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**DENTAL DISEASES
TRENDS IN THE WORLD
AND IN THE REPUBLIC OF BELARUS**

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Ю. В. Модринская

**ТЕНДЕНЦИИ
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В МИРЕ И РЕСПУБЛИКЕ БЕЛАРУСЬ**

**DENTAL DISEASES TRENDS IN THE WORLD
AND IN THE REPUBLIC OF BELARUS**

Учебно-методическое пособие



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MOTIVATIONAL CHARACTERISTICS OF THE TOPIC

The incidence of caries and periodontal diseases among the world's population has changed over the past 30 years. Many countries have achieved the WHO Dental Health Goals. A modern competent dentist should know the global goals of the dental health of the WHO, as well as be able to identify trends in dental diseases in the Republic of Belarus and compare with the situation in other countries of the world. This is necessary for dental care planning aimed at maintaining the dental health of the population.

The purpose of the class: to learn to analyze the main indicators of dental morbidity in different countries of the world and determine the trends of dental diseases in view of the WHO Global Goals.

Objectives of the class:

1. To study the WHO Global Dental Health Goals.
2. To study the dental health criteria recommended by the WHO.
3. To determine the trends of prevalence and incidence of dental caries and periodontal diseases in the Republic of Belarus and in the world.

Test questions on the topic of the class:

1. The WHO Dental Information System.
2. The WHO global dental health goals by 2010 (the WHO, 1993), by 2020 (the WHO, 1999).
3. Dental health criteria recommended by the WHO.
4. Trends in the incidence of dental caries in the world.
5. Achievement of the WHO dental health goals in various countries.
6. The results of a dental surveys of the population of Belarus.
7. Application of the the WHO dental health criteria to the situation in Belarus.

INTRODUCTION

The WHO determines the prevalence and trends of dental diseases in the world and the Republic of Belarus.

Dental problems and the further development of diseases can be predicted. The WHO has set the Global Dental Health Goals for 2000, 2010 and 2020.

Not all of the WHO Global Dental Health Goals have been achieved, but there is a trend in decrease in the prevalence and intensity of major dental diseases in the world and in the Republic of Belarus. The intensity of dental caries in 12-year-old children of the Republic of Belarus for the period from 1996 to 2008 decreased from 3.8 to 2.2 according to the DMFT index.

INFORMATION SYSTEM FOR DENTAL HEALTH MONITORING

In 1860, new technologies for the production of sugar appeared and made this product affordable for population. An increase in sugar intake is accompanied by a significant increase in the prevalence of dental caries. In 1900, the International Federation of Dentists (FDI) was created. One of the primary tasks of this organization was to conduct epidemiological surveys to collect data on dental caries in different countries of the world. The selective research method was used for this at that time.

Since 1971, the WHO has begun the periodic publication of manuals «Oral Health Survey» for the planning and conduction of epidemiological surveys in countries around the world.

In 1969, at the Headquarters of the WHO (Geneva, Switzerland), the Global Oral Data Bank (GODB) was created to study trends in the incidence of caries and other dental diseases in the world.

The WHO Dental Health Program supported the collection of epidemiological data, conducted computer-based data analysis for free for all who used the WHO dental system, standard research methods and the WHO maps. In epidemiological surveys, the «pathfinder» method was recommended, enabling countries to obtain an assessment of the dental health status of the population in the shortest possible time and to develop national dental health programs on its basis.

A graphic depiction of the trends in dental caries incidence in the populations of industrialized and developing countries was made by Dr. D. Barmes in 1988. It is now apparent that, in general, the trend in dental caries incidence corresponds to the prognosis (Fig. 1).

It should be noted that although the world had already reached the Global Goal in 1992 — DMFT of 12-year-old children was less than 3, prognosing a further trend (after 2000) was impossible.

In the 1990s the WHO Regional Office for Europe in Copenhagen developed the ORATEL dental health information system, which was based on the DMFT index as one of the most important indicators of the quality of dental care for the population. At the same time, the WHO recommends the use of new criteria for assessing the levels of caries intensity by the LCI index in 12 year-olds: 0–0.50 — very low; 0.51–1.50 — low; 1.51–3.0 — moderate; 3.01–6.50 — high and 6.51–10.00 — very high.

In 1996, the WHO Collaborating Centers in Sweden and Japan developed the Internet-based online CAPP (Oral Health Country / Area Profile Project) program, a project for monitoring dental health in the world.

