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**SITUATION ANALYSIS  
IN DENTISTRY**

Minsk BSMU 2018

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
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Л. А. КАЗЕКО, О. А. ТАРАСЕНКО

# СИТУАЦИОННЫЙ АНАЛИЗ В СТОМАТОЛОГИИ

## SITUATION ANALYSIS IN DENTISTRY

Учебно-методическое пособие



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## **СИТУАЦИОННЫЙ АНАЛИЗ В СТОМАТОЛОГИИ** **SITUATION ANALYSIS IN DENTISTRY**

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## SITUATION ANALYSIS IN DENTISTRY

The efficient functioning of the public oral health care system is possible only if a thorough science-based planning is present at all levels, from the individual dental office, department, clinic, district to the country level as a whole.

Efficient implies scientifically based and evaluable by using measurable criteria.

In 1980, the WHO published the document entitled «Planning oral health services» (WHO OP № 53), which is used as a guide in all countries of the world. WHO identified the following stages of planning oral health care of the population at the public level:

- situation analysis;
- defining measurable goals of dental health of the population;
- manpower provision (personnel, staff);
- material and financial support/security;
- monitoring and evaluation of the quality of oral health care system of the population.

It's obvious that all 5 stages are closely related and situation analysis is in the first place in the oral health care planning. Without it, the development of the science-based plan is not possible.

Situation analysis is a logical medical analysis of dental diseases and associated factors for the population of the serviced district.

The main goal of the situation analysis is assessment of oral health and the identification of risk factors for dental diseases.

Main components of situation analysis include:

- epidemiological data;
- data on oral health care;
- demographic and other data related to the health of the population.

Situation analysis is conducted by a dentist. The majority of the questions you need to decide on a professional level, for example, to evaluate the incidence, identify risk factors of dental disease, and evaluate the effectiveness of preventive oral health care and other issues within the competence of the expert (P. Leous, 1996).

Organizers must own methodology of situation analysis of oral health care at all administrative levels, but experience shows that every dentist need information about the situation analysis for the competent organization of his activity as efficiently as possible for the patient and for his financial situation.

Stages of the situation analysis:

- defining the goals of the situation analysis and approval of main stages of work with the local authority;
- collection of demographic and general data;
- detailed planning (using demographic data), and carrying out epidemiological studies;

- getting information about oral health care. Getting statistics on dental personnel, equipment, dental materials, means of prevention;
- identification of risk factors for dental diseases;
- statistical analysis of the epidemiological data.

Doctor's logical analysis of all materials and the conclusion:

- incidence of diseases and trends (socially significant diseases, widespread dental diseases);
- risk factors;
- manpower provision;
- material and financial support;
- list of the most important dental health problems (socially significant and widespread diseases).

Demographic data are needed to calculate the personnel needs, means and materials for oral health care. Most of the required information about the population is available in the official statistical documents. It is important to use the latest information. In cases where the available statistics had been received more than 5 years ago, it is necessary to amend the method of approximate calculations based on the known trends of the studied data. Be sure to quote the source (s) of statistical data.

If the situation analysis is done at the level of a large region or country, it is recommended to use administrative or geographical map. It is necessary to pay special attention to the following:

- big cities;
- densely populated rural areas;
- contrasting climatic and geographic zones;
- zones of different content of fluoride in the environment.

Information is also needed on the number of urban and rural population, population density in different areas, the annual population growth, the number of kindergartens and children attending these institutions (tabl. 1).

*Table 1*

**Demographic data of area (the source of the data should be cited)**

Population	10 000 000
Annual growth	1,7 %
Urban population	52 %
Children 0–17 years	3 500 000
Children 0–6 years	1 300 000
Children 3–6 years	820 000
Attend preschool	410 000
Kindergarten	1366
Children 7–17 years	2200 000
Attend schools	100 %
Number of schools	2200

It is important to take into account the age groups, education level, occupation of population in the analyzed area.

## ENVIRONMENTAL FACTORS AND LIFESTYLE OF PEOPLE

Data on water have fundamental importance in assessing the situation, particularly about the content of fluoride in drinking water and foods. It is necessary to get information about the general health of the population, bad habits, possible contamination of the environment in health care institutions.

**Drinking water.** Information about drinking water is available in the sanitary-epidemiological institutions. If necessary, the drinking water samples from wells and taps are sent to the laboratory for analysis. Chemically pure plastic bottle with an airtight lid is used for intaking drinking water for chemical analysis. Bottle capacity is 10 ml.

As an example, we give the following information about the area:

- urban population and about 20 % of the rural population use centralized water supply; content of fluorine in drinking water is 0.1–0.2 mg/l;
- in one of the zones, where about 5 % of the population live, drinking water is obtained from deep wells, it has a high concentration of fluorine: 1.5– 4.0 mg/l;
- artificial fluoridation of drinking water in the area is not carried out.

**Food.** Assessing characteristics of food should be carried out together with nutritionists, pediatricians, sanitary doctors, and by examining the relevant documents. In addition, we should talk about nutrition with parents, school teachers and teachers of kindergartens, as well as visit food shops, public canteens and school canteens for studying the food.

First of all the attention should be paid to the presence of a variety of products (4 basic types: bread, meat, milk, fruits and vegetables). It is necessary to reveal the use of any specific products, such as sea-fish, dairy products, tea and so on. Special attention is paid to the use of sugars and sugary foods in the diet. When the data are available, the average amount of sugar consumed per person per year is calculated. In addition, the information about the use of sugary foods (cakes, candy, etc.) is collected. A survey is the method of choice during nutrition research.

