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# **ЗДОРОВЬЕ НАСЕЛЕНИЯ И МЕТОДЫ ЕГО ИЗУЧЕНИЯ**

**Учебно-методическое пособие  
для студентов медицинских вузов факультета  
по подготовке специалистов для зарубежных стран  
по специальности «Лечебное дело»**

# **POPULATION HEALTH AND METHODS OF ITS STUDYING**

**Manual for students of medical higher educational institutions  
faculty on preparation of experts for foreign countries**

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Предназначено для проведения практических занятий на кафедре общественного здоровья и здравоохранения с целью получения знаний, умений и навыков по данным темам. Содержит современные материалы по вопросам изучения и анализа показателей здоровья населения, правилам расчета основных демографических показателей. Соответствует учебному плану и типовой учебной программе по дисциплине «Общественное здоровье и здравоохранение», утвержденной Министерством здравоохранения Республики Беларусь.

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## INTRODUCTION

While studying social health and health care a range of indices are used. The main component of the complex program studying population health is analysis and evaluation of medical-demographical indices.

Medical-demographical indices are used for characterizing population health, analyzing other indices of social health, including studying of activity of the doctor, the organizations of social health, planning of medical aid.

### 1. HUMAN HEALTH. THE FACTORS AFFECTING IT

«**Health**» is a state of complete physical, mental and social well-being and not just absence of illnesses or physical defects (by the World Health Organization). This definition is widely used by medical staff in most countries.

#### **Factors affecting human health:**

1. Biological (sex, age, heredity, type of constitution, temperament).
2. Natural (air temperature, humidity, landscape, flora, fauna).
3. Social-economical (labor and life conditions, condition of environment, level of development, condition of health care and so on).
4. Mental-physical (factors involving the activity of the second signal system).

Many factors affecting the state of human health are hard to note and evaluate. So in practice we use only those indices that are well studied and noted.

#### **There are 4 groups of indices:**

- a) demographic indices;
- b) morbidity indices;
- c) invalidity indices;
- d) physical development indices.

### 2. DEMOGRAPHIC INDICES

**Demography** (from Greek *demos* — people and *grapho* — write) — a science of population in its social development.

Statistic studying of population is carried out in two directions: statics of population and dynamics of population.

**Statics of population** studies the size and composition of population at a definite moment.

**Dynamics of population** studies changing of population size under the influence of biological, social-economical processes.

Dynamics of population is divided into **mechanical** and **natural movement**.

**Mechanical movement (migration)** — moving population through the borders of the country or its administrative-territorial structures involving changing the place of residence.

**Natural movement of population** — a complex of such demographic events as birth, death, still birth, matrimonies and divorces, directly or indirectly influencing the changing of the population size.

**Demographic indices are divided into 2 groups:**

**1. General demographic indices:**

- 1.1. Birth indices.
- 1.2. Mortality indices.
- 1.3. Index of natural population increase (decrease).
- 1.4. Index of the average forth-coming life-span.

**2. Special demographic indices:**

- 2.1. Index of total fertility.
- 2.2. Index of age fertility.
- 2.3. Indices of sex-age mortality.
- 2.4. Index of infantile mortality.
- 2.5. Index of prenatal mortality.
- 2.6. Index of early neonatal mortality.
- 2.7. Index of still birth.
- 2.8. Indices of matrimonies and divorces.

## 2.1. BIRTH RATE

**Birth rate** — a process of renewing further generations basing on biological factors which influence the organism’s ability of reproducing progeny.

**Total birth rate coefficient (formula 1):**

$$\frac{\text{total number of the born alive within a year}}{\text{average annual population size}} \times 1000 \quad (1)$$

The values of the total birth rate coefficient are evaluated according to the special scale (table 1).

Table 1 — The scale of values of the total birth rate coefficient

Total birth rate coefficient, ‰	Evaluation of the birth rate
Up to 11,0	Low
11–13,9	Below medium
14–16,9	Medium
17–19,9	Above medium
20 above	High

For thorough characterizing of the birth rate it’s necessary to know the fertility coefficient and age coefficients of birth rate.

