey).

57 respondents from 7 pharmacies took part in the survey. The majority of respondents have more than 5 to 10 years of work experience (40.3%). A significant

proportion of employees have less than 5 years of work experience (27.8%) and more than 10 to 15 years (15.3%).

At the first stage, based on the analysis of the scientific literature on improving pharmaceutical care, we developed a questionnaire for employees of the pharmaceutical industry, which contained 9 questions.

The study determined pharmacists' preferences when choosing a dosage form for use in children in percentage terms (fig.3.3).

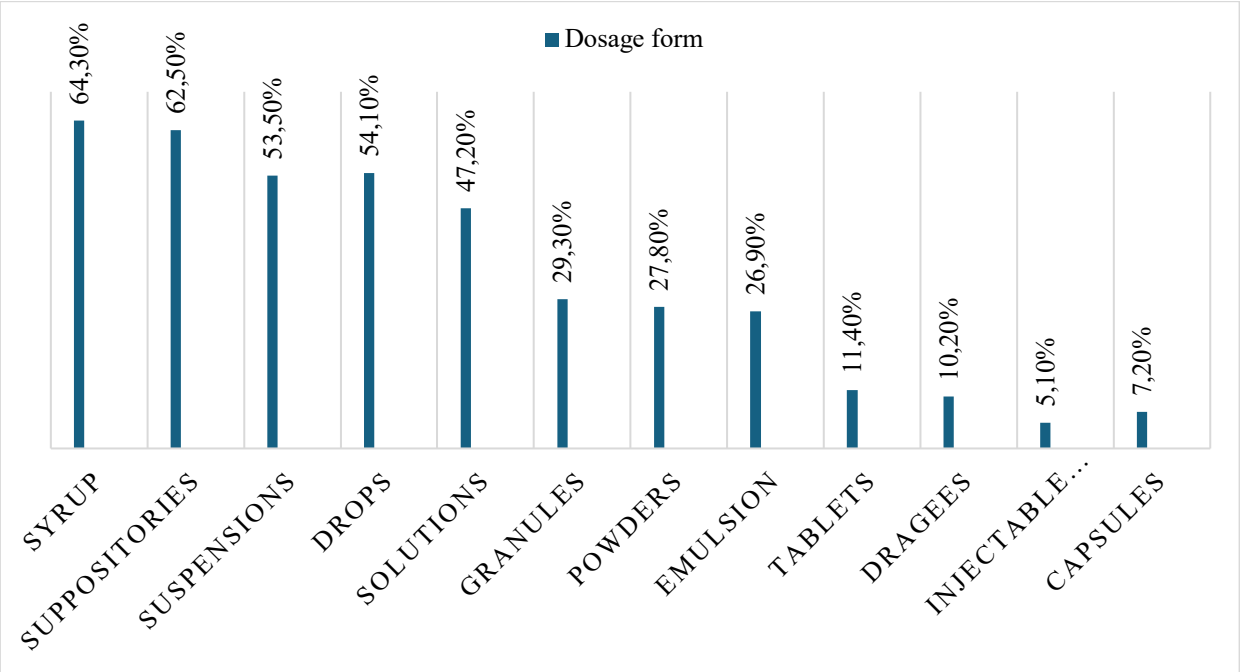


Fig. 3.3. Analysis of pharmaceutical workers' preferences when choosing a dosage form for use by children, in %

It was found that most pharmacists prefer liquid medication forms when choosing treatments for children. Over 64% of respondents consider syrups the optimal dosage form for children, followed by suppositories (62.5%), suspensions (53.5%), and drops (54.1%). Fewer specialists preferred tablets (27.8%), pills (10.2%), and injection solutions (5.1%).

In Morocco, pharmacists play an important role in providing pharmaceutical care to children, often acting as the first point of contact for parents. They advise on the treatment of common symptoms, medication dosage, and the prevention of complications. Pharmacists provide recommendations and dispense over-the-

counter medications to treat symptoms that parents often identify on their own. The most common conditions of the child, in which parents seek pharmaceutical care from a specialist, are shown in fig. 3.4.

It was found that consumers need advice when purchasing medicines for the treatment and prevention of fever and pain (57.3% of cases), for respiratory diseases (61%), as well as for infectious and allergic conditions (43.6; 49.3%, respectively). Parents also need the help of a pharmacist when choosing a type of feeding for their child and medical devices (glucose meters, thermometers, nebulizers). Pharmacists advise on the use of inhalation devices (e.g., spacers) and environmental control measures to avoid triggers (36,9%). Inform parents about the importance of immunization and adherence to the national vaccination calendar in 5.1% of cases.