The average duration of breastfeeding as well as the data on child nutrition compositions (infant formula), especially on the concentration of sugar and frequency of meals can be found out in conversations with pediatricians and young mothers. It is also important to have information on the nature and mode of nutrition of preschool children, school children and teens.

An example of a situation. The population of the district uses a variety of food products. Nutrients mainly have balanced ratio, with some excess of carbohydrates. The average amount of sugar per person per year is 36 kg.

Special features are not found in pregnant women's nutrition. 90 % of newborns are breastfed. The average duration of breastfeeding is 6 months. Dairy mixtures are nutritionally complete, fortified, and produced at the state enterprise. The sugar content in the formula is from 7 to 11 %.

In schools, in places of cultural recreation, summer camps for children there are buffets with a wide range of sweet products: cakes, candies, sweet rolls, etc. Children in organized groups eat at the same time. However, most of the children in addition to the main meal, eat sweet foods, pastries, ice cream from one to several times a day. Sweets are bought in coffee shops or brought from home.

Diet of unorganized preschoolers is often violated. Children have access to sweets at any time of the day. It is a customary to treat children with sweets as a reward among the population.

Most of young people (students of secondary and higher education institutions) do not keep to the diet.

Of the above listed nutritional information, you need to highlight the following:

- possible excess of carbohydrates, especially sweets in the diet of children;
- violation of diet, a relatively short period of breastfeeding and the high sugar content in the artificial nutrient mixtures (formula).

**The general health state.** Information about the general health may be obtained from publications in medical journals, available accounting and reporting documents of health care institutions, interviews with pediatricians and other non-dental profile colleagues. Especially important information is about eating disorders, hypovitaminosis, rickets, which can affect the dental status. Disease of adults such as gastritis, allergy, infectious diseases etc. may result from dental disease.

**Bad (unhealthy) habits.** In the analysis of the prevalence of bad habits among the population first of all one should pay attention to the habits that contribute to dental disease. Sucking fingers and prolonged sucking the nipple can disrupt the formation of the jaws. Smoking and drinking alcohol frequently contribute to oral mucosal diseases. To study the prevalence of smoking we recommend a questionnaire developed by the WHO (2011).

**Environmental pollution and occupational hazards.** Data on environmental pollution can be obtained at the Center for Hygiene and Epidemiology, at the local health care hospitals, as well as from dentists working at enterprises with hazardous production. It is necessary to explore the possibility of air pollution with harmful substances, such as fluorine compounds, heavy metals, acids.

The suspicion of the presence of certain industrial hazards or environmental contamination may occur when the workers of the enterprise have some characteristic lesions of teeth, such as dental fluorosis (not associated with an increased content of fluoride in drinking water), acid necrosis of tooth enamel etc. In the case of Belarus it should be also taken into account the pollution of a number of areas with radioactive isotopes as a consequence of the Chernobyl disaster in 1987.

**Climate.** A fairly general definition of the area climate (hot, mild or cold) and the average annual air temperature is sufficient. This is important for determining optimal doses of fluoride for the artificial fluoridation of drinking water and dietary salt and other ways of introducing fluorine into the body.

## DENTAL CARE

**Dental personnel (manpower).** Information about the kinds of dental personnel performing oral health care of the population is needed. The WHO classifies dental personnel into 2 types: doctors and auxiliary personnel. Optimal ratio is 1 dentist : 2000–4000 people. The auxiliary personnel is divided into operating, non-operating and technical. Optimal ratio is 1 dentist : 1 assistant : 1 hygienist : 2 dental technician. In addition, it is necessary to know the number of personnel engaged in oral health care of children. It is desirable to have information about the changes in the number of personnel in the last 5–10 years, to determine the trend in the provision of oral health care system by personnel. You need the information about the number of personnel of all categories that is trained annually. It can be useful to have the information about the future plans of training.

Here is example of needed data of analyzed area:

- dentists 4000 (the ratio to population is 1 : 2500);
- pediatric dentists 30 %;
- annual number of graduates of dentists: 150;
- nurses of school dental offices: 880;
- annual number of graduates of nurses: 90;
- hygienists: no.

**Medical institutions and equipment.** It is necessary to have information about the existing health care institution network (types, quantity, equipment):

- consulting centers;
- dental clinics;
- dental departments;
- dental offices;
- children's dental clinic;
- children's dental departments;
- children's dental offices;
- the total number of dental units for adults;
- the total number of dental units for children;
- provision of schools with dental offices;
- prevention offices;
- private offices and clinics.

In the planning of a comprehensive prevention of dental diseases the secondary and tertiary prevention are the essential components. Therefore, you must have information about the existing network of health care institutions: types, number and equipment.

Information about example of needed data of analyzed area can be summarized as follows:

- institute for the promotion of healthy lifestyle: 1;
- consulting centers: 2;



- dental clinics: 10;
- dental department: 20;
- dental offices: 1700;
- children's dental clinics: 2;
- children's dental departments: 10;
- children's dental offices: 900;
- the total number of dental units for adults: 2500;
- the total number of dental units for children: 980;
- provision of schools with dental offices: 40 %;
- offices of oral hygiene: no.

**Systematic care.** The accurate information about the percentage of coverage of preschool age children and students by systematic treatment (planned sanitation) is required and we need the information about organization of sanitation: organizational methods and the scope, frequency, equipment and materials, personnel, effectiveness. It is important to have data on the average number of visits to the dentist per child per year, the average time spent by the doctor per one child, a doctor's working time per day, week, year.