**Fertility coefficient (formula 2):**

$$\frac{\text{total number of the born alive within a year}}{\text{average annual number of fertile women (15 – 49 years old)}} \times 100 \quad (2)$$

**Age coefficients of birth rate (formula 3):**

$$\frac{\text{number of babies born from women of this age group within a year}}{\text{average annual number of women of this age}} \times 100 \quad (3)$$

For computing the age coefficients of birth rate it's better to take a five-year interval (15–19; 20–24; 25–29; 30–34; 35–39; 40–44; 45–49 years).

To exclude the influence of the age-sex composition of population and determine the degree of present reproducing, it's necessary to compute **reproducing coefficients of population**:

1. Total coefficient of birth rate.
2. Gross-coefficient of reproducing.
3. Net-coefficient of reproducing.

**Total coefficient of birth rate** shows how much in the average a woman would give birth within her whole reproductive period in case of preserving the birth level of the year for which this index is computing. For substituting parents' generation for children's one the total coefficient of birth rate must be about 2,2.

**Gross-coefficient of reproducing woman population** — a number of girls born by one woman within the whole reproductive period of life.

**Net-coefficient of reproducing woman population** — a number of girls born by one woman within the whole reproductive period of her life and having lived up to the age at which the woman had given birth to these girls.

## 2.2. MORTALITY

**Mortality indices** are the most important demographic indices characterizing the state of social health.

More precise characteristics of mortality may be given by total and special mortality coefficients.

**Total mortality coefficient (formula 4):**

$$\frac{\text{total number of the deceased within a year}}{\text{average annual population size}} \times 100 \quad (4)$$

The values of the total mortality coefficient are evaluated according to the special scale (table 2).

Table 2 — Values of total mortality coefficient

Total mortality coefficient, ‰	Evaluation of mortality level
Up to 10	Low
10–14,9	Medium
15–24,9	High
25–34,9	Very high
35 above	Extremely high

Special mortality coefficients are age mortality coefficients, indices of men and women mortality, city and village population mortality, death causes, different social and professional groups and so on.

***Women mortality (formula 5):***

$$\frac{\text{number of the deceased women within a calendar year}}{\text{average annual number of women}} \times 100 \quad (5)$$

***Mortality of men capable to work (formula 6):***

$$\frac{\text{number of men capable to work within a year}}{\text{average annual number of men capable to work}} \times 100 \quad (6)$$

***Mortality from malignant neoplasm (formula 7):***

$$\frac{\text{number of the deceased from malignant neoplasm within a calendar year}}{\text{average annual population size}} \times 100000 \quad (7)$$

***Mortality of women from breast cancer at the age of 35–39 (formula 8):***

$$\frac{\text{number of women the deceased from breast cancer at the age of 35 – 39 within a calendar year}}{\text{average annual number of women at the age of 35 – 39}} \times 100000 \quad (8)$$

***Mortality of men living in a village and deceased from myocardial infarction at the age of 60–64 (formula 9):***

$$\frac{\text{number of men living in a village and deceased from myocardial infarction at the age of 60 – 64 within a calendar year}}{\text{average annual number of men at the age of 60 – 69}} \times 100000 \quad (9)$$

## 2.3. MATERNAL MORTALITY

***Maternal mortality*** — women mortality caused by pregnancy of any duration and occurred during pregnancy or during 42 days after ceasing it because of some cause associated with pregnancy or aggravated form of its conducting but not by some accident or occasional cause.

***The index of maternal mortality is computed for 100 thousand born alive (formula 10):***

$$\frac{\text{number of the deceased pregnant women (from the beginning of pregnancy, women in labor, parturients within 42 days after ceasing pregnancy)}}{\text{number of the born alive}} \times 100000 \quad (10)$$

***Cases of maternal mortality can be divided into two groups:***

— 1<sup>st</sup> group — death resulting from obstetrical complications of pregnancy, labor and postnatal period as well as from interference, neglect, incorrect treatment or a set of events because of any of these causes;

— 2<sup>nd</sup> group — death resulting from some previous disease or a disease appearing within the period of pregnancy not caused by any obstetrical reason but aggravated by pregnancy.