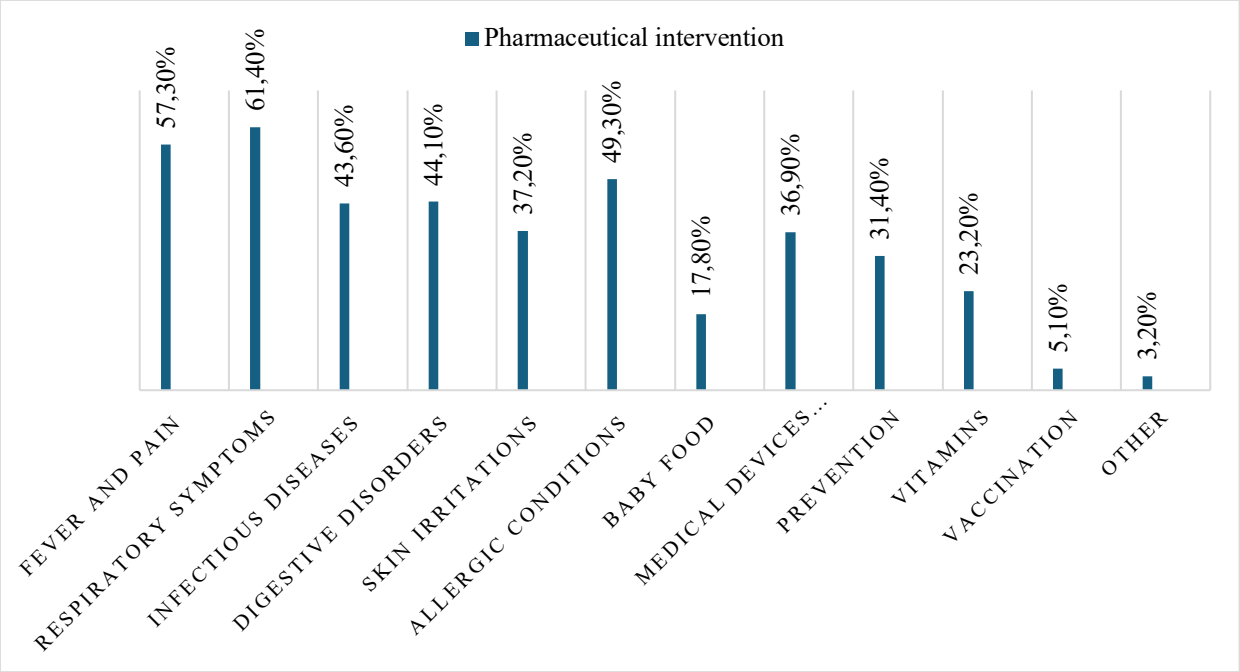


Fig.3.4 Main cases when pharmacists apply pharmaceutical care

Pharmacists complement the role of the doctor by ensuring the correct use of prescribed medications. However, if signs of a serious condition are identified, pharmacists are required to refer the child to the emergency department.

Next, respondents were asked to choose several of the most important questions with which consumers address them. It was found that the most common categories of questions include: dosage (81.1%) and method of administration

(79.8%); information about efficacy (66.3%); quality (safety) issues and side effects of drugs concern 56.8 and 57.2 percent of parents. Recommendations on the choice of drugs for common symptoms are provided by 82.1 percent of pharmacists, and on storage conditions - by 76.7%. Interestingly, information on the retail price of drugs when purchasing is not decisive for a child (14.2%) (fig. 3.5.).