The same information is required for analysis of the planned sanitation of other groups of the population, such as pregnant women, students, industrial workers, retired. In the absence of accurate statistics on the above issues a survey and / or spot examinations of the population can be carried out.

Example. In the studied area the planned sanitation covers 82 % of school-age children. Treatment is carried out directly in school's dental offices, or the children are sent to the nearest children's health care institutions. Routine examinations are carried out every year by the teams of pediatric dentists. 95 % of children are examined.

There are 2.2 visits of child to the dentist per year on average, of which primary visits are 0.72.

Preschool children are not covered by the planned sanitation.

The planned sanitation is carried out in a number of industrial enterprises, educational institutions, and in some antenatal clinics. In general, the planned sanitation covers about 5% of the adult population. The average number of visits is 1.3 per person per year.

At the mixed reception the doctor spends 15 minutes per patient, on therapeutic — 20 minutes, on a surgical — 12 minutes, on the orthopedic — 30 minutes per visit.

The doctor works 6 hours 30 minutes per day, 33 hours per week, 1500 hours per year. 30 minutes a day are given to the education of the population.

**Services on demand.** To analyze this type of dental services to the public it is important to have information of the total number of visits to the dental institutions per year for the calculation of the average number of visits per person per year (WHO indicator «use»). It also requires information about the number of the most common medical procedures (fillings, tooth extractions, dentures,

and others). It is desirable to have the listed data for the last few years to determine the dynamics of indicators. Approximate calculations of oral health care utilization can be made on the basis of a selective dental examination of key age groups, for example, 6, 12, 15, 18-years of age and 35–44-year-olds.

Example. From the statistical data of the chief dentist of the studied area during the year 1.69 million children applied for the oral health care, under the age of 17 years and 18 years of age and older — 8.4 million adults. The number of people visiting the dental offices has increased every year for the past 10 years.

**The costs of oral health care.** If there are official statistics on the budget for dental services to the population. This data can be used to analyze the adequacy of oral health care financing. If it is necessary, the dentist can himself approximately calculate the costs of dental treatment. For the calculation of the budget for the future, it is important to consider not only the costs of dental equipment and materials, but also personnel salaries, maintenance, and so on.

The following is an indicative list of components which must be taken into account when determining the costs of oral health care:

- manpower salaries;
- the cost of the office/premises;
- the cost of equipment and maintenance;
- the cost of dental materials;
- transport costs (for mobile teams);
- the cost of doctors and nurses education;
- the cost of housing for manpower (if the accommodation is paid by the state);
- the total cost of all other services (except housing) provided to the staff free of charge;
- the average cost of prosthetics for privileged categories of citizens;
- the average cost of the most common treatment procedures (fillings, tooth extraction, prosthetic) in the public and private health offices which need to be paid.

**Prevention.** The existing experience of implementing municipal prevention in the studied area, the organization of prevention activities in the current period and efficiency must be carefully analyzed. A positive experience can be used for further planning new prevention programs.

The relevant information about the coverage of the population by the prevention program is necessary. Information about individual and mass prevention, the effectiveness and economic benefit of dental diseases primary prevention are analyzed. The methods of prevention are specified.

It is also important to collect information about the availability and quality of personnel and mass prophylaxis products: toothpaste, toothbrushes, fluoride preparations for topical and systemic use (in Belarus — the availability of fluoridated salt in food to buy). The WHO recommended 450–600 milliliters of toothpaste per 1 person per year.

## DENTAL STATUS

There are a lot of different methods and criteria to assess the state of organs and tissues of the oral cavity. The WHO summarized international experience of the subject «Oral Health Survey» (2013, Geneva), and proposed standardized methods for research of dental diseases and conditions. The researcher can choose methods that are best suited for optimal solution of problem in terms of accuracy, reproducibility, volume, time-consuming, cost and so on. When analyzing the situation at the community level, the purpose of research is to determine the dental status of the population for the subsequent decision about the need of development or optimization existing primary prevention program of dental diseases and the system of oral health care of the population.

If the necessary information about the prevalence of dental diseases is absent or out of date (more than 5 years old), then the research is needed for common dental diseases: dental caries and periodontal disease. The list of diseases and conditions for epidemiological studies of the district must also contain dental fluorosis, oral mucosal diseases, dentoalveolar abnormalities.

The next question is about the scope and depth of information about the studied diseases. For example, while doing research of caries intensity we can study its localization on the tooth surfaces, the depth of dental tissues destruction, detect complications of caries (pulpitis, apical periodontitis) or determine only tooth caries lesion without going into detail. The time spent on the «simplified» or «in-depth» study is very different, so it is necessary to decide what information is needed. It is well known, for the purposes of treatment and preventive care planning the data of the average intensity of caries (high, moderate, low) are sufficient, hence there is no need to complicate and delay the examination. Thus, the choice of techniques should be determined by the objects of dental survey.

The WHO recommends (1980) to use the most simple, cheap and easily feasible method of epidemiological studies so called «pathfinder» dental survey.

**Assessment of oral health care level.** Such indicators as the ratio of dentists to the population, the number of oral health care institutions, the number of services kinds to the population to some extent characterize the level of dental services. However, these indexes are not necessarily the criteria of dental health. The intensity of dental caries in children is not necessarily dependent on the number of dentists. In case of the same provision by personnel, but different intensity of dental diseases, the population with a higher incidence is in the worst conditions, so the «standardization» of the provision of dental personnel is possible only in the most general terms.