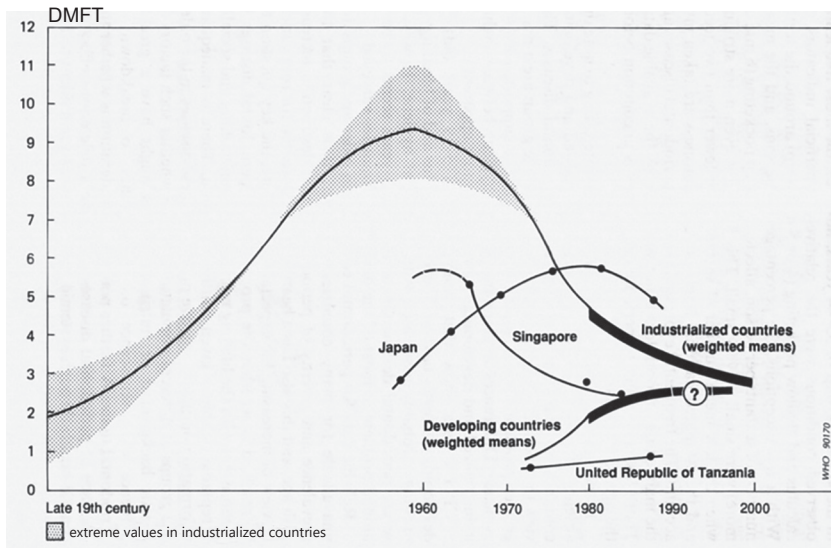


Fig. 1. Trends in the incidence of dental caries in the world among 12-year-old children (D. Barnes, 1988)

In 2003, the WHO developed the WHO Global Information Database and proposed the use of a stepwise approach (STEPS) for the control of chronic diseases, including major dental diseases. The sequence of development of information systems for monitoring dental health is presented in Fig. 2.

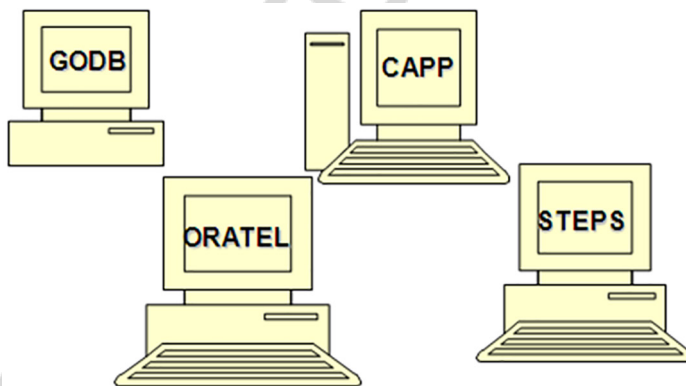


Fig. 2. The sequence of development of information systems for the dental health monitoring

BASIC CRITERIA AND GOALS OF DENTAL HEALTH

Each of the six key age groups uses its own priority criteria for dental health, according to which the WHO defines the goals (Table 1).

Table 1

Dental Health Criteria	
Age	Criteria
5–6 years	% free of caries
12 years	DMFT
15 years	DMFT, the number of healthy sextants (CPITN)
18 years	DMFT, «M», CPITN
35–44 years	DMFT, CPITN, % of population with complete tooth loss
65 years and older	DMFT, CPITN, % of population with complete tooth loss

Global Dental Health Goals by 2000 (the WHO, 1980):

1. 50 % of 5–6-year-olds will be healthy (free of caries).
2. The intensity of dental caries in 12-year-old children will not exceed the average DMFT 3.0.
3. 85 % of 18-year-olds will not have missing teeth.
4. The number of patients with complete tooth loss in 35–44 year-olds will decrease by 50 % from the 1982 level.
5. The number of patients with complete tooth loss in 65 years and older will decrease by 25 % from the 1982 level.
6. An information system for monitoring dental health will be introduced.

The intensity of dental caries according to the DMFT index in 12-year-olds in the regions of the world in 2000 according to the WHO information system is shown in Fig. 3.



Fig. 3. DMFT in 12-year-olds in regions of the world (the WHO, 2000)

Global Dental Health Goals by 2010 (the WHO, 1993):

1. 5–6-year-old children:

- 1.1. 90 % will be healthy (free of caries).

2. 12-year-old children:

- 2.1. The intensity of dental caries will not exceed the average DMFT 1.0.

