



# MEDICO-SOCIAL PROBLEMS OF DEMOGRAPHIC PROCESSES: POPULATION DYNAMICS

*Guidelines to the practical lesson  
for students in the specialties 222 "Medicine"  
and 228 "Pediatrics" on the course "Social Medicine,  
Public Health (Public Health)"*

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ  
Харківський національний медичний університет

## **MEDICO-SOCIAL PROBLEMS OF DEMOGRAPHIC PROCESSES: POPULATION DYNAMICS**

*Guidelines to the practical  
lesson for students in the specialties 222 "Medicine"  
and 228 "Pediatrics" on the course "Social Medicine,  
Public Health (Public Health)"*

## **МЕДИКО-СОЦІАЛЬНІ ПРОБЛЕМИ ДЕМОГРАФІЧНИХ ПРОЦЕСІВ: ДИНАМІКА НАСЕЛЕННЯ**

*Методичні розробки викладачів  
до проведення практичного заняття студентів  
за спеціальністю 222 «Медицина» і 228 «Педіатрія»  
з дисципліни «Соціальна медицина,  
громадське здоров'я» (Громадське здоров'я)*

Затверджено Вченою радою ХНМУ.  
Протокол № 5 від 22.04.2021.

**Харків  
ХНМУ  
2021**

Medico-social Problems of Demographic Processes: Population Dynamics : guidelines for students to the practical lesson **for** students in the specialties 222 “Medicine” and 228 “Pediatrics” on the course “Social Medicine, Public Health (Public Health)” / comp. V. A. Ohniev, P. O.Tregub, M. M. Mishchenko. – Kharkiv : KhNMU, 2021. – 24 p.

Compilers            V. A. Ohniev  
                          P. O. Tregub  
                          M. M. Mishchenko

Медико-соціальні проблеми демографічних процесів: динаміка населення : метод. вказівки до практичного заняття студентів за спеціальністю 222 «Медицина» і 228 «Педіатрія» з дисципліни «Соціальна медицина, громадське здоров'я» (Громадське здоров'я)/ упоряд. В. А. Огнєв, П. О. Трегуб, М. М. Міщенко. – Харків : ХНМУ, 2021. – 24 с.

Упорядники        В. А. Огнєв  
                          П. О. Трегуб  
                          М. М. Міщенко

## METHODS FOR CONDUCTING THE CLASS

**The aim of the class:** to learn medical and social aspects of demography and methodology for the migration and indicators analyzing the natural population movement.

**Students need to know:**

➤ **Programme Issues:**

- birth rates, factors affected fertility, current trends and regional features of fertility in Ukraine and in the world;
- procedure of births registration in Ukraine, the nature of concepts “live birth”, “stillbirth”, “fetal death”;
- methodology for determination and assessment of general and special indicators of fertility;
- total mortality, its main causes in different regions, in separate countries and in Ukraine, sex, age and territorial features of mortality rates;
- deaths recording procedure in Ukraine, mortality study technique, definition of general and special death-rate indicators, their significance and assessment, the structure of death’s causes;
- the natural population movement, documents used to study the natural population movement, the possibility of their application;
- the average life expectancy, definition, methodology of indicator determining, its dynamics in different regions of the world, in separate countries and in Ukraine, the average male and female life expectancy.

➤ **accounting and reporting documentation:**

- medical certificate of death (*form No. 106/0-95*) ;
- nurse’s certificate of death (*form No. 106-1/0-95*);
- medical certificate of birth (*form No. 103/0-95*);
- medical certificate of perinatal death (*form No. 106-2/0-95*);
- medical certificate of child's stay under the medical institution’s supervision;
- book of deceased (*form No. 151/0*);
- book of perinatal mortality (*form No. 153/0*).

**Need to be able:**

- To fill in the basic accounting documents for the natural population movement studying;
- To analyze the migration processes and indicators of natural population movement;
- To develop measures for demographic changes stabilizing.

**Form of the class:** practical lesson.

**Lesson location:** training room of the department.

### **Methodical support of the lesson:**

- methodological developments for classes;
- methodical literature: workbook for students (basic training);
- presentation materials;
- test items.

**Lesson algorithm:** After checking the presence of students, the teacher announces the topic and purpose of the lesson, explains the relevance of its study and the possibility of using them in practical work.

Using educational materials provided by teacher, students independently learn topic materials and perform specified tasks. By the end of the class teacher asks students about the difficulties during the preparing of the topic and helps to ensure a sufficient understanding of them. Then teacher controls students' knowledge on the basic theoretical material.

*Applied forms of control:* oral quiz of students, theoretical or problematic discussion, prompt controls on options-time to complete 5–7 minutes, daily control of theoretical knowledge – individual tasks or task for several options, including 3–4 theoretical questions (time to complete not more than 20 min.), execution of tests followed by analysis of answers.

In some situations control of theoretical knowledge can be carried out after a practical lesson.

*Forms of practical tasks:* business games and cases.

After the control of theoretical knowledge teacher makes general conclusion on studied subject, sums up control of theoretical knowledge of students, as well as announcing to students their received assessment and homework.

### **Class schedule and timing in percent to the duration of class:**

1	Introduction to class	up to 5 %
2	Review of the main issues of the topic and control of theoretical knowledge	90 %
3	Summarizing and announcement of homework.	up to 5 %
	<b>Total</b>	100 %

### **Recommended literature**

#### **Basic literature**

1. The Virtual Handbook on Population Dynamics URL: [www.thomas-brey.de/science/virtualhandbook](http://www.thomas-brey.de/science/virtualhandbook)
2. Korotayev A., Malkov A., Khaltourina D. Introduction to Social Macrodynamics: Compact Macromodels of the World System Growth URSS. 128 c. URL: [urss.ru/cgi-bin/db.pl?lang=Ru&blang=en&page=Book&id=34250](http://urss.ru/cgi-bin/db.pl?lang=Ru&blang=en&page=Book&id=34250)
3. Turchin P. Complex Population Dynamics: a Theoretical/Empirical Synthesis. – Princeton, NJ: Princeton University Press, 2003. – 450 p.
4. Methodical materials on the subject “Public Health”.
5. Summary of lectures in Social Medicine and Public Health / Kharkiv National Medical University, Department of Public Health and Healthcare Management.