Figure 1 illustrates the availability of dentists to European population. Large differences of this indicator in the countries («more» — «less») do not necessarily coincide with the incidence of dental diseases. Figure 2 shows the

data of average DMFT in 12-year-olds and provision by dentists in the selected countries. It is obvious that the intensity of dental caries may be the same with good (Slovakia) and insufficient (Romania) staffing.

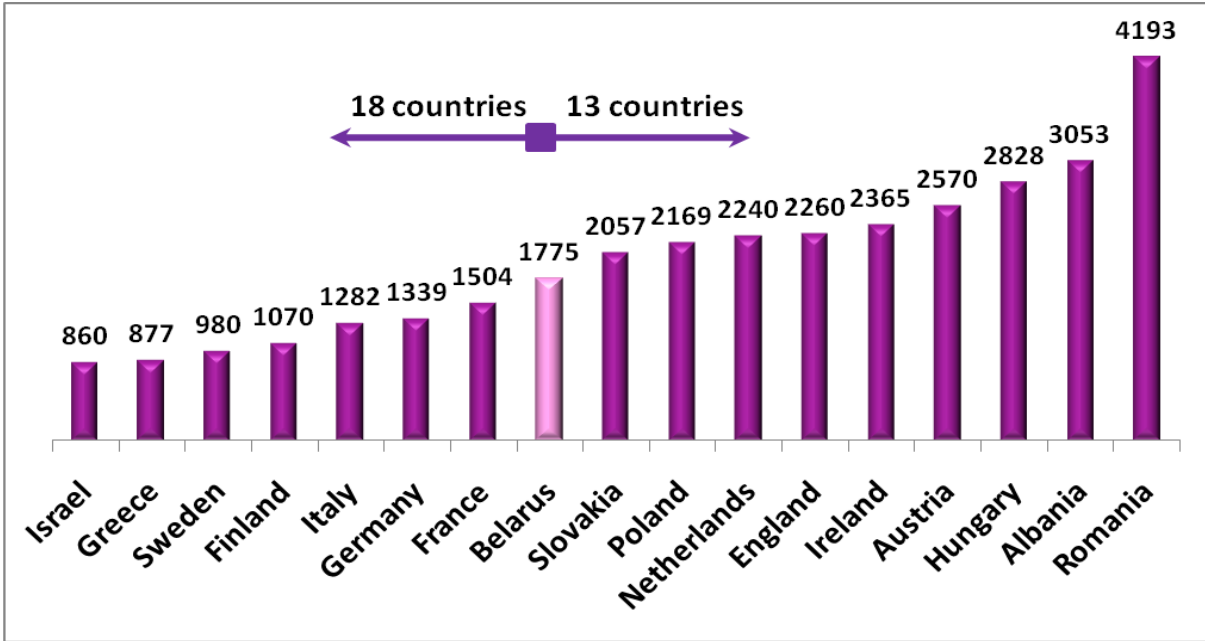


Fig. 1. Availability of dentists to the population in European countries

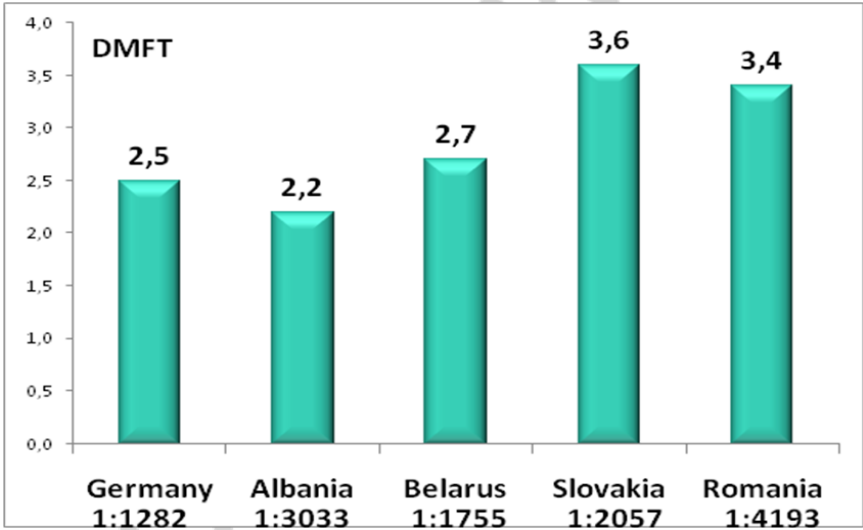


Fig. 2. DMFT in 12-year-olds and the level of dentists provision in the selected countries

Indicator «attendance» is used to assess oral health care. It is calculated as a percentage (the ratio of patients who applied for care during a year to the entire population of the district). It is advisable to differentiate between «primary attended» and «recurring attended». For those groups of the population that receive routine oral health care, it is important to identify indicators of «percentage of coverage» and «number of visits» on average per person.

**Valuable evaluation criteria are health criteria.** According to the DMFT index we can assess the health of the personal dentition system or population

groups and analyze need in oral health care. Index DCL is used to determine the oral health care level (P. A. Leous, 1987). DCL is determined by the following formula:

$$\text{DCL} = 100 \% - (100 \times (\text{D} + \text{A}) / \text{DMFT})$$

where DCL — the oral health care level; 100% — rated maximum level of providing the population with oral health care; D — untreated carious teeth; A — missing teeth, unrestored by dentures; DMFT — decayed, missed, filled tooth.

DCL can only be used as an group indicator. It is estimated by the following criteria (tabl. 2).