3. 15-year-old teens:

- 3.1. The intensity of dental caries will not exceed the average DMFT 2.3.
- 3.2. The number of healthy sextants (CPITN = «0») will be not less than 5.

4. 18-year-old young people:

- 4.1. There will be no missing teeth (M = «0») due to tooth decay or periodontal disease.

5. 35–44-year-old adults:

- 5.1. The number of people with complete tooth loss will be no more than 2 %.
- 5.2. DMFT will be no more than 10 («M» will be not more than 4).
- 5.3. 90 % will have 20 or more functioning teeth.
- 5.4. Sextants with deep pockets (CPITN «4») will be no more than 0.1.

6. 65 years and older seniors:

- 6.1. The number of people with complete tooth loss will be no more than 5 %.
- 6.2. 75 % of individuals will have 20 or more functioning teeth.
- 6.3. Sextants with deep pockets (CPITN «4») will be no more than 0.5.

European Dental Health Goals by 2020:

Goal 1. 5–6-year-old children:

- 1.1. 80 % and more will be healthy (free of caries).
- 1.2. The average DMFT of primary teeth will not exceed 2.0.

Goal 2. 12-year-old children:

- 2.1. The average intensity of caries of permanent teeth will not exceed the DMFT 1.5, of which the «D» component (untreated caries) will be less than 0.5.
- 2.2. The average number of sextants with a healthy periodontium will be at least 5.5.

Goal 3. 15-year-old teens:

- 3.1. The average intensity of caries will not exceed DMFT 2.3, of which the «D» component (untreated caries) will be less than 0.5.
- 3.2. The number of teeth missing due to caries will be 0.
- 3.3. The average number of sextants with a healthy periodontium will be at least 5.0.

Goal 4. 18-year-old young people:

- 4.1. The number of teeth missing due to caries will be 0.
- 4.2. The average number of sextants with a healthy periodontium will be at least 4.0.

Goal 5. 35–44-year-old people:

- 5.1. No more than 1 % of people will have complete tooth loss.

- 5.2. 90 % of people will retain 20 or more naturally functioning teeth.
- 5.3. The average DMFT will not be more than 10, of which no more than 4 will be missing due to caries.
- 5.4. The average number of healthy periodontal sextants will be 2 or more (CPITN «0»).

Goal 6. 65–74-year-old people:

- 6.1. No more than 10 % of people will have complete tooth loss will be.
- 6.2. 90 % or more will have a functionally full bite (natural or restored).
- 6.3. The average number of sextants with deep pockets will not exceed 0.5 (CPITN «4»).

DENTAL CARIES TRENDS IN THE WORLD

In the second half of the 20th century, due to the implementation of communal programs for the prevention of dental caries, the intensity of dental caries among children in industrialized countries began to decline. Changes in the clinical picture and dynamics of the DMFT index among children in Zurich (Switzerland) from 1964 to 2000 are presented in Fig. 4.

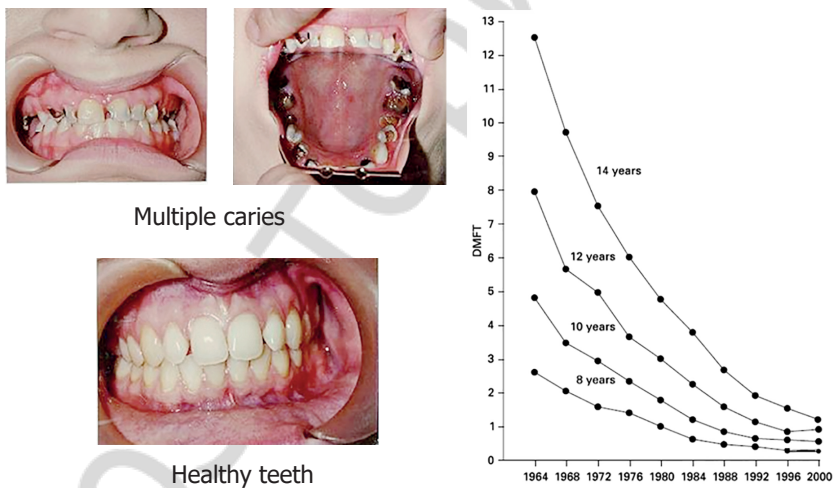


Fig. 4. Change in the DMFT in children from 1964 to 2000 (Zurich, Switzerland)

The global value of the DMFT index for 12-year-old children in the world in 2015 was 1.86 (according to 209 countries). In 73 % of countries (153 out of 209 countries), the DMFT value was less than 3. The global DMFT index for the period from 1980 to 2015 is presented in Table 2.