### Additional literature

1. Henderson, K., Loreau, M. An ecological theory Of changing human population dynamics // *People Nat.* 2019;31–43.  
<https://doi.org/10.1002/pan3.8>
2. Nitzbon, J., Heitzig, J., & Parltitz, U. (2017). Sustainability, collapse and oscillations of global climate, population and economy in a simple world-earth model. *Environmental Research Letters*, 12(7).  
<https://doi.org/10.1088/1748-9326/aa7581>.
3. Samir, K., & Lutz, W. (2017). The human core of the shared socioeconomic pathways: Population scenarios by age, sex, and level of education for all countries to 2100. *Global Environmental Change*, 42, 181–192.  
<https://doi.org/10/1016/j.gloenvcha.2014.06.004>
4. Turchin, P. (2009). Long-term population cycles in human societies. *Annals of the New York Academy of Sciences*, 1162(1). 1–17.  
<https://doi.org/10/1111/j.1749-6632.2009.04447.x>

### Information Resources

1. State Committee for Statistics of Ukraine, official website  
<http://www.ukr.stat.gov.ua/>
- a. U.S. National Library of Medicine – <http://www.nlm.nih.gov/>
2. University of West Florida – University libraries. LibGuides. Public Health. Statistics and Data <https://libguides.uwf.edu/c.php?g=435443&p=2968919>
3. Scientific Library of Kharkiv National Medical University –  
<http://libr.knmu.edu.ua/index.php/biblioteki>
4. Vernadsky National Library of Ukraine – <http://www.nbu.gov.ua/>
5. National Scientific Medical Library of Ukraine – <http://www.library.gov.ua/>
6. Korolenko State Scientific Library – <http://korolenko.kharkov.com>
7. Central Scientific Medical Library of Sechenov State Medical University in Moscow – <http://www.scsml.rssi.ru>

## THEORETICAL MATERIAL FOR CLASS TRAINING

### 1. Population dynamics. Mechanical population movement

**Population dynamics** is the change of population number and its structure for a certain period of time. Mechanical and natural processes can change the population number and its structure, so specialists define mechanical and natural dynamics:

- ***mechanical population movement*** are changes caused by migration processes;
- ***natural population movement*** are changes occurred due to fertility and mortality of population, and characterized population reproduction processes.

## Mechanical population movement

**Migration** is the population movement associated with the change of residence place. The word migration comes from the Latin “migro” (that means “to move”).

There are some migration types, such as:

- **internal migration** it is a movement within the country;
- **external migration** it is a movement outside the state. At the same time, there are specific terms: **emigration** that means leaving over the borders of a given country for the permanent residence; and **immigration** it is an entry into definite country for the permanent residence.

**Moreover, on time duration defined such migration types:**

- **permanent or irrevocable migration** in this case migrants stay in new place of residence permanently;
- **temporary** one is a relocation for a sufficiently long, but limited period of time (not less than 1 year);
- **seasonal** one is a movement in certain periods of year for a short time, often in connection with seasonal work (not less than 1 month)
- **floating** one is the daily population movement in certain territory (movement of rural residents for work or study in the city and their return to their permanent residence place in the evening).

**Mechanical population movement** is significant for the sanitary and epidemic prosperity of a certain territory, as it may contribute to the spread of infectious and parasitic diseases. Therefore, the migration processes account is an important condition for the sanitary state assessment of population, and the accurate information about it allows to guarantee the timely organization of medical aid to migrants, as along the route and after arriving at a new place of residence.

**The main indicators of migration processes include:**

- number of arrivals to the city per 1000 of population;
- number of people who left the city per 1000 of population;
- migration increase or decrease;
- coefficient of migration processes efficiency = migration growth / amount of arrivals and departures.

## 2. Natural population movement

**The natural population movement** is a change of population because of the interaction of general demographic phenomena **fertility and mortality**.

**The natural population movement or reproduction** demonstrates, whether the existing fertility and mortality levels guarantee the existence of population growth. The difference between the birth and death rates is called the natural increase. At present, Ukraine has a negative natural increase of population because of low fertility; high mortality; and unfavourable age structure. Among the dynamic processes there is a specific term **population decline**.

**Population decline** is a systematic reduction of the absolute population base of any country or territory as a result of the narrowed population reproduction, when the subsequent generations are numerically smaller than previous (mortality exceeds birth rate, high emigration or presence of circumstances caused the large losses of people).

**Indicators of natural population movement** are sub-divided into basic and additional ones.

**The basic demographic indicators of the natural population movement include:** fertility rate, mortality rate, the natural increase (decrease) indicator, and the average life expectancy.

**Additional** indicators include the infant mortality rate, perinatal mortality rate, neonatal mortality rate, post-neonatal mortality rate, maternal mortality rate, marriage rates, fertility, and others). It should be noted that all demographic indicators are determined using the intensive indicators and are calculated on 1000, with the exception of the maternal mortality (per 100,000 of live births).

**Population birth rate.**

**Birth rate** is the process of child bearing in a specific population aggregate over the certain period of time. Birth rate is the process of new generations' renewal, based on the biological factors affecting the ability of organism to reproduce the offspring (conception, fertilization, and childbearing).

**Birth rate in the world.** 365,000 children are born every day in the world, 26 % of them in Africa, 57 % in Asia, 5 % in Europe, 9 % in Latin America, 3 % in North America and less than 1 % in Australia and Oceania together.

The highest figures in the world according to 2018 data were in Niger – 51.08 ‰, Uganda – 47.55 ‰, Mali – 46.09 ‰, Zambia – 44.63 ‰, Burkina Faso – 43.98 ‰, and Malawi – 41.08 ‰.

The lowest figures were in Monaco – 6.72 ‰, Japan – 7.41 ‰, Hong Kong – 7.45 ‰, Singapore – 8.65 ‰, and Saint Pierre and Miquelon – 8.58 ‰.

In Ukraine, according to the data of 2018, the birth rate was 9.3 ‰. Ukraine is one of ten countries in Europe with the lowest level of total birth rate. In this list there were such countries as Bulgaria, Spain, Italy, the Czech Republic, Latvia and Estonia.