Table 2

Criteria for DCL interpretation

Value, %	DCL
0–9	Poor
10–49	Insufficient
50–79	Satisfactory
80 and above	Good

### Interpretation of situation analysis data

Information about demographics, manpower, oral health care and dental status of the population of the area is summarized. Professional analysis of these data determines the most important problems and justifies the possible approaches to their solving.

For example, on the basis of above data we can identify a number of problems, the main ones are dental caries and periodontal disease. Perhaps dental caries is problem № 1, because:

- the intensity of caries in children is high and the periodontal disease is moderate;
- treatment of dental caries is associated with significant material costs;
- dental caries and its complications affect the general health of the population.

Analyzing the possible causes of the high intensity of dental caries, we identify a number of factors predisposing to the development of caries, such as low content of fluoride in drinking water, eating sweets and others. Contributing factor to the occurrence of periodontal disease is a poor oral hygiene in children, that is confirmed by the presence of calculus (CPITN). The oral health care level is insufficient.

Analyzing the issues of dental personnel provision, it should be noted that, historically, all countries tried to have more the personnel and, therefore, adhere to the criterion: the more, the better. However, the unlimited increase in the number of personnel does not solve the problem of disease elimination. At the same time, in our example, the lack of specialized personnel for primary prevention is one of the most serious problems.

## CONCLUSION AND SUMMARY

Situation analysis should be used to justify the plan of effective treatment and preventive care. **Conclusion** includes the following items:

- determination of dental disease according to the WHO level, as well as serious diseases (AIDS and others); trends (decrease, increase, stabilization);
- identification of risk factors: bad oral hygiene, excess of sweets, smoking, deficiency of fluoride in drinking water;
- tentative identification of staffing (enough, not enough, excess) as a whole and the individual types (auxiliary personnel, experts and so on).
- determination of material support of the system.
- determination of oral health care availability and quality, including prevention, treatment and prosthetics, list of the most important problems of dental health.

**Summary** includes the following items: list of the most important problems of dental health.

## CRITERIA FOR EVALUATION

Criteria for evaluation of dental diseases are in tables 3, 4, 5, 6, 7.

*Table 3*

**Criteria for evaluation of dental caries prevalence**

Prevalence (%)	Evaluation criteria
0–30	Low
31–80	moderate
81–100	high

*Table 4*

**Criteria for evaluation of caries intensity level by the WHO (1994) for 12 year olds**

12 years	DMFT	CIL
	0–0.5	very low
	0.5–1.5	low
	1.51–3.0	moderate
	3.01–6.5	high
	6.5–10.0	very high

*Table 5*

**Criteria for evaluation of caries intensity level by the WHO (1980) for 35–44 year olds**

35–44 years	DMFT	CIL
	0.2–1.5	very low
	1.6–6.2	low
	6.3–12.7	moderate
	12.8–16.2	high
	> 16.3	very high

Table 6

**Criteria for evaluation of periodontal diseases prevalence by the WHO (1980)**

Prevalence in %	Evaluation criteria
0–20	low
21–50	moderate
51–100	high

Table 7

**Periodontal diseases categories for 15 year of age by the WHO (1980)**

Symptoms	Intensity level (average number of sextants)		
	Low	moderate	high
Tartar	0–1.5	1.6–2.5	> 2.6
Bleeding	0–0.5	0.6–1.5	> 1.6

Recommended consumption of sugar per person per year — 15–18 kg.

Recommended quantity of fluoride toothpaste per person per year — 450–600 ml.

Recommended ratio of dentists to population 1 : 2000–4000 (in the RB 1 : 1750).

Recommended ratio of doctors to auxiliary personnel:

1 dentist : 1 assistant: 1 hygienist : 2 dental technicians

Recommended attendance — 50–60 %

10–20 % may mean that:

a) dental care is not available;

b) low level of population motivation is present;

80–90 % — we should analyze structure:

a) if patients attend dentists for treatment, it may mean that not satisfactory quality of treatment is provided;

b) if patients attend dentists for prevention, it may mean that high motivation level is present.

Equipment (optimal): 1 unit for 2 dentists, dental unit in each school

Material and financial support (budgeting) — ideally, 3–4 % of GDP (in RB 0.3–0.4 %)

**DATA ON oral health care FROM GERMANY**

Demographic data (tabl. 8).

Table 8

**Demographic data from Germany**

Population	82 398 326
Annual growth	0.2 %
Urban population	78 %

Children 0–17 years	
Children 0–14	15.62 %
Children 0–6 years	
Children 3–6 years	
Attend preschool	
Attend kindergartens	
Children 7–17 years	
Attend schools	
Number of schools	
Elderly 65 and older	16.44 %

Big cities\_\_\_\_

Densely populated rural areas\_\_\_\_

Climatic and geographic contrasting areas\_\_\_\_

Areas of different levels of content in the environment\_\_\_\_

Education, profession of people\_\_\_\_

### ***Environmental Factors and Lifestyle of People***

**Food:** the number of sugar per person per year 40.1 kg.

Use of sugary foods (cakes, candy, etc.) \_\_\_\_

The average duration of breastfeeding\_\_\_\_

Child nutrition formulations (infant formula)\_\_\_\_

Concentration of sugar and frequency of meals\_\_\_\_

Nature and mode of nutrition of preschool children, school children and teens\_\_\_\_