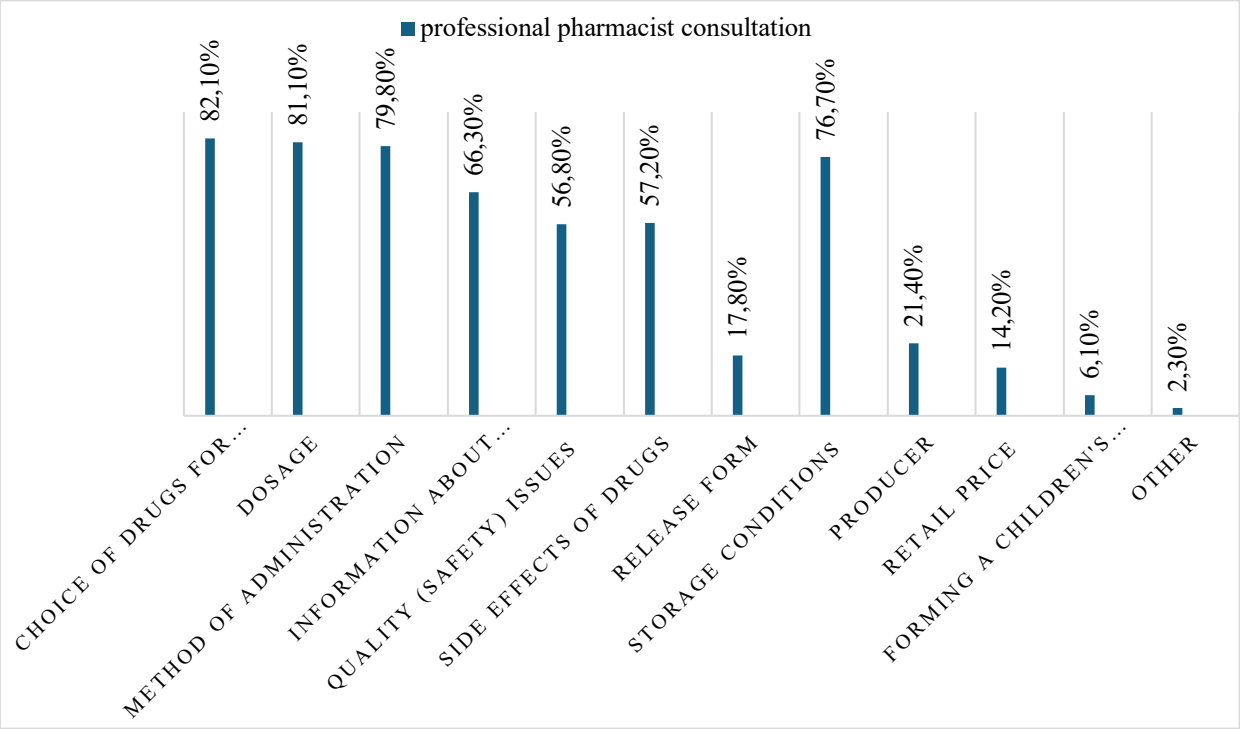


Fig.3.5 Results of analysis of information about medicines when purchasing for a child

Appropriate dosage forms are essential in pediatric pharmacotherapy. According to the Moroccan Ministry of Health, there is a significant shortage of prescription dosage forms adapted specifically for children, especially for the age group up to 6 years. Therefore, we asked pharmacists about the sufficiency of dosage forms in the pharmacy that they can dispense without a doctor's prescription (fig.3.6). According to our survey, 17% of pharmacists believe that several medicines needed by children in general form remain unavailable in the appropriate over the counter (OTC) pharmaceutical form. Common OTC medicines are usually available in appropriate pediatric dosage forms (80%), 3% of respondents were unable to answer this question.

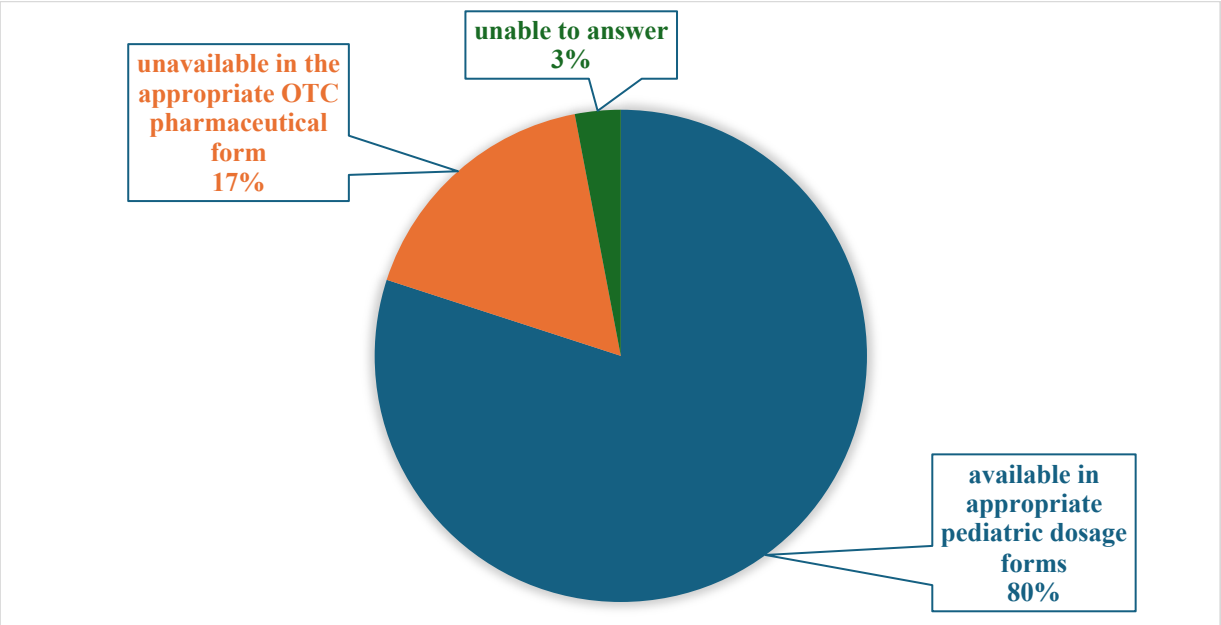


Fig.3.6 Assessment of the availability of pharmaceutical forms suitable for children

In Morocco, pharmacists are increasingly involved in therapeutic education programs. They are trained in providing pharmaceutical care to children, but this process currently has some limitations and is mainly focused on specific diseases. Most respondents already provide advice to parents on the use of medicines for self-medication, but feel the need for more in-depth knowledge and basic therapy (fig3.7).