**Late maternal death** is defined as women death from some direct obstetrical cause or cause indirectly relating to it, which occurred in the period of more than 42 days after delivery but less than 1 year after delivery.

## 2.4. INFANTILE MORTALITY

Infantile mortality — mortality of children at the age up to 1 year old. The coefficient of infantile mortality is computed by several ways:

**1<sup>st</sup> way** (is applied in case of stable level of birth rate) according to Bodio's formula 11:

$$\text{Infantile mortality} = \frac{\text{number of babies deceased at the age of 1 year old within a year}}{\text{number of babies born alive in the given year}} \times 1000 \quad (11)$$

**2<sup>nd</sup> way** (is applied in case of sharp variations of the birth rate coefficient). Therefore the annual index of infantile mortality is computed according to **Rahts's formula 12**:

$$\text{Infantile mortality} = \frac{\text{number of babies deceased at the age of 1 year old within a year}}{\frac{1}{3} \text{ of babies born alive previous year} + \frac{2}{3} \text{ of babies born alive in the given year}} \times 1000 \quad (12)$$

**3<sup>rd</sup> way** (according to the formula 13 offered by M. H. Vakhitov and V. Y. Albitskiy):

$$\text{Infantile mortality} = \frac{\text{number of babies deceased at the age of 1 year old within a year}}{\frac{1}{5} \text{ of babies born alive previous year} + \frac{4}{5} \text{ of babies born alive in the given year}} \times 1000 \quad (13)$$

The scale for evaluating the total coefficient of infantile mortality and used in European countries including Belarus is the following (table 3):

Table 3 — The scale for evaluating the total coefficient of infantile mortality

Coefficient of infantile mortality, ‰	Evaluation of infantile mortality level
Up to 7	Low
7–9,9	Medium
10–14,9	High
15–19,9	Very high
20 above	Extremely high

World health assembly defined the **prenatal period** as the period beginning from the 22<sup>nd</sup> full week (154<sup>th</sup> day) of fetus' intrauterine life and ending after 7 full



days (168 hours) after birth.

**Prenatal period:**

**antenatal** — intrauterine (before labor);

**intranatal** — during labor;

**early neonatal (postnatal)** — the 1<sup>st</sup> week of life.

Each period has its own mortality index. The following indices may be computed (formula 14–21):

$$\text{Antenatal mortality} = \frac{\text{number of babies born dead within the year (or number of babies deceased before labor after 22 weeks of pregnancy)}}{\text{total number of babies born alive and dead}} \times 1000 \quad (14)$$

$$\text{Infantile mortality} = \frac{\text{Number of babies deceased in labor within a year}}{\text{total number of babies born alive and dead}} \times 1000 \quad (15)$$

$$\text{Prenatal mortality} = \frac{\text{number of babies + number of babies deceased born dead within the 1<sup>st</sup> 168 hours of life}}{\text{total number of babies born alive and dead}} \times 1000 \quad (16)$$

Summing of antenatal and intranatal mortality gives still birth rate.

$$\text{Still birth} = \frac{\text{number of babies born dead within a year}}{\text{number of babies born alive and dead}} \times 1000 \quad (17)$$

**Still birth** is death of conception product before its complete expulsiing or extracting from mother's organism not depending on duration of pregnancy.

$$\text{Neonatal mortality} = \frac{\text{number of babies deceased within the 1<sup>st</sup> four weeks of life (till 28 days) in the given year}}{\text{number of babies born alive in the given year}} \times 1000 \quad (18)$$

$$\text{Early neonatal mortality (postnatal)} = \frac{\text{number of babies deceased at the age of 0 – 7 days (till 168 hours) in the given year}}{\text{number of babies born alive in the given year}} \times 1000 \quad (19)$$

$$\text{Late neonatal mortality (2 – 4 weeks of life)} = \frac{\text{number of babies deceased at 2 – 4 weeks of life}}{\text{number of babies born alive} - \text{number of babies deceased at 1<sup>st</sup> weeks of life}} \times 1000 \quad (20)$$

$$\text{Post neonatal mortality} = \frac{\text{number of babies deceased in the period from 29<sup>th</sup> day to 1 year old}}{\text{number of babies born alive} - \text{number of babies deceased within the 1<sup>st</sup> iweeks of life}} \times 1000 \quad (21)$$

Registration of babies deceased till one year and in the prenatal period is carried out according to «Medical certificate of prenatal and infantile death» (form 106–2/u). All babies deceased till one year and fetus having body mass

more than 500 g are to have pathologic anatomic examination. In case of babies (fetus) death during multiple labor death certificate is given for each baby (fetus).