**Water:** central water supply 72% of population

Contents of fluoride 0.7 ppm

**The general state of health:**\_\_\_\_

**Bad (unhealthy) habits:** \_\_\_\_

**Environmental pollution and occupational hazards:**\_\_\_\_

**Climate:** mild. The average annual air temperature is +5-+10°C

### ***Dental care of the population***

Number of dentists 76 644

Dental assistants 126 000

Hygienists 160

Dental technicians 80 000

Periodontologist 39

Oral surgeons 1 169

Maxillofacial surgeons 946

Orthodontist 2 643

Pediatric dentists\_\_\_\_

Annual production of dentists\_\_\_\_



Nurses of school dental offices\_\_\_\_  
Annual production of nurses\_\_\_\_  
Trend in the provision of oral health care by personnel\_\_\_\_  
Number of personnel of all categories being prepared annually\_\_\_\_  
Future plans for training personnel\_\_\_\_

State facilities	1 %	dentists
Private practice	83 %	dentists
Universities	3 %	dentists
Other	13 %	dentists

Counseling centers\_\_\_\_  
Dental clinics\_\_\_\_  
Dental departments\_\_\_\_  
Dental office \_\_\_\_  
Children's dental clinic \_\_\_\_  
Children's dental departments\_\_\_\_  
Children's dental office\_\_\_\_  
Total number of dental units for adults\_\_\_\_  
Total number of dental units for children\_\_\_\_  
Provision of school by dental offices\_\_\_\_  
Prevention offices\_\_\_\_  
Private offices and clinics\_\_\_\_  
Oral hygiene offices\_\_\_\_

Number visits of child/pregnant women/students/industrial workers/retired to the dentist per year \_\_\_\_, of which \_\_\_\_ are primary visits

Average time spent on one child/pregnant women/students/industrial workers/retired\_\_\_\_

Doctor's working time per day \_\_\_\_, week \_\_\_\_, year \_\_\_\_

All attended 84 560 450

Primary attended 45 995 000

Children attended 10 340 500

Average number of visits per person per year\_\_\_\_

Number of the most common dental procedures:

Fillings\_\_\_\_

Tooth extractions\_\_\_\_

Dentures\_\_\_\_

Data over the past few years\_\_\_\_

The budget for the oral health care per year 0.9% GDP (2243\$/year)  
(Coverage of population)

Fluoridation of water 2 %

Fluoride salt 20 %

Fluoride tablets 1 %  
 Fluorine topically 85 %  
 Number of tubes (or ml) of dental pastes for 1 person per year 450 ml  
 Dental status of German population is available in table 9.

Table 9

**Dental status of German population**

Diseases and conditions	Age groups, years					
	6	12	15	35–44	65–74	
Oral hygiene OHI-S	0.9	0.7	0.9	1.2	1.5	
Dental caries	Prevalence in %	56	51,6	88	99.2	100
	DMFT (D–M–F)	2.1	1.2 (0.25–0.02–0.97)	4.6 (0.6–0.02–3.98)	16.1 (0.5–3.6–12.0)	23.5 (0.2–17.0–6.2)
Fluorosis	Prevalence B %					
	Idex DFI					
Periodontal diseases	CPITN «0»	sextants %	5.2	4.6	1.8	0
			71 %	68 %	20 %	0
	CPITN 1	sextants %	0.7	0.9	1.3	1.6
			28 %	26 %	15 %	26 %
	CPITN 2	sextants %	0.1	0.4	2.4	3.2
			1 %	5,5	57 %	59 %
CPITN 3 + 4	sextants %	–	0.1	0.5	1.2	
			–	0.5 %	8 %	15 %
Dentoalveolar anomalies (Prevalence in %)						
		10	14	15		

15 years — D – 0.6                      A – 0.02  
 35–44 years — D – 0.5                  A – 1.3  
 65–74 years — D – 0.2                  A – 7.6

## EXAMPLE OF SITUATION ANALYSIS BASED ON THE DATA FROM GERMANY

**1. Defining the goals of the situation analysis and approval of the main stages** of work with the local authorities. The main goals of the situation analysis are definition of measurable categories of oral health and the identification of risk factors for dental diseases.

### **2. Collect demographic and general data.**

Demographic data of the area (the source of the data should be cited) (tabl. 10).

Table 10

**Demographic data of German population**

Population	82 398 326
Annual growth	0.2 %
Urban population	78 %
Children 0–17 years	No data

Children 0–14	15.62 %
Children 0–6 years	No data
Children 3–6 years	No data
Attend preschool	No data
Kindergarten	No data
Children 7–17 years	No data
Attend schools	No data
Number of schools	No data
Elderly 65 and older	16.44 %

It is necessary to pay special attention to the following:

- big cities;
- densely populated rural areas;
- climatic and geographic contrasting zones;
- areas of different content of fluoride in the environment.

It is important to take into account the age groups, education, profession of people of studied area.

### 3. Environmental factors and lifestyle of people.

**Drinking water.** 72 % of the population have central water supply. Content of fluorine is 0.7 ppm. Apparently, 2 % of the population, which use fluoridated water, have lower content of fluorine in water.

**Food.** Consumption of sugar per person per year is 40.1 kg. It is much more than the WHO recommendation (15–18 kg). Other data are not available.

For assessing characteristics of food we should be in touch with nutritionists, pediatricians, sanitary doctors, and examine the relevant documents. In addition, we should talk about nutrition with parents, school teachers and teachers of kindergartens, as well as visit food shops, canteens and school canteens to get acquainted with the food.

There are no specific products.

We should collect information about the use of sugary foods (cakes, candy, etc.) by survey. The average duration of breastfeeding as well as the data on child nutrition formulations (infant formula), especially on the concentration of sugar and frequency of meals can be found out from conversations with pediatricians and young mothers. It is also important to have information on the nature and mode of nutrition of preschool children, school children and teens.