Table 2

Trends of DMFT in 12-year-olds

Global DMFT	Source	Year
2,43	Leclercq et al, 1987	1980
2,78	Leclercq et al, 1987	1985
1,74	CAPP (www.mah.se/capp)	2001
1,61	Bratthall, 2005	2004
1,67	Natarajan, 2011	2011
1,86	Gavrilidou NN, 2015	2015

There is a trend toward a decrease in the intensity of dental caries among 12-year-old children in the countries of the world according to the WHO data in 2003 and in 2014 (Fig. 5, 6).

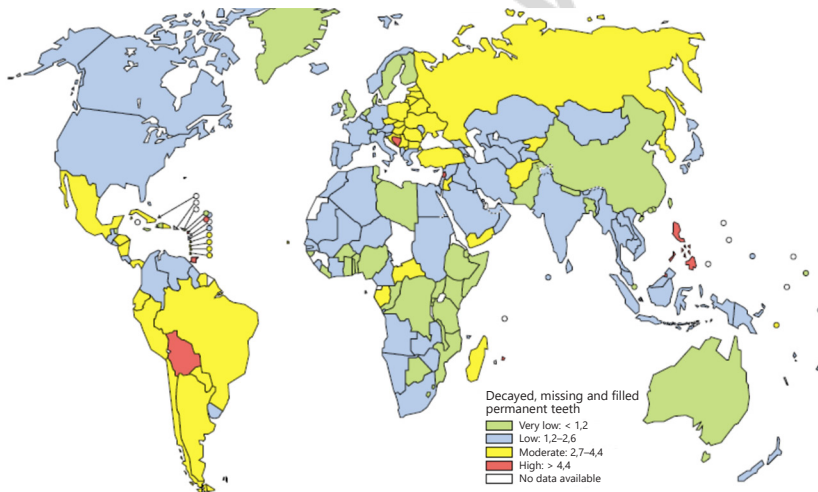


Fig. 5. Level of caries intensity (LCI) in 12-year-olds in the world (the WHO, 2003)

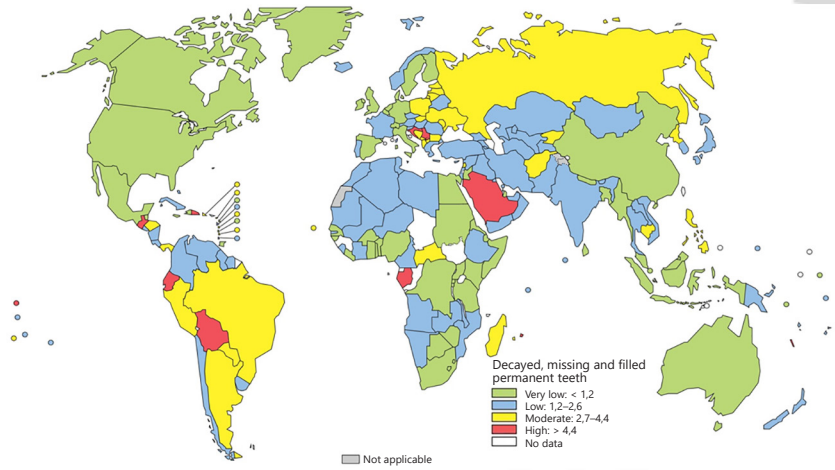


Fig. 6. Level of caries intensity (LCI) in 12-year-olds in the world (the WHO, 2014)

The level of caries intensity in 35–44 year olds in countries of the world according to the WHO 2003 data is presented in Fig. 7.