## 2.5. NATURAL INCREASE

Natural increase may be defined as the absolute difference between the number of the born and deceased people within a particular period of time (often a year) or as the coefficient of natural increase in population.

*The coefficient of natural increase (natural decrease)* is computed in two ways.

*1<sup>st</sup> way (formula 22):*

$$\text{Total birth rate coefficient} - \text{Total death coefficient} \quad (22)$$

*2<sup>nd</sup> way (formula 23):*

$$\frac{\text{number of the born} - \text{number of the deceased}}{\text{average annual population size}} \times 1000 \quad (23)$$

The values of the total coefficient of the natural increase or decrease are determined according to the following scale (table 4).

Table 4 — Values of the total coefficient of natural increase or decrease

Total coefficient of natural increase (‰)	Evaluation of the level	Total coefficient of natural decrease (‰)
Up to + 2	Very low	up to – 3
2–3,9	Low	(-3)–(-5,9)
4–6,9	Medium	(-6)–(-8,9)
7–9,9	High	(-9,0)–(-11,9)
+10 and above	Very high	-12 and below

High natural increase in population may be considered as a favorable demographic phenomenon only in case of low mortality. High increase in case of high mortality characterizes unfavorable situation of population reproduction despite of the relatively high birth rate index. Low increase in case of high mortality indicates to unfavorable demographic situation.

Negative natural increase (natural decrease) shows unfavorable social-economic situation in the society resulting in reducing the population size of the country and other unfavorable demographic phenomena.

## 2.6. THE AVERAGE FORTH-COMING LIFE-SPAN

*The average forth coming life-span at birth* — the number of years which the generation born in the studied year will probably live in the average in case if the age coefficients of mortality remain the same as in the year of their birth

within the whole forth coming life.

The average forth coming life-span is one of the indices of mortality tables.

The method of compiling mortality tables is applied for investigating the effectiveness of treatment particularly for studying the distant results of treating patients with chronic diseases (tuberculosis, malignant neoplasm and others) and for comparing the effectiveness of different methods of treatment.

### 3. INDICES OF POPULATION MORBIDITY

**Morbidity** is a statistic notion. It indicates the frequency of diseases revealed and registered in population in general and in its separate groups (age, sex, territorial, professional and so on) within the year.

One of the main preconditions for scientific studying of morbidity is specially made nomenclatures and classifications of diseases (WDC-10).

Health service in Belarus has passed to the WDC-10 since 2001.

Nowadays the following terminology concerning morbidity is used:

1. **Primary morbidity** — a complex of diseases revealed and registered in population for the first time in the given year.

2. **Total morbidity** — a complex of all diseases both revealed in the given year and registered in previous years because of which patients applied for medical aid in the given year.

3. **Pathologic affection** — a complex of all types of pathologic states in population revealed and registered while carrying on preventive examinations.

**Morbidity is studied by 4 methods:**

1. According to the data of people's applying for medical aid.

2. According to the data of medical examinations.

3. According to the data of death causes.

4. According to the data of invalidity causes.

Each method is based on its source of information, primary statistic registering document.

#### 3.1. STUDYING OF MORBIDITY ACCORDING TO THE DATA OF PEOPLE'S APPLYING FOR MEDICAL AID

This method studies total, primary morbidity, acute infectious, significant non-epidemic morbidity, hospitalized morbidity and morbidity with temporary disability.

Total morbidity is studied by the method of overall registering all primary applications for medical aid to MPO in the given year.

The registering unit is each case of the 1<sup>st</sup> patient's application to MPO about the given illness in the given year.