**The general health state.** No data. We should obtain information about the general state of health from publications in medical journals, available accounting and reporting documents of health care institutions, interviews with pediatricians and other non-dental profile colleagues.

**Bad (unhealthy) habits.** No data. We should get the information about sucking fingers and prolonged sucking the nipple, which can disrupt the formation of the jaws. Smoking and drinking alcohol frequently contribute to oral

mucosal diseases. To study the prevalence of smoking the WHO developed special questionnaire (2011).

**Environmental pollution and occupational hazards.** No data. We should get the data on environmental pollution at the Governmental Center of Hygiene and Epidemiology, as well as from dentists working at hazardous facilities.

**Climate.** In Germany the climate is mild. The average annual air temperature is +5—+10 °C.

#### **4. Dental care of the population.**

*Dental personnel (manpower):*

- dentists 76 644 (the ratio to population 76 644 : 82 398 326 = 1: 1075);
- pediatric dentists — no data;
- annual production of dentists — no data;
- nurses of school dental offices — no data;
- annual production of nurses — no data;
- hygienists — 160.

Doctors to assistants ratio is 76 644 : 126 000 = 1 : 1.64. It is more than the ratio, recommended by the WHO (1 : 1).

Doctors to hygienists ratio is 76 644 : 160 = 1 : 0.002. It is less than ratio, recommended by the WHO (1 : 1).

Doctors to dental technicians ratio is 76 644 : 80 000 = 1 : 1.04. It is less than ratio, recommended by the WHO (1 : 2).

There are no data on the trend in the provision by personnel as well as on the number of personnel of all categories being prepared annually and about the future plans for personnel education.

We have information about distribution of dentists in different institutions, but can not interpret these data as we have not criteria for evaluation of these data. We see that more than two thirds of dentists work at private institutions.

State institutions	1 % dentists
Private practice	83 % dentists
Universities	3 % dentists
Other	13 % dentists

*Medical institutions and equipment:*

- counseling centers — no data;
- dental clinics — no data;
- dental departments — no data;
- dental office — no data;
- children's dental clinic — no data;
- children's dental departments — no data;
- children's dental office — no data;
- the total number of dental units for adults — no data;

- the total number of dental units for children — no data;
- provision of school by dental offices — no data;
- prevention offices — no data;
- private offices and clinics — no data;
- oral hygiene offices — no data.

*Systematic (routine) oral health care.* It is an average of  $10\,340\,500 : 82\,398\,326 \times 0.1562 = 10\,340\,500 : 12\,870\,618 = 0.8$  visits of child to the dentist per year, of which  $\times$  are primary visits (no data). Preschool children are not covered by the systematic treatment.

We have no data about the average time spent on one child, doctor's working time per day, week, year (the WHO recommends 1750 hours). The same information is required for analysis of the planned rehabilitation of other groups, such as pregnant women, students, industrial workers, retired.

*Services on demand.* Attendance of adult population is

$$82\,398\,326 - 12\,870\,618 = 69\,527\,708$$

$$84\,560\,450 / 69\,527\,708 \times 100\% = 122\%$$

Primary attendance is  $45\,995\,000 / 69\,527\,708 \times 100\% = 66\%$ . It coincides with that recommended by the WHO (50–60%).

There are no data about the average number of visits per person per year (WHO indicator «use»). We also require the information on the number of the most common medical procedures (fillings, tooth extractions, dentures, and others). It is desirable to have the data listed over the past few years to determine the dynamics of indicators. Approximate calculations of oral health care utilization can be made on the basis of a sample survey of dental public key age groups, for example, 6, 12, 15, 18 years and 35–44-year-olds.

*The cost of oral health care (costing).* The budget for oral health care per year is 0.9 % GDP (2243\$/year). It is not sufficient (the WHO recommends 3–4 % of GDP).

*Information on prevention.* There are some prevention activities in Germany. Coverage of population by fluoridated water is 2 %, by fluoridated salt 20 %. 1 % of the population (probably children) use fluoride tablets. 85 % of the population use fluoride topically. The number of ml of dental paste for 1 person per year is 450 ml. It coincides with the WHO recommendation (450–600 ml). We see that 22 % of the population use fluoride systemically and more than two thirds use fluoride topically. But there is no accurate data about involvement in the prevention programs. The information on individual and mass prevention, the effectiveness and economic benefit of primary prevention of dental diseases should be analyzed.

##### **5. Identification of risk factors for dental diseases.**

The main risk factors of caries: bad oral hygiene, sweets, shortage of fluoride.

The main risk factors of periodontal diseases: bad oral hygiene.

The main risk factors of oral cancer: smoking.

There is a trend of OHI-S index increase with age. It means that oral hygiene becomes worse.

Consumption of sugar per person per year is 40.1 kg. It is much more than the WHO recommendation (15–18 kg).

72 % of population have central water supply. The content of fluorine is 0.7 ppm. Apparently, 2 % of the population, who use fluoridated water and 20 % of the population who use fluoridated salt, have lower content of fluorine in water. 1 % of population (probably children) use fluoride tablets. In general the situation with systemic fluoridation is satisfactory.

85 % of the population use fluorine topically. The number of ml of dental pastes for 1 person per year is 450 ml. Situation with topical use of fluoride is satisfactory.

There is no information about smoking.

### **6. Detailed planning (using demographic data), and carrying out epidemiological studies.**

The WHO summarized international experience on the subject «Oral Health Survey» (2013, Geneva), in which the standardized methods for dental diseases and conditions of research are offered. We choose the methods which meet the criteria of accuracy, reproducibility, volume, time, cost and are best suited for the optimal solution of the problem.