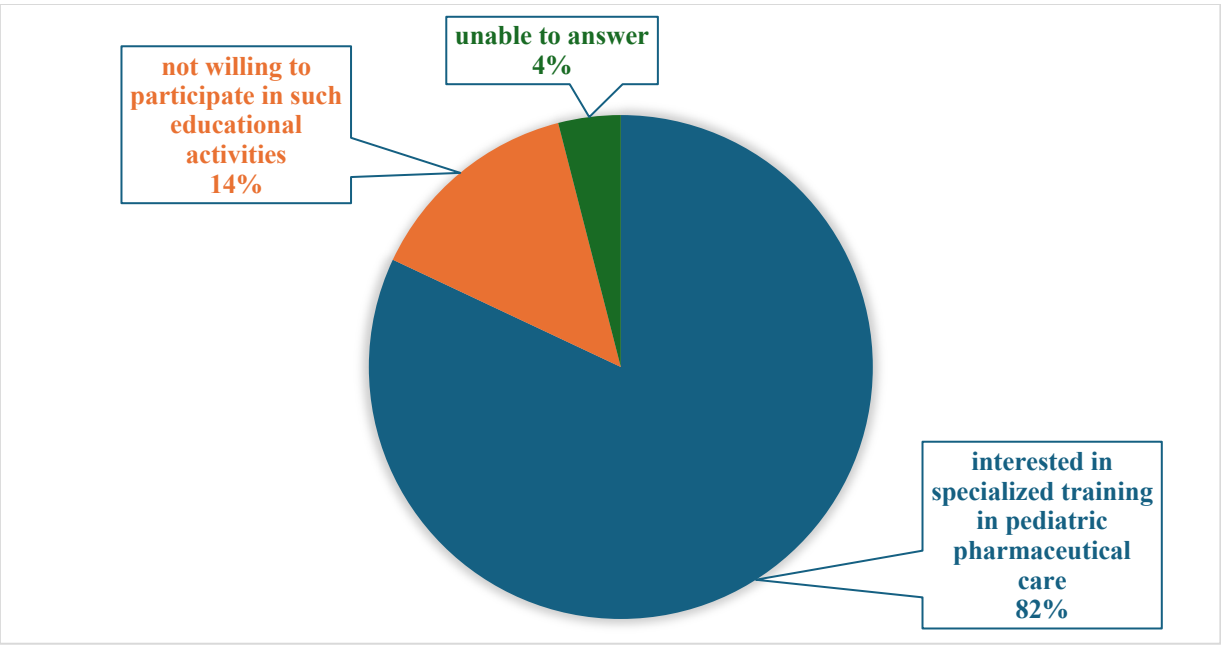


Fig.3.7 Analysis of pharmacists' readiness to undergo specialized training in pediatric pharmaceutical care

Our survey of pharmacists in Morocco showed that 82% of professionals are interested in specialized training in pediatric pharmaceutical care. Over 14% of pharmacists are not willing to participate in such educational activities, although many note that basic university education is not enough and that continuous professional development in pediatrics is necessary.

Next, respondents were offered a list of topics that, in their opinion, would expand their knowledge of pediatric pharmacotherapy (fig. 3.8).