The main registering document in out-patient-polyclinic organizations — statistic registering coupon of final (detailed) diagnoses. The registering form № 025–2/y is

filled in for all cases of acute diseases and for the 1<sup>st</sup> applications in the given calendar year about chronic diseases.

The diseases diagnosed first time are singled out from the total number of applications. They are marked with a sign +.

**1. The index of primary morbidity (formula 24):**

$$\frac{\text{number of illnesses firstly registered in the given calendar year}}{\text{average annual population size}} \times 100000 \quad (24)$$

**2. Index of total morbidity (formula 25):**

$$\frac{\text{number of all primary applications about illnesses (firstly registered in the given year and previous illnesses)}}{\text{average annual population size}} \times 100000 \quad (25)$$

**3. Special intensive indices (formula 26):**

$$\frac{\text{number of illnesses in the given class of diseases (by sex, age, profession, nosological form)}}{\text{population size of the given group}} \times 100000 \quad (26)$$

**4. Structure of morbidity (formula 27):**

$$\frac{\text{number of diseases class of the diseases (by sex, age, nosological form)}}{\text{total number of diseases}} \times 100 \quad (27)$$

**Study of the acute infectious morbidity**

Infectious diseases subjected to compulsory information are divided into the following groups:

1. Quarantine diseases (the plague, cholera, haemorrhagic fevers).
2. Diseases, information of which is collected by specialized dispensaries (tuberculosis, syphilis, gonorrhea, fungous disease and so on) with simultaneous informing territory centers of hygiene, epidemiology and public health.
3. Diseases every case of which is informed to a territory Center of Hygiene and Epidemiology and Health Protection (enteric fever, paratyphoid fever, scarlet fever, German measles, chicken-pox, salmonellosis, dysentery, whooping-cough, enteritis, measles, meningitis, encephalitis, hepatitis, tetanus, poliomyelitis, rabies and others).
4. Diseases about which medical-prophylactic organizations give only general numerical data (the grippe, acute respiratory disease) to the Center of Hygiene and Epidemiology and Health Protection.

Registration of quarantine diseases cases is carried out by instant informing to higher organs of public health and Republic's Ministry of Health.

According to the international agreements **information about cases of such diseases is given to WHO.**

Study of infectious morbidity is carried out by overall method.

Unit of registration is every case of acute infectious disease or suspicion of it.

The main registering document is emergency informing about infectious disease, acute professional food poisoning, unusual reaction to vaccine. Registering form № 058/u, is recorded in the register of infectious diseases (f. № 60/u).

Emergency information is directed to the organs of state sanitary inspection by the doctor who revealed the infectious disease or suspected it within 12 hours after preliminary informing on the telephone.

***Index of infectious morbidity is computed for 100 000 people (formula 28).***

$$\frac{\text{number of infectious diseases cases registered per year}}{\text{average annual population size}} \times 100 \quad (28)$$

Special intensive indices may be computed according to particular groups of population (children, adults, men, women, workers and, so on) within particular periods of the year on specific nozologic forms.

***Study of the most important non-epidemic diseases*** (tuberculosis, syphilis, gonorrhoea, trichophytosis, microsporia, favus, trachoma, lepra).

Unit of registration is every case of the most important non-epidemic disease.

Registering forms are different for every disease — special notification № 089/u; 090/u; 091/u and others.

On revealing the above-mentioned diseases special notifications are directed to appropriate specialized medical organization within 3 days terms.

Primary morbidity, prevalence of every nozologic form, special indices, indices of the structure are computed for the analysis of the most important non-epidemic diseases.

***Study of the «hospitalized» morbidity.***

This kind of morbidity is computed for persons staying at hospital.

Unit of registration is every case of hospitalization.

This kind of morbidity is studied according to the data of a statistic card of the discharged patient (f. № 066/u).

For the analysis of hospitalized morbidity we compute indices of hospitalization frequency by classes and separate diseases, sex, age, indices of treatment outcomes and so on.

***Study of morbidity with temporary disablement.***

Registration of this morbidity kind is carried out by overall method.