If the necessary information on the prevalence of dental diseases is missing or out of date (more than 5 years old), we need the information on common dental diseases: dental caries and periodontal disease. Dental fluorosis, oral mucosa diseases, dentoalveolar abnormalities should also be included in the list of diseases and conditions for an epidemiological study of the area.

«Simplified» study is sufficient in our case. We should assess OHI-S, components of DMFT, average intensity of caries (high, moderate, low), average number of sextants with bleeding, calculus and periodontal pockets, prevalence of dentoalveolar abnormalities, average number of teeth unrestored by prosthesis (dentures).

OHI-S in 6-year-olds is 0.9 (satisfactory), in 12 year-olds — 0.7 (satisfactory), in 15 year-olds — 0.9 (satisfactory), in 35–44 year-olds — 1.2 (satisfactory), in 65–74 year-olds — 1.5 (satisfactory). There is an evident trend of index increase with age but hygiene is satisfactory according to index interpretation.

Prevalence of caries in 6-year-olds is 56 % (moderate), in 12 year-olds — 51.6 % (moderate), in 15 year-olds — 88 % (high), in 35–44 year-olds — 99.2 % (high), in 65–74 year-olds is 100 % (high). There is an evident trend of caries prevalence increase with age.

DMFT index is 2.1 in 6-year-olds, 1.2 in 12 year-olds (CIL is low), 4.6 in 15 years-old, 16.1 in 35–44 year-olds (CIL is high), 23.5 in 65–74 year-olds. There is evident trend of DMFT index and CIL increase with age.

Component D of DMFT index is 0.25 in 12 year-olds, 0.6 in 15 years-old, 0.5 in 35–44 year-olds, 0.2 in 65–74 year-olds. There is an evident trend toward decrease of component D of DMFT index. It means that people with age have fewer untreated caries cavities.

Component F of DMFT index is 0.97 in 12 year-olds, 3.98 in 15 year-olds, 12.0 in 35–44 year-olds, 6.2 at the age of 65–74 years. There is an evident trend toward increase and then decrease of component F of DMFT index. It means that people aged 35–44 years have more filled teeth than young people and older people (65–74 years) have fewer filled teeth than 35–44 year olds.

Component M of DMFT index is 0.02 in 12 year-olds, 0.02 in 15 years-old, 3.6 in people aged 35–44 years, 17.0 in people aged 65–74 years. There is evident trend toward increase of component M of DMFT index with age (people lose their teeth).

DCL for 15 years =  $100\% - (100 \times ((0.6 + 0.02)/4.6)) = 86.5\%$  (good)

DCL for 35–44 years =  $100\% - (100 \times ((0.5 + 1.3)/16.1)) = 88.8\%$  (good)

DCL for 65–74 years =  $100\% - (100 \times ((0.2 + 7.6)/23.5)) = 66.8\%$  (satisfactory)

There is a trend of oral health care level worsening in old people.

There are no data on fluorosis.

Prevalence of periodontal diseases in 12 year-olds —  $100\% - 71\% = 29\%$  (moderate), in 15 year-olds —  $100\% - 68\% = 32\%$  (moderate), in 35–44 year-olds —  $100\% - 20\% = 80\%$  (high), in 65–74 year-olds is  $100\%$  (high). There is an evident trend of periodontal diseases prevalence increase with age.

Periodontal disease intensity in 15-year-olds is moderate regarding bleeding (average 0.9 sextants), and low regarding tartar (average 0.4 sextants).

Average sextants CPITN «0» (healthy) is 5.2 in 12 year-olds, 4.6 in 15 years-old, 1.8 in people aged 35–44 years, 0 in people aged 65–74 years. There is an evident trend toward decrease in the number of healthy sextants with age. Periodontal health becomes worse.

Average sextants CPITN «1» (bleeding) is 0.7 in 12 year-olds, 0.9 in 15 year-olds, 1.3 in 35–44 year-olds, 1.6 in 65–74 year-olds. There is an evident trend toward increase in the number sextants with bleeding with age. Periodontal health becomes worse.

Average sextants CPITN «2» (calculus) is 0.1 in 12 year-olds, 0.4 in 15 year-olds, 2.4 in 35–44 year-olds, 3.2 in 65–74 year-olds. There is an evident trend toward increase in the number of sextants with calculus with age. Periodontal health becomes worse.

Average sextants CPITN «3+4» (periodontal pockets) is 0.1 in 15 year-olds, 0.5 in 35–44 year-olds, 1.2 in 65–74 year-olds. There is an evident trend toward increase in number of sextants with periodontal pockets with age. Periodontal health becomes worse.

Evaluation criteria on dentoalveolar abnormalities are not developed.

## **7. Statistical analysis of epidemiological data.**

### **8. Conclusion:**

1. In Germany there is an evident trend toward increase of DMFT index and CIL with age. There is an evident trend toward increase in number of sextants with bleeding, calculus and periodontal pockets with age. Periodontal health becomes worse.

2. There is a trend toward OHI-S index increase with age. It means that oral hygiene becomes worse. The population eats a lot of sugar. Systemic and topical use of fluorine is satisfactory.

3. In Germany there are a lot of assistants and not enough hygienists and dental technicians. There were no data about pediatric dentists.

4. Material and financial support in Germany is not sufficient.

### **Summary:**

The most important dental problems in Germany are dental caries and periodontal diseases.

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