**Birth rate levels in Ukraine (per 1000 of population)**

Years	Birth rate
1950	22.8
1955	20.1
1960	20.5
1965	15.3
1970	15.2
1980	15.0
1990	12.7
1995	9.6
2001	7,7
2007	10,2



Years	Birth rate
2003	8,5
2005	9,0
2006	9,8
2007	10,2
2008	11,0
2009	11,1
2010	10,9
2011	11,0
2012	11,4
2013	11,0
2014	9,41
2015	10,3
2016	10,1
2017	9,8
2018	9,3

Definition of the concept “birth rate” is quite difficult. As you know, childbirth ends not only with the birth of a live child, but also are possible the miscarriages, abortions, dead fetus birth. Thus, it is necessary to distinguish such concepts as live births and stillbirths.

**Live birth** is the complete expulsion or extraction of a child (fetus) from the mother’s body irrespective of the gestation period, then who breathes or manifests other signs of life, such as: palpitation, umbilical cord pulsation or the corresponding muscular movements, whether the umbilical cord is cut or not, whatever placenta has exfoliated or not.

**Fetal death (stillborn fetus)** is the death of fetus before it is completely expulsion or extraction from the mother's body regardless of the gestation period: while it does not show any signs of life (breathing, heartbeat, umbilical cord pulsations or the corresponding muscular movements are absent).

**According to Article 158 of the “Code of Ukraine about the marriage and family”**, the child birth must be registered in the civil registry office.

The application for the child birth registration has to be submitted to the registry office not later than 1 month since the child birth. Registration is carried out upon the submission of the certificate from medical institution about the child birth – “Medical certificate of birth” (*form No. 103/0-95*), issued to mother after her discharge from the hospital by all health institutions where the childbirth took place.

If a woman gave birth to a child outside the medical institution, she receives “Medical certificate of child’s stay under the supervision of a medical institution” (*Form No. 103-1/o-96*).

**Methods for calculation of general birth rate coefficient**

$$\frac{\text{Number of children who were born alive during the year}}{\text{Average annual population number}} \times 1000$$

**The total birth rate** is calculated as the ratio of the total number of live births in a particular region (area) for a certain period of time to the annual average population in the same area for the same period multiplied by the base (1000).

Let's consider the special indicators of birth rate.

**Fertility index** is a special indicator of birth rate characterized the frequency of children birth among women of childbearing age (fertile, generative one between 15 and 49 years).

**Fertility rate** is calculated as the ratio of children born alive per year to the number of women at the age of 15–49 years multiplied by the base (1000).

The following special fertility rates are very significant for the population reproduction:

- total indicator of population reproduction;
- gross reproduction rate (rough indicator);
- net reproduction ratio (refined reproduction rate).

**The total indicator of population reproduction** is the average number of children born by a woman during the fertile period of her life (15–49 years). In the European Union, the total rate is 1.5 children per 1 woman, for the population growth it is necessary – 2.1 children. In Ukraine there is 1.3 children per a woman.

**The gross reproduction rate** is the average number of girls born by women between 15 and 49.

**The net reproduction rate** is the number of girls born on average by one woman for the entire reproductive period of her life and who reached the age when she gave birth to them. This rate characterizes the degree of generation substitution of women by their daughters, while the existing protection of fertility and mortality existing levels.

**There are the types of population reproduction that depend on the level of the net coefficient, among them are following ones:**

- stationary reproduction (net coefficient is 1);
- extended reproduction (net coefficient more than 1);
- narrowed reproduction (net coefficient is less than 1).

In Ukraine, the net coefficient is 0.62 (2018).

**The age-specific intervals of childbearing age** are significant for the reproduction characteristics. It makes possible identification of the age period in which children are born the most. In this regard, the entire childbearing age is sub-divided into 7 periods:

- 1 interval – 15–19 years;
- 2 interval – 20–24 years;
- 3 interval – 25–29 years;
- 4 interval – 30–34 years;
- 5 interval – 35–39 years;
- 6 interval – 40–44 years;
- 7 interval – 45–49 years.

The definition of the age-specific intervals of the childbearing age makes possible to determine **the maximum fertility type** recommended by the UN:

- Early type – the maximum fertility is at the age between 20 and 24 years;
- Late type – the maximum fertility is at the age of 25–29 years;
- Wide type – the age-specific fertility rates of 20–24 years and 25–29 years

do not differ from each other a lot, but exceed other age groups.

Types of maximum fertility in Ukraine:

1. Until the 40 years of 20<sup>th</sup> century, existed so called “rural type” of fertility, which meant that there was a high female fertility as under the age of 30 as after 30 years.

2. At present we can observe mostly an “urban type” of fertility, in which the highest birth rate dominates at the age of 20–24 years, and then it decreases.

3. Moreover, in Ukraine, the birth rate is maintained mainly because of the first-borns, which led to decrease of children in families: 52 % of families have 1 child; 2 children have 39.5%; 3 or more children – only 8.4 % of families.

Various factors and conditions affect the fertility level: economical, social, medical, biological, environmental and others, namely:

- living standard decline of population, and unemployment;
- insufficient social policy of the state;
- inadequate women's reproductive health;
- active involvement of women in public life;
- employment of a certain part of women at the enterprises with hazardous and harmful working conditions;
- decrease of marriages and an increase of divorces (in 2013, in Ukraine on 1000 of people it has been registered 6.0 marriages and 1.0 divorces);
- disproportion in the sex composition of population;
- A large number of abortions in population – 23.4 per 1,000 women of childbearing age, 277 abortions per 1,000 of live births (2013);
- the number of women in Ukraine who do not have children is 19.3 %;
- and the number of incomplete families in Ukraine is 27.5 %, with one mother there are 25.4 %, with one father there are 2.1 %.

### **Population mortality is one of the most important demographic indicators of public health**

**Registration of death** is performed by the civil registration authorities (civil registry office) after the last residence place of deceased, at the place of death, after the corpse identification or at the burial place on the basis of “Medical certificates of death” issued by the medical-preventive institutions (*form No. 106/0-95*) or “Medical assistant’s certificate of death” (*Form No. 106-1/0-95*), as well as a court decision about the death fact establishment or the declaration of citizen dead, according to reports from the places of detention.