Unit of registration is every case of disablement in connection with the worker's disease in the given year.

The primary registering document is a list of disablement which is filled in by the doctor of a medical-prophylactic organization and is given to the worker's place of employment.

All completed cases of the treatment connected with giving out disablement lists are registered in a special journal at every medical-prophylactic organization.

Based on the registering documents a report about temporary disablement causes (f. № 16-VN) within half a year, a year is made at enterprises and estab-

lishments. The report data make it possible to compute indices characterizing morbidity with temporary disablement (TD).

**1. Number of morbidity with temporary disablement cases for 100 workers (formula 29):**

$$\frac{\text{number of morbidity with TD within a year}}{\text{average list number of workers}} \times 100 \quad (29)$$

**2. Number of morbidity with TD days for 100 workers (formula 30):**

$$\frac{\text{number of days of disablement with TD}}{\text{average list number of workers}} \times 100 \quad (30)$$

**3. Average duration of one case morbidity with TD (formula 31):**

$$\frac{\text{number of days of disablement with TD}}{\text{number of cases with TD}} \times 100 \quad (31)$$

**4. Structure of morbidity with TD (cases, days):**

$$\frac{\text{number of cases (days) of disablement on the given disease (group of diseases)}}{\text{number of disablement in all diseases cases (days)}} \times 100 \quad (32)$$

### 3.2. STUDING OF MORBIDITY ACCORDING TO THE DATA OF MEDICAL EXAMINATIONS

Medical examinations make it possible to reveal diseases at their initial stage when the patient does not know about his disease yet. Besides, at medical examinations all cases of chronic diseases are taken into consideration, and diseases proceeding latently are revealed.

Unit of registration is every disease or borderline condition revealed at a prophylactic examination.

Main registering documents are:

- card of outpatient observation f. № 025/u;
- card of dispensarization f. № 131/u;
- control card of dispensary observation (regular medical check-up) f. № 030/u, if a patient requires regular observation and treatment.

There are distinguished preliminary, recurrent and particular medical examinations of the population.

The following indices are computed on processing medical examinations data:

**1. Pathologic affection (formula 33):**

$$\frac{\text{number of diseases and borderline conditions revealed and registered in the examined people}}{\text{number of the examined people}} \times 1000 \quad (33)$$

**2. Instantaneous affection (formula 34):**

$$\frac{\text{number of diseases revealed and registered at prophylactic examinations}}{\text{number of the examined people}} \times 1000 \quad (34)$$

**3. Structure of the examined people according to the health groups (formula 35):**

$$\frac{\text{number of persons classified as I (II – III) health}}{\text{number of the examined people}} \times 100 \quad (35)$$

### **3.3. STUDING MORBIDITY ACCORDING TO THE DATA OF DEATH CAUSES**

This method gives possibility to take into account the diseases which were not revealed during patient's life and caused death.

Unit of observation is every death cause.

Registering documents are doctor's death certificate f. № 106-u-84, doctor's certificate of perinatal death № 106-2/u-84. These documents are given by the doctor on the basis of hospital and out-patient's observation before patient's death and on the basis of the deceased autopsy results.

Statistic analysis makes it possible to compute the following indices:

**1. Index of mortality from the disease (formula 36):**

$$\frac{\text{number of the dead from this disease within a year}}{\text{average number of the dead within a year}} \times 1000 \quad (36)$$

**2. Structure of the death causes (formula 37):**

$$\frac{\text{number of the dead from this disease within a year}}{\text{average number of the dead within a year}} \times 1000 \quad (37)$$

### **3.4. STUDING OF MORBIDITY ACCORDING TO THE DATA INVALIDITY CAUSES**

An invalid is a person who in connection with limitation of vital functions as a result of physical or mental defects requires social help and protection.

Invalidity estimation is based on the degree of vital functions limitation and requirement of social protection.

There are distinguished three degrees of vital functions limitation: acute, significant and pronounced.

The question about invalidity determining is solved depending on the degree of vital functions limitation.

Medical assessment in the Republic of Belarus is made by MREC (medical rehabilitation expert commissions).