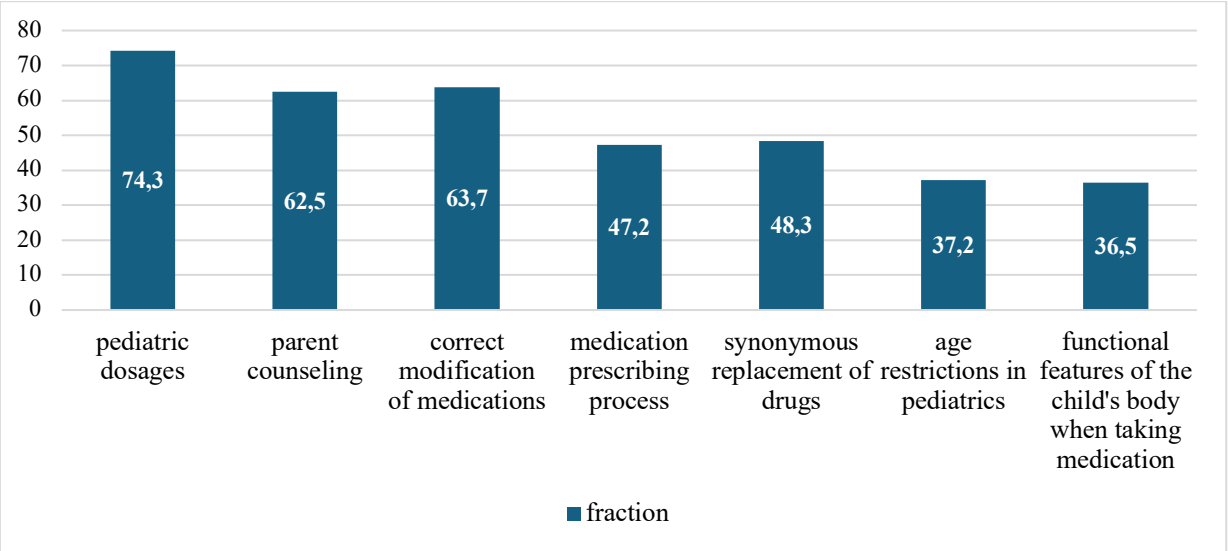


Fig.3.8 Analysis of the information needs of pharmaceutical workers regarding drug provision for the pediatric population

The survey showed that 74.3% of specialists are interested in specialized training on dosage forms. Most respondents (62.5) want to gain additional knowledge when providing advice to parents on treatment issues. The lack of special pediatric dosage forms leads to the need to train pharmacists in the correct modification of drugs (for example, crushing tablets), so many pharmacists want to gain knowledge on this issue (63.7). To improve pediatric care, experts suggest involving pharmacists in the process of prescribing medications to control the use of excipients that may be harmful to children. The issue of prescribing medications is of concern to 47.2 percent of respondents. Pharmaceutical workers are also interested in the issues of synonymous substitution (48.3%), the functional effects

of the characteristics of the child's body on taking medications (36.5%), and age restrictions on the use of drugs by children (36.5%).

Pharmacies in Morocco have service standards governing the dispensing of medicines, especially for children. These rules are based on national legislation (Code of Medicines and Pharmaceuticals) and international principles of good pharmacy practice (GPP) [9,19,26,31]. In our study, we propose to implement pharmaceutical care for the dispensing of pediatric drugs in accordance with the developed standard of medical care to help overcome problems associated with irrational use of medications (fig.3.9).