**Issued “Medical certificate of death”** or “Medical assistant’s certificate of death” have to be registered by the public health institutions in a special journal (“Journal of dead” (*form No. 151/0*)). Examination of death is performed by physicians, in some cases by medical assistants, at the request of relatives of deceased, his/her neighbours, workers of housing maintenance organizations and others.

**An application for registration** must be submitted not later than within 3 days till the day of death or corpse detection, and if it is impossible to obtain a certificate from the health public establishment, the forensic medical examination, or the conclusion from the prosecutor’s office – it has to be submitted not later than 5 days. In cases of child death within 0-6 days the “Medical birth certificate” of a child (*form No. 103/0-95*) and “Medical certificate of perinatal death” are filling out (*form No. 106-2/0-95*). The last document is also filled out in cases of dead child birth. All medical-preventive institutions of the Ministry of public health of Ukraine, which fill out the “Medical certificate of perinatal death”, have a “Journal of Perinatal Mortality Accounting” (*file No. 153/0*).

**The overall death rate** characterizes the frequency of deaths per a year per 1000 population living in the particular area. It is calculated as the ratio of the total number of deaths from all causes in particular area over a certain period of time to the average annual population in the same area multiplied by the base (1000).

**Special death rates** reflects the mortality depending on the group, reasons, conditions, etc. for example, depending on sex, age, reason, place of residence, etc.

**On the territory of Ukraine, mortality among the rural population is 1.5 times higher than in the city.** In 1999, it was 18.7 ‰ and 13.0 ‰, respectively, while the age-standard indicators were the same for rural and for urban population.

**Population mortality in sex-age section** has the stable features, namely male mortality in all age groups is higher than that of female one. This feature is demonstrated all over the world, but the measure of male mortality predominance over female one is various in different countries. In Ukraine, men die 4 times frequently from poisoning and injuries; 1.4 times – from malignant neoplasms; 2.4 times – from respiratory diseases; 1.6 times – from the digestive system diseases, and 5.1 times more often – from infectious and parasitic diseases, while women die 1.2 times frequently from the circulatory system diseases.

**The leading mortality causes of men and women are the following:**

- **the first place** takes the circulatory system disease for both men and women;
- **the second place for men** is occupied by accidents, poisonings and traumas, and **the third place** malignant neoplasms;
- **the second place for women** had taken malignant neoplasms, and **at the third place** are the accidents, poisoning and injuries.

**In structure of the mortality causes** the first place are occupied the circulatory system diseases (67.3 %), the second place – malignant tumors (13.3 %), the third one – accidents, poisonings and injuries (6.3 %), the fourth one are respiratory system diseases (2.3 %). All together they make 89.2% of all deaths (2018).

**Structure and mortality rates of the working-age population** have their own characteristics. The first two ranking places are occupied by the circulatory system diseases and accidents, poisoning and injuries.

**Regional features of mortality in Ukraine.** The Northeast region has the highest level of overall mortality, then in the Central and South-Eastern regions.

The data by regions: the highest death rates were recorded in Chernihiv region – 19.1 ‰, in Poltava region – 16.8 ‰, in Sumy region – 16.4 ‰, in Kropyvnytsky region – 16.3 ‰, in Kharkiv region – 15.9 ‰; the lowest ones are in Transcarpathian region – 12.2 ‰, Lviv region – 13.0 ‰, Ivano-Frankivsk region – 12.7 ‰ and in Kyiv city – 11.0 ‰.

**Mortality rate in some countries of the world.** The lowest mortality rate is in UAE, in Qatar, and Kuwait – 2 ‰, where population is extremely young, a high proportion of labour migrants in population, a high level of health care system and the extremely low level of alcohol consumption.

The highest rate, more than 25 ‰ is in Swaziland, Botswana, and Lesotho (African countries).

In Europe, the average death rate is 10 ‰, in China – 7.13 ‰, in the USA – 8.2 ‰, in African countries – 14 ‰.

On the basis of mortality rates in sex-age groups, it is calculated another statistical indicator which reveals the causes of the mortality formation in different age groups. This is an **indicator of the population survival to a certain age**, the indicator was proposed by WHO. It is expressed in percentages and is determined by the following age limits: up to 1 year, up to 15 years, up to 45 years, and up to 65 years.

**In Ukraine, the survival rate** up to 45 years is 94.2 % for women, and 83.6 % for men; up to 65 years, respectively, 78.3 % and 47.9 %.

#### **The natural increase (loss) of population.**

**The natural population increase** is defined as a difference between fertility and mortality. If the death rate exceeds the birth rate, then the population number decreases, and such growth indicator has a negative sign and is called **the negative growth**. The negative growth is an **unnatural process**. The negative natural increase is unnatural population decline. The natural population increase must be analyzed together with the birth and death rates of population, as it is possible that with the positive natural growth, there can be the high fertility and mortality rates of population. High fertility, accompanied by high mortality, especially infant mortality, indicates on the unsatisfactory state of population health.

**The list of countries with the negative natural growth includes** such states as Italy (-0.2 ‰), Poland (-0.36 ‰), Estonia (-1.8 ‰), Germany (-1.86‰), Hungary (-3.8 ‰), Russia (-4.8 ‰), Lithuania (-5.3 ‰), Ukraine (-5.5 ‰), Romania (-6.6 ‰), Bulgaria (-7.1 ‰), and Latvia (-7.5 ‰).

**The average life expectancy** is the average number of years that will live the born generation (age-mates of a certain age), with term that the age-specific mortality rate will not change during their life expectancy.

An increase in mortality among children, youth and people of work age influences on the average life expectancy. Therefore, it has more practical value for the health assessment of population, than the overall mortality rate, which is significantly affected by the high frequency and specific gravity of population death rate of the retirement age.

In 2018, **the average life expectancy in Ukraine was 72 years**, including **67** years for men and **76** years for women, so, the difference is about 5 years.

It is known that mortality from the circulatory system diseases, neoplasms and external causes (accidents, poisoning, and traumas) have the greatest influence on the indexes of the average life expectancy.

Average life expectancy in different countries of the world is represented in the following tables.