Medical-consulting commissions (MCC) in medical-prophylactic organizations give directions to MREC, registering form № 088/u.

### **Invalidity groups**

- I Sharp vital functions limitation caused by the disease, trauma complications, congenital defects leading to sharply marked social desadaptation, if persons with the above-mentioned impairments require constant nursing and help.
- II Significant vital functions limitation with marked social desadaptation and disability to work.
- III Marked vital functions limitation, significant reduction of social adaptation abilities with significant decrease of labour activity volume, difficulty in performing professional duties.

Primary registration of all cases of invalidity outcome and results of invalids re-examination is made with the help of statistic card.

In the statistics of invalidity the following indices are used:

#### **1. Percentage of invalids among the population (formula 38):**

$$\frac{\text{number of invalids beind on the register at the beginning of a year}}{\text{size of population at the beginning of a year}} \times 100 \quad (38)$$

#### **2. Invalidity of population primary index (formula 39):**

$$\frac{\text{number of persons identified as invalids at the certain age for the first time}}{\text{average annual size of population of the corresponding age}} \times 10000 \quad (39)$$

#### **3. Structure of primary invalidity (formula 40):**

$$\frac{\text{number of persons for the first time identified as invalids because at the certain nozologic disease form}}{\text{number of persons for the first time identified as invalids because of all nozologic diseases forms}} \times 100 \quad (40)$$

Index of primary invalidity structure is computed according to the groups, invalidity causes and so on.

## **4. PHYSICAL DEVELOPMENT**

Physical development is a direct index of population health.

Physical development is organism properties making possible to determine age peculiarities, physical strength and endurance.

Physical development of a person depends on the following factors:

1. Medical-biological (sex, age, habitus status, heredity).



2. Natural-climatic (temperature, humidity, landscape).
3. Social-economical (conditions of work, way of life, material and cultural level of society development).

A method of anthropometry is used while studying morphological and functional features characterizing physical development.

**Anthropometry** makes it possible to carry out quantitative registering of person's physical properties.

**The following indices are used while studying physical development:**

Somatometric (morphologic), measuring of body sizes and its parts.

Physiometric (functional) are determined with the help of special physical instruments: vital lung capacity, excursion of the chest, muscular strength of the arms, back muscles strength.

Somatoscopic (descriptive) based on the description of the whole body and its separate parts (bearing, chest form, muscular system development, degree of fat deposition, type of physique, degree of secondary sexual characters development and so on).

Medical control of person's physical development begins from the moment of birth and it has somatic character during succeeding years.

Data about physical development received during current medical observation are registered in the child's case history, medical out-patient's card, medical card of a conscript, medical card of a serviceman and other medical documents.

Estimation of physical development is carried out by comparing individual indices with standard data of the corresponding age sexual group. It can be determined as average, higher or lower than average, high or low. In the 20<sup>th</sup> century there appeared conception «acceleration» (from Latin — speeding-up) — speeding-up of growth and development of children and teenagers in comparison with pervious generations.

## **5. TASKS FOR STUDENTS' SELF WORK**

### **5.1. VARIANTS OF PROBLEMS FOR SELF SOLVING**

**Problem 1.** In 2008 average annual size of population of the city was 180 000 people including 90000 women at the age of 15–49. In 2008 there were born alive 1800 babies (in 2007–1620), number of girls was 47,7 %, stillborn — 29 babies. In 2008 there died 2590 people, including babies up to 1 year — 40, up to 1 month — 29, within the first week of life — 13. Indices of age fertility for 1000 woman: for 15–29 years old — 129,6; for 25–29 years old — 116,0; for 20–34 years old — 84,0; for 35–39 years old — 34,0; for 40–44 years old — 9,1; for 45–49 years old — 1,3. Compute all possible demographic coefficients.

**Problem 2.** Compute infantine mortality three ways:

In 2008 in city N. 3879 babies were born alive, in 2007—4160 babies. 84 babies died within the first year of life in 2008 (among them 25 were born in 2008).