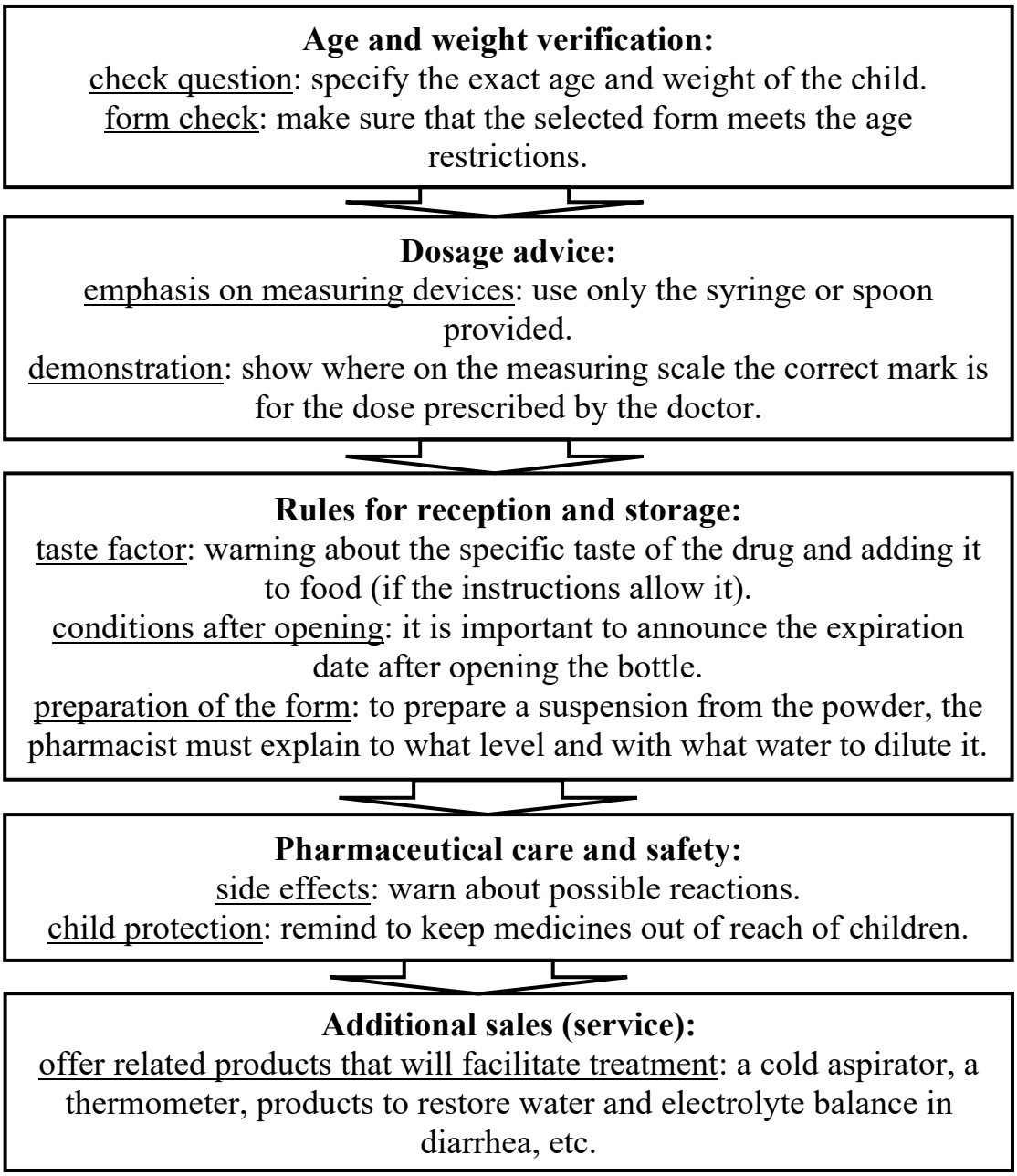


Fig.3.9 Basic rules for a pharmacist when implementing pediatric dosage forms

Conclusions to chapter 3

It has been determined that, to implement effective and safe pharmacotherapy in children, it is necessary to resolve some issues regarding the study of the effectiveness and safety of medicines in children of different ages, as well as the development of children's forms of medicines.

The study showed that modern approaches to improving the rational use of medicines in children are based, firstly, on the integration of innovative dosage forms taking into account the proper selection, dosing and administration of drugs based on a deep understanding of pediatric pharmacology. The use of digital technologies in pediatrics significantly increases the safety and effectiveness of treatment, helping parents and doctors avoid dosing errors and adhere to the medication administration schedule.

Thanks to the analysis of literature sources, we came to the conclusion that the role of the pharmacist in ensuring the rational use of medicines in pediatrics goes far beyond the usual dispensing of goods.

We conducted a social survey of pharmaceutical workers. The study revealed that there is a lack of awareness among specialists about children's medicines.

It was found that the majority of respondents consider syrups to be the most optimal dosage form for use in children (64.3), as well as drops (54.1), suppositories (62.5), suspensions and solutions.

It was found that consumers more often need advice when purchasing drugs for the treatment and prevention of cold symptoms, infectious diseases, and allergic conditions.

When treating children, consumers most often turn to pharmacists for professional advice on the choice of over-the-counter drugs, clarification of the dosage and features of the use of drugs. Even if there is a prescription from a doctor, about 82.3% of parents always or almost always ask the pharmacist for additional consultation at the pharmacy (choice of remedies for common symptoms).

GENERAL CONCLUSIONS

1. According to the scientific literature, we analyzed the current demographic situation in the world and in particular in Morocco. It was found that at the beginning of 2025, the age structure of the world population consisted mainly of people aged 15-64. Dynamics of morbidity and spread of diseases of the child population of Morocco for 2019-2025 has a wavy character.

2. An analysis of international regulatory documents on the organization of medical care for children was conducted. It was determined that regulatory documents in the field of pediatric medicine are usually based on standards that guarantee the child the right to the highest attainable level of health and quality medical services.

3. It has been established that the problem of developing and producing pediatric dosage forms is quite pressing in many countries. This is due to the need to conduct clinical trials in each age group of the pediatric population, the high cost of production, and the need to resolve moral and ethical issues with the parents of sick children.

4. An analysis of scientific literature showed that Morocco has made undeniable progress in realizing children's rights, improving health coverage and maternal and child health indicators, as well as increasing the detection of cases requiring protection.

5. We've experiencedestablished that in many countries of the world, the role of pharmaceutical workers has significantly increased at the stage of parents' decision-making regarding the rational use of medicines to preserve and strengthen the health of their own children.

6. Based on the systematization of the opinions of pharmacists, it can be argued that to promote the rational use of medicines in children and improve the quality of pharmaceutical services, it is necessary to introduce educational programs to systematically improve knowledge on providing reliable and objective information about the properties and correct use of pediatric dosage forms.