#### **Countries with the highest average life expectancy**

<b>Country</b>	<b>Generally in the state</b>	<b>Men</b>	<b>Women</b>
Japan	82,6	78,0	86,1
Andorra	82,2	79,4	85,1
Switzerland	82,1	80,0	84,2
Israel	82,0	80,0	84,0
Island	81,8	80,2	83,3
Australia	81,2	78,9	83,6
Spain	80,9	77,7	84,2
Sweden	80,9	78,7	83,0

#### **Countries with the lowest average life expectancy**

<b>Country</b>	<b>Generally in the state</b>	<b>Men</b>	<b>Women</b>
South Africa	49,3	48,8	49,7
Cote d'Ivoire	48,3	47,5	49,3
Malawi	48,3	48,1	48,4
Somalia	48,2	46,9	49,4
Nigeria (30% below world average)	46,9	46,4	47,3

### **SELF -INDEPENDENT WORK**

#### **Task 1**

Based on the data in the table, it is necessary to calculate the natural movement indicators for one of the regions, to compare with the indicators of the country and to make the appropriate conclusions.

Table 1

### Baseline data for the natural population movement indexes calculation

Region	Total of population	Children under 14	Population 50+	Unemployed (children and pensioners)	Number of persons of working age	Born alive	Total of died	Number of women at the age from 15 up to 49
1	273200	68300	81960	123789	149411	2377	4180	130735

#### Natural population movement calculation:

##### – Total birth rate:

$$\frac{\text{Number of children born alive during the year} - 2377}{\text{Average annual population base} - 273200} \times 1000 = 8,7 \text{ ‰}$$

##### – Special indicator of fertility (fecundity, fertility):

$$\frac{\text{Number of children born alive during the year} - 2377}{\text{Number of women at the age from 15 to 49 years old} - 130735} \times 1000 = 18,2 \text{ ‰}$$

##### – Total mortality rate:

$$\frac{\text{Total of died per year} - 4180}{\text{Average annual population base} - 273200} \times 1000 = 15,3 \text{ ‰}$$

##### – Natural population increase:

$$\text{Birth rate coefficient} - 8,7 - \text{mortality rate coefficient} - 15,3 = -6,6 \text{ ‰}$$

##### – The proportion of children under the age of 14:

$$\frac{\text{Number of children under 14 years old among the population of the region} - 68300}{\text{Average annual population base} - 273200} \times 100 = 25 \text{ ‰}$$

##### – The proportion of population at the age of 50 years and over:

$$\frac{\text{Population at the age of 50 years old} - 81960}{\text{Average annual population base of the region} - 273200} \times 100 = 30 \text{ ‰}$$

##### – Type of population age structure: regressive

##### – Demographic load coefficient:

$$\frac{\text{Quantity of unemployed (children, pensioners)} - 123789}{\text{Quantity of persons of the working age} - 149411} \times 1000 = 828,5 \text{ ‰}$$

Table 2

### General indicators of natural population movement

Date	Birth rate coefficient	Mortality coefficient	Age structure type	Demographic load	Natural growth (decrease)
Estimated	8,7‰	15,3‰	Regressive	828,5‰	-6,6‰
On the country	9,8‰	16,2‰	Regressive	923,5‰	-6,2‰
Difference	-1,1‰	-0,9‰	Equal	-95,0‰	+0,4‰

### **Analysis and conclusions:**

During the natural movement indicators comparing in Region No. 1 and data on the country, it is established that, in general, the birth rate and the mortality rate in the region is lower than the general one in the country, but the amount of the natural population increase in the region is higher.

### **Task 2**

On the basis of the random data, fill out the account and record documentation: medical death certificate, medical birth certificate, medical certificate of perinatal death, medical certificate of child's stay under the supervision of medical establishment

### **TEST TASKS**

1. Population estimation was realized according to the following characteristics: number, professional, sex and age composition, categories, ethnic and socioeconomic qualities, birth rate and population migration. Determine which of the following demographic characteristics reflect the dynamic processes among the population?

- A. *Categories and ethnic qualities of population.*
- B. *Sex and age composition of population.*
- C. *Birth rate and population migration.\**
- D. *Socioeconomic qualities of population.*
- E. *Number and professional composition of population.*

2.\*\* In N region, due to the favorable natural and climatic ecological and socioeconomic conditions, there was an increase of pensioners who moved to another region of the country. The state administration, assessing the reserve capacity of the region, introduced a number of benefits resulted the similar mass resettlement from abroad. Indicate what kind of mechanical population movement occurs in the region:

- A. *Population immigration.\**
- B. *Progressive composition of population.*
- C. *Regressive composition of the population.*
- D. *Stationary composition of population.*
- E. *Emigration.*

3. At the metallurgical plant of a large industrial city N work 230 men who live in the rural area and spend 2 hours a day to get to the plant and back home. Determine which of the following kind of migration is carried out by workers

- A. *Daily.*    B. *Monthly.*    C. *Floating.\**    D. *Constant.*    E. *Seasonal.*

4. Among the processes characterizing the population movement, an important place has given to the mechanical movement. Which of the following is the name of migration if population moves to the new residence place for a long time?

- A. *Long time.*                      C. *Non-defined.*                      E. *Seasonal.*
- B. *Floating.*                          D. *Constant.\**



5. Migration changes the number and age composition of population in some settlements. Which of the following is the name of migration if the population moves to a new place for short period of time (for winter, summer, autumn or spring)?  
*A. Short term.*                      *C. Non-defined.*                      *E. Seasonal.\**  
*B. Floating.*                              *D. Time limited.*
6. During the population migration analyze, it is classified according to the number of characteristics. Which of the following is the name of migration if the population moves to a new place every morning and backs to their permanent residence place in the evening?  
*A. Daily.*                                      *C. Non-defined.*                      *E. Official.*  
*B. Floating.\**                              *D. Seasonal.*
7. In N. district, where live 60,000 of people, 616 children were born alive during the year. Indicate with which of the following particular indicator it is possible to characterize this demographic situation:  
*A. Marriage fertility.*                      *D. Total fertility.*  
*B. Natural population increase.*                      *E. Birth rate.\**  
*C. Vital capacity coefficient.*
8. The birth rate is the most important medical-social criteria of vital capacity coefficient and population reproduction. The total birth rate and fertility rates, the age-specific fertility rates, “gross” and “net” population reproduction rates, are used to characterize the birth rate process intensity. Which of the following information is necessary to determine the total birth rate:  
*A. Working age population.*  
*B. Number of children born alive, and average annual population.\**  
*C. Number of children born dead.*  
*D. Women of childbearing age*  
*E. Number of women whose pregnancy ended by childbirth.*
- 9.\*\* In demography, it is confirmed to distinguish the biological ability of reproduction and the actual reproduction. Which indicator determines the number of live births per 1000 of women aged from 15 to 49 in population?  
*A. Obstetric level.*                      *C. Indicator of childbearing.\**                      *E. Birth rate level.*  
*B. Perinatal level.*                      *D. Reproductive level.*
10. After the maturity and the childbearing function activity population is subdivided into the following age periods: 1–14 years, 15–29 years, 30–49 years, 50–59 years, and 60+. Determine which of the following age levels of population are taken for the lower and upper limit of childbearing age?  
*A. 15–29 years.*                      *C. 30–49 years.*                      *E. 30–70 years.*  
*B. 15–49 years.\**                      *D. 30–59 years.*
11. During the child bearing, the doctor who took birth noted that fetus was with a gestation period up to 28 weeks, with the length less than 35 cm and weight of 1,000 grammes was born without self-breathing, but with the presence of heartbeat