**Problem 3.** Compute infantine mortality three ways:

In 2008 in M. region 2345 babies were born alive, in 2007—2221 babies. 42 babies died within the first year of life in 2008 (among them 15 were born in 2007).

## 5.2. TEST CONTROL

Choose a correct answer

### 1. Dynamics studies:

Answer variants:

- a) changing of population size under influence of biological, social- economic processes;
- b) medical-biological processes;
- c) structure of population.

### 2. Statistics of population studies:

Answer variants:

- a) natural population movement;
- b) size and composition of population at a certain period of time;
- c) migration processes.

### 3. General demographic indices include:

Answer variants:

- a) natural increment of population;
- b) mortality;
- c) age-sexual population composition;
- d) birth rate.

### 4. Index of infantine mortality is computed for the number of born alive:

Answer variants:

- a) 1000;
- b) 10000;
- c) 100000.

### 5. Index of age birth rate in demographic statistics is:

Answer variants:

- a) general;
- b) special;
- c) selective.

6. Average number of girls, born by one woman within her whole life and reached the age of the woman given birth to them, is:

Answer variants:

- a) net-coefficient;
- b) gross-coefficient;
- c) total birth rate coefficient.

**7. In computing total birth rate coefficient they take into account the number of born:**

*Answer variants:*

- a) alive;
- b) stillborn;
- c) alive and stillborn.

**8. Level of total mortality equal to 13 % is:**

*Answer variants:*

- a) high;
- b) middle;
- c) low.

**9. Index of infantine mortality equal to 11 % is:**

*Answer variants:*

- a) high;
- b) middle;
- c) low.

**10. Index «Infantine mortality» is determined for what age group of children:**

*Answer variants:*

- a) within 2–4 weeks of life;
- b) older than 1 month;
- c) up to 1 year.

**11. Index of birth rate equal to 10 % is estimated as:**

*Answer variants:*

- a) low;
- b) middle;
- c) high.

**12. Gross and net-coefficients belong to indices of:**

*Answer variants:*

- a) natural increment;
- b) birth rate;
- c) reproduction.

**13. Late neonatal mortality is the mortality of children:**

*Answer variants:*

- a) older than one month up to one year;
- b) within 2–4 weeks of life;
- c) within first month of life.

**14. Maternity mortality is computed for:**

*Answer variants:*

- a) 100 childbirths;
- b) 1000 born alive;
- c) 100000 born alive;
- d) 1000 women.

**15. Early neonatal mortality is the mortality of children within:**

*Answer variants:*

- a) 1<sup>st</sup> week of life;
- b) 1<sup>st</sup> month of life;
- c) 1<sup>st</sup> year of life;
- d) 2<sup>nd</sup> – 12<sup>th</sup> months of life.

**16. Neonatal mortality is called the mortality of children:**

*Answer variants:*

- a) within the 1<sup>st</sup> month of life;
- b) at the age of 1 year;
- c) within the 1<sup>st</sup> week of life;
- d) at the age of 10 days.

**17. To compute coefficient of fertility it is necessary to know:**

*Answer variants:*

- a) number of born alive and number of female population;
- b) number of born alive and number of women of fertile age;
- c) number of born alive and average annual size of population.

**18. Sum of antenatal and intranatal indices mortality corresponds to a coefficient of:**

*Answer variants:*

- a) birth rate of stillborns;
- b) perinatal mortality;
- c) neonatal mortality.

**19. Total birth rate coefficient means:**

*Answer variants:*

- a) average number of children which one woman would give birth to during her whole life in case of keeping the existing level of birth rate at every age;
- b) average number of girls born by one woman;
- c) average number of girls born by one woman taking into account possibility of her death.

**20. Perinatal mortality means:**

*Answer variants:*

- a) stillborns after 22 weeks of pregnancy;
- b) died within the 1<sup>st</sup> year of life;
- c) died within the 1<sup>st</sup> week of life.

### KEYS TO THE TEST PROGRAM

1	a	8	b	15	a
2	b	9	a	16	a
3	a, b, d	10	c	17	b
4	a	11	a	18	a
5	b	12	c	19	a
6	a	13	b	20	a
7	a	14	c		

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**(на английском языке)**

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