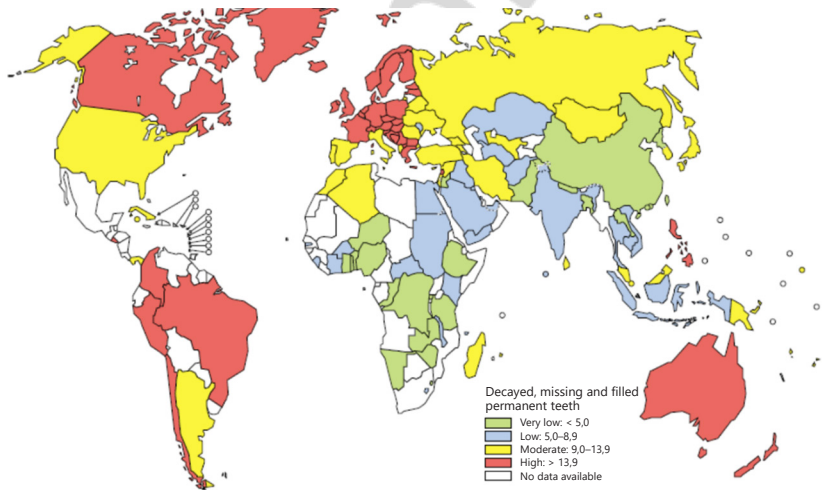


Fig. 7. Level of caries intensity (LCI) in 35–44-year-olds in the world (the WHO, 2003)

TRENDS IN DENTAL CARIES IN THE REPUBLIC OF BELARUS

Among 5–6-year old children 10 % did not have caries in 1996. By 2008–2010, this figure had reached 20 %.

The intensity of dental caries in 12-year-old children according to the DMFT index in 1996 amounted to 3.8, and by 2003–2004 it decreased to 2.7 and by 2008–2010 to 2.2.

Among 15-year-old adolescents, the DMFT index in 1996 was 4.7 and fell to 3.4 in 2008–2010.

Fig. 8 shows the dynamics of the intensity of decay of permanent teeth (DMFT) among 12-year-old children in the Republic of Belarus for the period from 1980 to 2008.

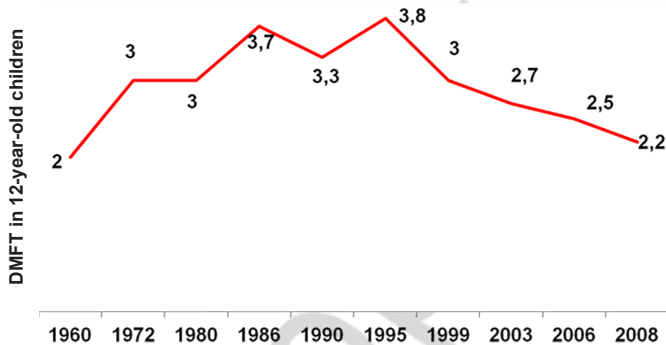


Fig. 8. Dynamics of intensity of caries of permanent teeth (DMFT) in 12 year-olds in the Republic of Belarus

Among young people aged 18, the intensity of dental caries (DMFT) also decreased from 6.8 in 1996 to 5.7 in 2008–2010. The average number of extracted teeth, component «M» in the DMFT decreased from 0.38 to 0.26. The average number of carious teeth, the «D» component in the DMFT decreased from 2.3 to 1.7.

The intensity of dental caries among 35–44-year-old adults (DMFT) in 1996 was 13.8, in 2003–2004 — 15.4, in 2008–2010 — 13.1, and in 2017 — 14.7. By 2010, the average number of extracted teeth, the «M» component in the DMFT had decreased from 6.5 to 2.7, and the average number of carious teeth, the «D» component in the DMFT decreased from 2.1 to 1.7. The number of filled teeth, the «F» component in the DMFT had increased from 5.2 to 7.6 by 2010.

Among elderly people aged 65–74, the intensity of caries according to the DMFT index in 1996 was 22.5, in 2003–2004 — 22.4, in 2008–2010 — 23.4, in 2017 — 22.7. And the percentage of edentulous patients increased from 14.8 % to 19 % from 1996 to 2010, and amounted to 15.9 % in 2017.

TRENDS IN PERIODONTAL DISEASES IN THE WORLD AND IN THE REPUBLIC OF BELARUS

The prevalence of the most severe symptom of periodontal disease (CPITN code «4» — deep periodontal pockets) in the world varies from 10 % to 15 % among adults.

However, the most common code in all regions of the world is code «2» according to the CPITN index (gum bleeding and stone), which is a consequence of poor oral hygiene.

The dynamics of the CPITN index among adolescents and adults of the Republic of Belarus from 1996 to 2010 is shown in Table 3.