and pulsation of the umbilical cord. How doctor has to qualify the birth of fetus:

- A. Abortion/
- B. Miscarriage.
- C. Liveborn.\*
- D. Stillborn.
- E. Perinatal death.

**12.** Citizen N. gave birth to a healthy full-term infant in municipal maternity hospital. On the seventh day after the childbirth, mother and infant were discharged from the hospital. During the discharge, mother was warned about the necessity of child's registration in the civil registration office. On the basis of which of the following document she can make this registration?

- A. Extract from the hospital neonatal record.
- B. Labour and delivery record.
- C. Medical certificate of child's stay under the supervision of medical establishment.
- D. Medical birth certificate.\*
- E. Prenatal record: information of the maternity hospital about the newborn.

**13.** Registration of child birth is realized at the residence place by one of his/her parents or by one of them. Determine which of the following basic document should be provided to the civil registry office for the birth registration of a child?

- A. Medical certificate of child birth.
- B. Registry of labor in the hospital.
- C. Hospital neonatal record.
- D. Medical birth certificate.\*
- E. Certificate from the maternity hospital about the child birth.

**14.** The organizational and methodical cabinet of the Central District Hospital had to study the birth rate throughout the district. The head of the organizational-methodical department instructed to do it the doctor-statistics. With the help of which of the following document will be studied the birth rate in the area in this case?

- A. With the growth chart of child.
- B. Using the stub of medical birth certificate.\*
- C. Using the prenatal record.
- D. Using the results of population census.
- E. Using birth certificate from the maternity hospital.

**15.\*\*** A doctor of the rural medical hospital was called to citizen O., a resident of a remote village, who has given the birth to a child at home without any medical assistance. What document should be filled by the doctor to register this childbirth case?

- A. Labour and delivery record.
- B. Child's record.
- C. Hospital neonatal record.
- D. Medical certificate of child's stay under the supervision of medical establishment.\*
- E. Medical birth certificate.

**16.\*\*** Woman gave birth to a child in the city hospital. On the fourth day after the birth, woman with a child was discharged from the hospital. Determine on the basis of which document the child will be registered in the civil registry office?

- A. Extract form the hospital neonatal record.*
- B. Labour and delivery record.*
- C. Medical birth certificate.\**
- D. Maternity house information about the newborn.*
- E. Statistical record of patient discharged from the hospital.*

**17.\*\*** Woman K., without any medical assistance, gave birth to a child at home. Family physician of a rural medical outpatient clinic on the relatives request verified the child birth. What document should be filled by the family doctor to register this childbirth case?

- A. Birth certificate.*
- B. Medical birth certificate.*
- C. Medical certificate of child's stay under the supervision of medical establishment.\**
- D. Birth verification letter.*
- E. Medical birth verification letter/*

**18.\*\*** Family doctor of rural medical outpatient clinic accepted the physiological births from a citizen, a resident of neighboring village at home. Determine which particular document should be filled by the family doctor to register this childbirth case?

- A. Medical certificate of child's stay under the supervision of medical establishment.*
- B. Medical birth verification letter.*
- C. Medical birth certificate.\**
- D. Birth certificateю*
- E. Birth verification letter.*

**19.** Citizen N. gave birth to a healthy full-term infant in the municipal maternity hospital. On the seventh day after the childbirth, mother and infant were discharged from the hospital. During the discharge, mother was warned about the need to register the child in the civil registration office. Which of the following is the period of child birth registration in the civil registry office according to the current legislation in Ukraine?

- A. Not later than ten days.*
- B. Not later than one year.*
- C. Not later than one month.*
- D. Not later than three days.*
- E. Not later than three months.\**

**20.\*\*** Information and analytical department of Central Regional Hospital should analyze the demographic situation in the district. The corresponding assignments were distributed among the employees of the department. In particular, one of them was assigned to study the birth rate of population. What records should serve an information source for him?

- A. Hospital neonatal record.*      *D. Maternity house information about the newborn.*  
*B. Labour and delivery record.*  
*C. Medical birth certificate.\**      *E. Birth certificate.*

**21.** In rural area A is marked an “urban” fertility type. Determine, which of the following age group of women has high birth rate in this case?

- A. 15–19 years.*      *C. 25–29 years.*      *E. 35–39 years.*  
*B. 20–24 years.\**      *D. 30–34 years.*

**22.** Mortality is the second significant demographic process after the birth. Mortality rate is used to assess the social, demographic and medical prosperity of population. Which information of the following is necessary to determine the overall mortality rate:

- A. Number of working population.*  
*B. Number of children born dead.*  
*C. Number of stillborns.*  
*D. Number of deaths per year, and an average annual number of population.\**  
*E. Number of deaths among those who were treated in hospitals.*

**23.** One of the important indicators that characterized the health status of population is the average life expectancy. Which of the following age-related mortality rate indicator significantly affects the normal life expectancy?

- A. Stillbirth.*      *D. Mortality of infants.\**  
*B. Mortality in working age.*      *E. Mortality of adults.*  
*C. Mortality of children over 1 year old.*

**24.** Citizen N gave birth to a dead child in the municipal maternity hospital. According to the current legislation of Ukraine, it is necessary to register a case of stillbirth in civil registry office. Determine on the basis of which of the following document is it possible to make such registration?