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Ф А 2.2.1–36–366

National University of Pharmacy

Pharmaceutical faculty
Department of social pharmacy
Level of higher education master's
Specialty 226 Pharmacy, industrial pharmacy
Educational and professional program Pharmacy

APPROVED
The Head of Department
of Social Pharmacy

_____
Alina VOLKOVA
"05" of September 2025

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Elaamiri MOHAMED

1. Topic of qualification work: «Investigation on modern approaches to improving the rational use of medicines in children», supervisor of qualification work: Lyubov TERESHCHENKO, PhD, associate professor, approved by order of NUPh from "06" of October 2025 № 266

2. Deadline for submission of qualification work by the applicant for higher education: May2026 year.

3. Outgoing data for qualification work: authors' publications; media publications; official health sites; State Statistics Service of the world; sites of WHO, IFD, Internet, etc.

4. Contents of the settlement and explanatory note (list of questions that need to be developed): to analyze the current state of pharmaceutical care for children; to analyze the legislative acts regulating the development and implementation of dosage forms in the world; to analyze the National List of Morocco; to analyze the WHO List of medicines for Children.

5. List of graphic material (with exact indication of the required drawings):
Tables – 4, schemes – 17.

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	11.09.25	11.09.25
2	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	21.11.25	21.11.25
3	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	24.12.25	24.12.25

7. Date of issue of the assignment: «05 » of September 2025 year.

CALENDAR PLAN

№ з/п	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Analysis of scientific, periodical literature on the topic of qualification work	September 2025	**done**
2	To study the pharmaceutical aspects of children's medications and justify measures aimed at the effectiveness and safety of their use	October – November 2025	**done**
3	To investigate possible risks and hazards associated with the prescription and consumption of medications by children of different age groups and to substantiate pharmaceutical care measures aimed at the effectiveness and safety of their use	December – January 2025 – 2026	**done**
4	Conduct a survey among pharmacists in a Moroccan pharmacy	February – March 2026	**done**
5	Registration of a qualification work according to the general requirements	April 2026	**done**
6	Preparation of the report and multimedia presentation in official protection of a master's thesis	May 2026	**done**

An applicant of higher education _____ Elaamiri MOHAMED

Supervisor of qualification work _____ Lyubov TERESHCHENKO

ВИТЯГ З НАКАЗУ
По Національному фармацевтичному університету

«06» жовтня 2025 р. **№ 266**
Фармацевтичний факультет

Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5 курсу 2025-2026 н. р., група Фм21(4,10д)англ-01, освітньо-професійна програма «Фармація», спеціальність «226 Фармація, промислова фармація», галузь знань «22 Охорона здоров'я», рівень вищої освіти другий (магістерський), денна форма здобуття освіти, термін навчання 4 роки 10 місяців, мова навчання англійська.

Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи (українською мовою)	Тема кваліфікаційної роботи (англійською мовою)	Керівник кваліфіка-ційної роботи	Рецензент кваліфіка-ційної роботи
Кафедра соціальної фармації				
Елаамірі Мохамед	Дослідження сучасних підходів до покращення раціонального використання ліків у дітей	Investigation on modern approaches to improving the rational use of medicines in children	доц. Терещенко Л. В.	доц. Бондарева І. В.

Підстава: подання декана фармацевтичного факультету доцента Олександра ГОНЧАРОВА

Ректор
Вірно. Секретар

УКРАЇНА НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ ФАРМАЦЕВТИЧНИЙ ФАКУЛЬТЕТ №02010936 МІСТО ХАРКІВ

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу

щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«01» травня 2026 р. № 333728039

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти МОХАМЕД Елаамірі, групи Фм21(4,10д)англ-01, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» очної (денної) форми здобуття освіти на тему: «Дослідження сучасних підходів до покращення раціонального використання ліків у дітей / Investigation on modern approaches to improving the rational use of medicines in children», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Заступник голови Комісії,
заступник директора інституту
в складі ЗВО ННІПФ,
доцент Олена НОВОСЕЛ

Ф А 2.2.1-36-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Elaamiri MOHAMED

on the topic: **«Investigation on modern approaches to improving the rational use of medicines in children»**

Relevance of the topic. Rational pharmacotherapy in children remains one of the most pressing problems in medicine and pharmacy. The problem of this issue is ignoring the ethical and deontological principles of pediatric pharmacology, namely: numerous drugs used in adults are used in pediatric practice by the same analogy, which is unacceptable in the conditions of the modern level of development of pharmacy.

Practical value of conclusions, recommendations and their reliability. Attention is focused on the issue of the safety of the use of medicines by children of different age groups. Pharmaceutical care measures when dispensing medicines to children, as patients of a special risk group, are justified.

Assessment of work. The graduate student demonstrated analytical thinking and responsibility throughout the research process. The work is logically structured, methodologically sound, and thoroughly referenced. It combines statistical analysis, policy review, and strategic evaluation.