Table 3

Dynamics of the CPITN index in adolescents and adults of the Republic of Belarus from 1996 to 2010

1996	2003-2004	2008-2010
15-year-old (CPITN «0»)		
0.9	1.07	
35-44-year-old (CPITN «0»)		
0.1	0.19	1.24
35-44-year-old (CPITN «4»)		
0.2	0.06	0.02

THE WHO DENTAL HEALTH IMPROVEMENT PROGRAM FOR THE 21ST CENTURY

GLOBAL DENTAL HEALTH GOALS BY 2020 (THE WHO, 2003)

Common goals:

1. To minimize the effect of diseases of the oral cavity and craniofacial region on overall health and psychosocial development.
2. To minimize the impact of manifestations of systemic diseases in the craniofacial region on individuals and society and use these manifestations for early diagnosis, prevention and effective treatment of systemic diseases.

Community-based dental disease prevention programs are being developed based on the recommendations of the WHO Global Dental Health Improvement Program for the 21st Century (Fig. 9).



Fig. 9. Highlights of the 21st Century the WHO Global Dental Health Improvement Program

The 21st Century Global Dental Health Improvement Program is based on the concept of risk factors (Fig. 10).

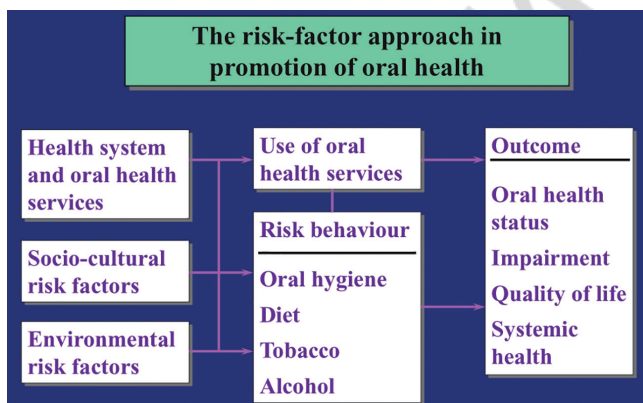


Fig. 10. The concept of risk factors (P. E. Peterson, the WHO, 2002)

QUESTIONS FOR SELF-TRAINING

Variant 1

1. Specify the dental health criteria recommended by the WHO for children and adolescents.
2. Specify the key age groups for evaluating dental health of adult.
3. What are the global dental goals for the elderly by 2010?
4. Compare dental health of children of the Republic of Belarus (2002–2003) with the global goals of the WHO by 2010.
5. Name the countries of Western Europe that have come closest to or have reached the WHO global goal by 2010 for 12-year-olds.

Variant 2

1. Specify the dental health criteria recommended by the WHO for young people.
2. Specify the key age groups for evaluating dental health in children.
3. Indicate the WHO global dental health goals by 2010 for adults.
4. Compare the dental health of the elderly population of the Republic of Belarus (2002–2003) with the global goals of the WHO 2010.
5. Specify the countries of Eastern Europe that are closest to the 2010 the WHO global goal for 12 year olds.

Variant 3

1. Specify the dental health criteria recommended by the WHO for adults.
2. Specify key age groups for evaluating dental health in older people.
3. What are the global dental health goals of the WHO by 2010 for children?
4. Compare dental health of young people of the Republic of Belarus (2002–2003) with the global goals of the WHO 2010.
5. Indicate the Central Asian CIS countries that are closest to the 2010 the WHO global goal for 12 year olds.

SITUATIONAL TASKS

Task 1. Conduct a comparative analysis of the dental health of the children of the Republic of Belarus for the period from 1996 to 2017. Use the dental health criteria and key age groups recommended by the WHO. Identify the trends and compare with the WHO Global Dental Health Goals by 2010. Present the results of the analysis in the form of tables and graphs.

Task 2. Conduct a comparative analysis of the dental health of adolescents and young people of the Republic of Belarus for the period from 1996 to 2017. Use the dental health criteria and key age groups recommended by the WHO. Identify trends and compare with the WHO Global Dental Health Goals by 2010. Present the results of the analysis in the form of tables and graphs.

Task 3. Conduct a comparative analysis of the dental health of the adult and elderly population of the Republic of Belarus for the period from 1996 to 2017. Use the dental health criteria and key age groups recommended by the WHO. Identify the trends and compare with the WHO Global Dental Health Goals by 2010. Present the results of the analysis in the form of tables and graphs.

Task 4. Describe the trends in the prevalence of dental caries in 6-year-olds in Belarus, over the past 10 years and the intensity of dental caries in the age group of 35–44, over the past 10 years in the veiw of the the WHO Global Goals.

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