- A. Medical certificate of perinatal death.\**  
*B. Medical certificate of death.*  
*C. Labour and delivery record.*  
*D. Medical birth certificate.*  
*E. Maternity house information about the newborn.*

**25.\*\*** After a long illness, citizen C died at home. District doctor issued a “Medical certificate of death” and informed his relatives that it should be registered in the local civil registry office. In what period of time from the date of death is it necessary to make such registration in accordance with the current legislation of Ukraine?

- A. Not later than ten days.*      *D. Not later than three days.\**  
*B. Not later than one year.*      *E. Not later than three months.*  
*C. Not later than one month.*

**26.** Citizen R gave birth to a dead child in the municipal maternity hospital. According to the current legislation of Ukraine, it is necessary to register a case

of stillbirth in civil registry office. Determine on the basis of which of the following particular document is it possible to perform such registration and in which maximum terms.

*A. Medical certificate of perinatal death. Term – 3 days.\**

*B. Medical certificate of perinatal death. Term – 6 days.*

*C. Medical certificate of death. Term – 1 month.*

*D. Medical certificate of death. Term – 3 days.*

*E. Medical certificate of death. Term – 6 days.*

**27.\*\*** Family physician witnessed the death. Determine on the basis of which medical document this death is recorded and in what is the maximum period of such death registration in the civil registry office?

*A. Medical certificate of death. Term – 1 month.*

*B. Medical certificate of death. Term – 3 days.\**

*C. Medical certificate of death. Term – 7 days.*

*D. Death certificate. Term – 3 months.*

*E. Death certificate. Term – 3 days.*

**28.\*\*** Citizen C died at home after a long 7 years' illness, all this period he was under the clinical supervision in the district clinic. In accordance with the current legislation of Ukraine, the death case must be registered in the local civil registry office. Determine on the basis of what document is possible to make such registration?

*A. Medical certificate of perinatal death.*

*B. Medical certificate of death.\**

*C. Extract from the register of the deceased.*

*D. Dispensary observation record.*

*E. Medical assistant's death certificate.*

**29.** The death rate is one of the of the natural movement indicators. Determine which of the following are the trends of this indicator in Ukraine?

*A. Increased mortality.\**

*B. Mortality reduction among the urban residents.*

*C. Mortality reduction among the rural residents.*

*D. Mortality reductionno*

*E. Mortality stabilization.*

**30.** Mortality rates are historically used to assess the health status of population. Determine which of the following is the main cause of death in Ukraine?

*A. Respiratory system diseases.*

*D. Accidents, poisoning and injuries.*

*B. Digestive system diseases.*

*E. Neoplasms.*

*C. Circulatory system diseases.\**

**31.** Mortality does not fully describe the health status of population, as the death probability is not the same for different diseases, but at the same time it is a significant demographic indicator. Determine which of the following diseases take the second place among the overall mortality causes of the population?

- A. Respiratory system diseases.*                      *D. Accidents, poisoning and injuries.*  
*B. Digestive system diseases.*                      *E. Neoplasms.\**  
*C. Circulatory system diseases.*

**32.** Structure of death causes is a necessary indicator to characterize the health of population. Determine which of the following diseases take the third place among the overall mortality causes of the population?

- A. Respiratory system diseases.*                      *D. Accidents, poisoning and injuries.\**  
*B. Digestive system diseases.*                      *E. Neoplasms.*  
*C. Circulatory system diseases.*

**33.** The death rate volume depends on the structure of population by age, sex and other important characteristics. Determine, which of the following is the main cause of children death in Ukraine under the age of 14?

- A. Nervous system and sensory organs diseases.*  
*B. Respiratory system diseases.*  
*C. Digestive system diseases.*  
*D. Congenital anomalies*  
*E. Accidents, poisoning and injuries.\**

**34.** The level and mortality structure are determined by the complex interaction of many factors, an important place is occupied by the age groups. Determine which of the following diseases take **the second place** among the causes of children death in Ukraine under the age of 14 years?

- A. Nervous system and sensory organs diseases.*  
*B. Respiratory system diseases.*  
*C. Digestive system diseases.*  
*D. Congenital anomalies.\**  
*E. Accidents, poisoning and injuries.*

**35.** Mortality increase in Ukraine in recent years is associated not only with the population aging, but also with the mortality increase among the working-age population. Determine which of the following is the main cause of mortality of the working-age population?

- A. Nervous system and sensory organs diseases.*  
*B. Respiratory system diseases.*  
*C. Circulatory system diseases*  
*D. Accidents, poisoning and injuries.\**  
*E. Cancer.*

**36.** In big city it is planned to take set of measures aimed to reduce the overall mortality of population. Determine which of the following group of people should be prioritized?

- A. Persons of working age.*                                      *D. People 60+.\**  
*B. Working pensioners.*                                      *E. Persons under 60 years.*  
*C. Children under 15 years.*

- 37.** On the basis of the mortality data in the age groups it is calculated the survival rate. Which of the following age groups is used to calculate this indicator in accordance with WHO recommendations?
- A. Up to 1 year, 15 years, 45 and 65 years.\**
  - B. Up to 18 and 60 years.*
  - C. Up to 18 years, 55 years for women and 60 years for men.*
  - D. Up to 3 years, 14, 45 and 65 years.*
  - E. Up to 6 years, 18 and 50 years.*
- 38.** To assess the social, demographic and medical prosperity of the particular territory, it is necessary to take into account not only the birth and death rates of population, but also the others, among which there is the natural increase indicator. Which of the following indicator is determined?
- A. Ratio of mortality rate of the working persons to the number of women of childbearing age.*
  - B. Difference between the born alive and still-born.*
  - C. Difference between the levels of total fertility and total mortality.\**
  - D. Difference between the number of births (alive and still) and the number of deaths.*
  - E. Ratio between the infant mortality and live births.*
- 39.** An integrated measure of population health status is the average life expectancy. Determine which of the following is the average life expectancy in Ukraine?
- A. 60–63.      B. 64–66.      C. 67–69.\*      D. 70–72.      E. 73–75.*
- 40.** The average life expectancy of population depends on gender, age, place of residence and other parameters. Determine, which of the following is the average life expectancy in Ukraine for men?
- A. 60–58.      B. 62–64.\*      C. 63–61.      D. 65–67.      E. 69–70.*
- 41.** The average life expectancy is calculated on the basis of the age-specific mortality rates at present time using the so-called survival tables. Determine, which of the following is the average life expectancy in Ukraine for women?
- A. 67–69.      B. 70–72.      C. 73–74.\*      D. 75–77.      E. 78–80.*
- 42.** The average life expectancy of the Ukrainian population is 67.6 years. WHO in the programme “Health for all in the 21<sup>st</sup> century” has determined the indicator for Ukraine, which should be achieved. Which of the following is determine it?
- A. 70 years old.      C. 75 years old.\*      E. 79 years old.*
  - B. 72 years old.      D. 77 years old.*
- 43.** In city T., during the life expectancy calculation of population, it have been estimated the age-specific death rates. In the future (after several years) the age-specific mortality rates have become much lower than estimated. How will change the life expectancy of population in comparison with the calculated coefficients?
- A. It will decrease significantly.      C. It will not change.      E. It will decrease.*
  - B. It is unknown.\*      D. It will increase.*