General conclusion and recommendations on admission to defend. In general, the qualification work of Elaamiri MOHAMED on the topic: «Investigation on modern approaches to improving the rational use of medicines in children» is performed at the proper level, meets the requirements of the "Regulations on the preparation and protection of qualification works at the National University of Pharmacy" and can be recommended for defense in the Examination commission.

Scientific supervisor _____ Lyubov TERESHCHENKO

«11» of May 2026

Ф А 2.2.1-36-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Elaamiri MOHAMED

on the topic: **«Investigation on modern approaches to improving the rational use of medicines in children»**

Relevance of the topic. Children's health is an integral indicator of the general well-being of society, as well as an indicator of all socio-ecological problems in the country and the effectiveness of the development of the health care system as a whole. The state's task of preserving and strengthening children's health is ensured by implementing the provisions of the UN Convention on the Rights of the Child. Thus, Article 24 of the Convention defines the right of the child to use the most advanced health care services and means of treating illness and restoring health, ensuring the right of every child to access such health care services

The qualification work is a theoretical generalization and solution to the scientific problem that underlies the definition of the term "financial resources" in terms of their composition, structure and value and the determination of the impact of each of the components on the financial stability, profitability, liquidity and business activity of the business entity, which will allow management personnel to make motivated decisions when developing a financial resources management system.

Author's suggestions on the research topic. The qualification work concludes on the rational use of medicines in pediatrics. Attention is focused on the safety of the use of medicines by children of different age groups.

Practical value of conclusions, recommendations and their validity. The practical significance of the work lies in the analysis of modern approaches to improving the rational use of medicines in children. Thus, the research direction of Elaamiri MOHAMED work is relevant and has practical significance.

Disadvantages of work. Some minor stylistic inconsistencies and occasional language issues are present, but they do not significantly affect the overall quality or comprehension of the research.

General conclusion and assessment of the work. According to the relevance and the results of the research qualification work of Elaamiri MOHAMED on the topic: «Investigation on modern approaches to improving the rational use of medicines in children» meets the requirements for master's works and can be recommended for official defense in the Examination commission.

Reviewer _____ Irina BONDAREVA

«12» of May 2026

Ф А2.2.1-36-230

ВИТЯГ

з протоколу засідання кафедри соціальної фармації

№ 15 від «13» травня 2026 року

ПРИСУТНІ: зав. каф. доц. Волкова А.В., доц. Болдарь Г.Є., доц. Дядюн Т.В., проф. Котвіцька А.А., проф. Назаркіна В.М., доц. Ноздріна А.А., проф. Панфілова Г.Л., доц. Сурікова І.О., доц. Терещенко Л.В.

ПОРЯДОК ДЕННИЙ: Про представлення до захисту в Екзаменаційній комісії кваліфікаційних робіт.

СЛУХАЛИ: завідувачку кафедри доц. Волкову А. В. з рекомендацією представити до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти спеціальності 226 Фармація, промислова фармація Елаамірі Мохамед на тему: «Дослідження сучасних підходів до покращення раціонального використання ліків у дітей».

Науковий керівник: к. фарм. н., доцент кафедри СФ Терещенко Л.В.

Рецензент: к. фарм. н., доцент кафедри ММЗЯФ Бондарева І.В.

ВИСТУПИЛИ: доц. Волкова А.В., проф. Панфілова Г.Л. доц. Ноздріна А.А. висловили рекомендації до кваліфікаційної роботи Елаамірі Мохамед

УХВАЛИЛИ: Рекомендувати до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти Елаамірі Мохамед на тему: «Дослідження сучасних підходів до покращення раціонального використання ліків у дітей».

Завідувачка каф. СФ, доцент _____ Аліна ВОЛКОВА

Секретар, доцент _____ Альміра НОЗДРІНА

Ф А2.2.1-36-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувачка вищої освіти Елаамірі Мохамед до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньо-професійною програмою Фармація
на тему: «Investigation on modern approaches to improving the rational use of medicines in children».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Олександр Гончаров /

Висновок керівника кваліфікаційної роботи

Здобувачка вищої освіти Елаамірі Мохамед під час виконання кваліфікаційної роботи продемонструвала уміння працювати з науковими даними, проводити їх узагальнення, аналізувати та узагальнювати результати дослідження. Усі поставлені завдання відповідно до мети роботи було виконано у повному обсязі. Результати дослідження належним чином оброблені і представлені.

Керівник кваліфікаційної роботи _____ Любов ТЕРЕЩЕНКО

«11» травня 2026 р.

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувачка вищої освіти Елаамірі Мохамед допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувачка кафедри
соціальної фармації _____ Аліна ВОЛКОВА

«13» травня 2026 р.

Qualification work was defended

of Examination commission on

« 09 » __June___ 2026 year

With the grade _____

Head of the State Examination commission,

DPharmSc, Professor

_____ / Volodymyr YAKOVENKO