**44.** Population is characterized by the following demographic patterns: urban population increase, aging population, sharp birth rate decline, average life expectancy reduction and the high death rate of population, and the negative population growth. Determine which of the following demographic patterns are characterize the modern population of Ukraine?

- A. *Only the urban population increase.*
- B. *Only the low population mortality.*
- C. *Only the negative population growth.*
- D. *Only the sharp birth rate decline.*
- E. *All mentioned patterns.\**

**45.** Population is one of the most important factors of the state's economy development. Demography studies population size and its composition. Which of the following trends are observed in the changes of population number and its composition in Ukraine in recent times?

- A. *In the age group under 30, a significant advantage of women.*
- B. *In the age group under 30, a significant advantage of men.*
- C. *Population base increase.*
- D. *Population decrease, and aging of population.\**
- E. *Rural population decrease.*

**46.** Information about the age structure of population is necessary for the many socio-economic and demographic processes study. Knowing the features of the age structure of population at any period, it is possible to assume the trends of general demographic processes. Determine which of the following changes are happened in the age structure of the Ukrainian population over the past decade:

- A. *In the age group under 30, a significant predominance of women.*
- B. *In the age group under 30, a significant predominance of men.*
- C. *Density growth of children.*
- D. *Growth in the proportion of people of working age.*
- E. *Growth in the proportion of people 60+, and decrease of children in the proportion.\**

**47.** Demography is a science of population reproduction patterns, about the dependence of its character from socio-economic and natural conditions, migration, studying the size, territorial distribution and composition of population, their changes, the causes and consequences of these changes and who gives the recommendations for their improvement. Determine which of the following are pattern characterizes the current demographic situation in Ukraine?

- A. *Population juvenescence, mortality reduction.*
- B. *Population aging, the overall mortality rate increase.\**
- C. *Death rate decrease, birth rate increase.*
- D. *Birth rate increase, population juvenescence.*
- E. *Increase of the average growth of adolescents, the birth rate increase.*



48. Demographic situation is a complex of a quantitative characteristic and a qualitative assessment of demographic processes (birth rate, mortality, migration, marriage, etc.) occurring on certain territory. Determine which of the following is the negative trends for the next 5–7 years, according to the forecast, regarding the demographic situation in Ukraine?

*A. They will constantly change (in the direction of decrease, in the direction of increase).*

*B. They will increase.\**

*D. They will stabilize.*

*C. They will not changed.*

*E. They will decrease.*

\*\* – tests are necessary for the preparation to KROK exam

### CONTROL QUESTIONS:

1. Give the definition of demography, and what are main sections of it?
2. What features characterize the dynamics of population?
3. What is “migration” and what are its types?
4. How the migration process analysis is performed?
5. What is the natural movement of population?
6. What indicators characterize the population natural movement?
7. Describe depopulation as a medical and social problem of society?
8. What are the sources of natural population movement indicators?
9. Birth rate and methods of the birth rates determination and it types.
10. Special indicators of birth rate and their significance for the demographic processes analysis.
11. What are factors affecting the birth rate level?
12. What is the procedure of the birth registration of Ukrainian citizens and what documents are necessary for such registration?
13. What are significant trends for the birth rate in Ukraine?
14. General and special indicators of mortality. Method of their calculation.
15. What is the procedure of the dead registration and what documents are necessary for such registration?
16. Describe causes of mortality in different sex and age groups of population.
17. Natural increase (decline) of population and features of the demographic processes analysis on the basis of natural increase (decrease).
18. Average expectancy of life, its regional and national characteristics.
19. Characteristics of current demographic situation in Ukraine.

### CONTENT

Methods for Conducting the Class . . . . .	3
Theoretical Material for Class Training . . . . .	5
1. Population dynamics . . . . .	5
2. Natural Population Movement . . . . .	6
Self-Independent Work . . . . .	13
Test tasks . . . . .	15
Control Questions . . . . .	24

*Навчальне видання*

# **МЕДИКО-СОЦІАЛЬНІ ПРОБЛЕМИ ДЕМОГРАФІЧНИХ ПРОЦЕСІВ: ДИНАМІКА НАСЕЛЕННЯ**

*Методичні розробки викладачів  
до проведення практичного заняття студентів  
за спеціальністю 222 «Медицина» і 228 «Педіатрія»  
з дисципліни «Соціальна медицина,  
громадське здоров'я» (Громадське здоров'я)*

Упорядники      Огнев Віктор Андрійович  
                         Трегуб Павло Олегович  
                         Міщенко Марина Михайлівна

Відповідальний за випуск      В. А. Огнев



Комп'ютерний набір Н. М. Мартиненко  
Комп'ютерна верстка О. Ю. Лавриненко

Формат А5. Ум. друк. арк. 1,5. Зам. № 21-34117.

---

**Редакційно-видавничий відділ  
ХНМУ, пр. Науки, 4, м. Харків, 61022  
izdatknmurio@gmail.com**

Свідоцтво про внесення суб'єкта видавничої справи до Державного реєстру видавництв, виготівників і розповсюджувачів видавничої продукції серії ДК № 3242 від 18.07.2008 р.