Medical and social problems of demographic processes. Peculiarities of demographic indicators in regions of the world, foreign countries and Ukraine.

1950 - the population was 2.5 billion people
1987 - the population of 5 billion people
1999 - the population was 6 billion people
October 31, 2011 - the population of 7 billion people
July 14, 2022, the population of 8 billion people:
4.041 billion men and 3.969 billion women.

The population of the Earth increases by 1 billion inhabitants almost every 12 years.

January 1, 2022

Population:

- 41,167,335 existing population
- 40,997,699 permanent residents

State Statistics Service of Ukraine.

Population health is a conditional statistical concept characterized by:

According to demographic indicators:

- Birth rate;
- Mortality;
- Population growth
- Life expectancy

According to morbidity indicators:

- General, primary
- Infectious
- Hospital
- Morbidity with temporary disability, etc.

According to indicators of disability:

- General
- Primary

According to indicators of physical development
According to indicators of pre-clinical conditions (immune system condition)

Statics of the population - the numerical composition of the population at a certain (critical) moment in time.

The composition of the population is studied according to a number of main characteristics (structure):

- ✓ gender, age,
- ✓ social groups,
- ✓ profession and occupation,
- ✓ marital status,
- ✓ nationality, language,
- ✓ cultural level, literacy, education,
- ✓ place of residence,
- ✓ geographical location and population density.

DEMOGRAPHY

δῆμος - *people*

γράφω - *to write, depict.*

Dynamics of the population - the movement and change of the population size.

Mechanical movement - under the influence of migration processes.

Natural movement (population reproduction) - birth and death rates.

The indicators are determined separately:

- ➢ infant mortality rate
- ➢ maternal mortality

Mechanical movement of the population:

There are two main types of migrations:

External - displacement of population outside the country/region

- **Emigration** – leaving the country for permanent residence.
- **Immigration** – entering the country for permanent residence.

Internal - population movement within the country / region

- **Urbanization** - the growth and development of urban settlements, the growth of the specific weight of the urban population at the expense of the rural population.
- **Ruralization** - deurbanization, a process that is the reverse of urbanization: the outflow of population from cities to rural areas.

By duration, migration is divided into:

- Permanent
- Temporary
- Pendulum
- Seasonal

The number of the population

The main source of information on the number and composition of the population is the population census (simultaneous, continuous observation)

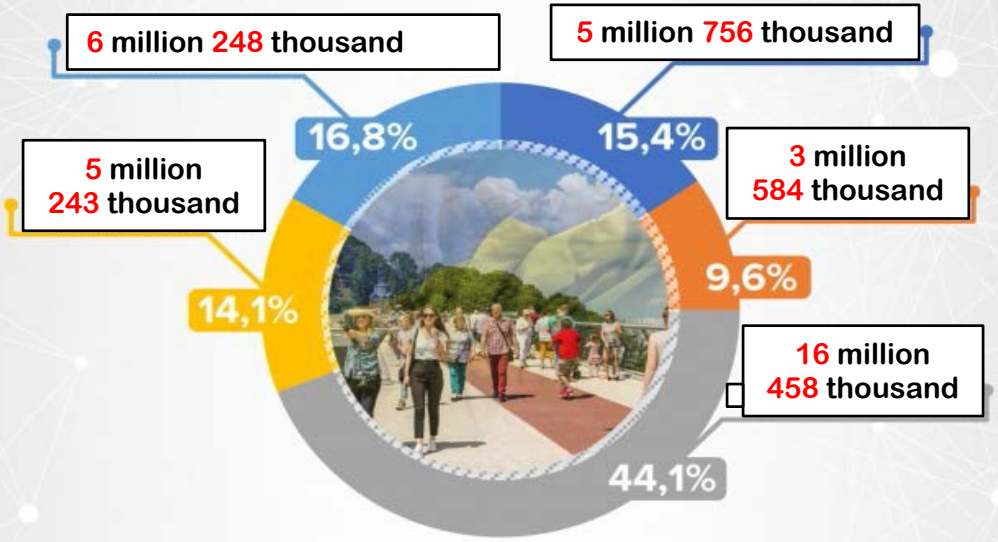
The *census program* is a list of information collected during the census. The census sheet includes a number of questions that allow you to obtain the necessary information: address, demographic characteristics (gender, age, marriage), citizenship, ethnic characteristics, religion, education, etc.

According to the electronic population census of 2019

37 million 289 thousand people live in Ukraine

(Data are approximate!)

POPULATION OF UKRAINE BY AGE



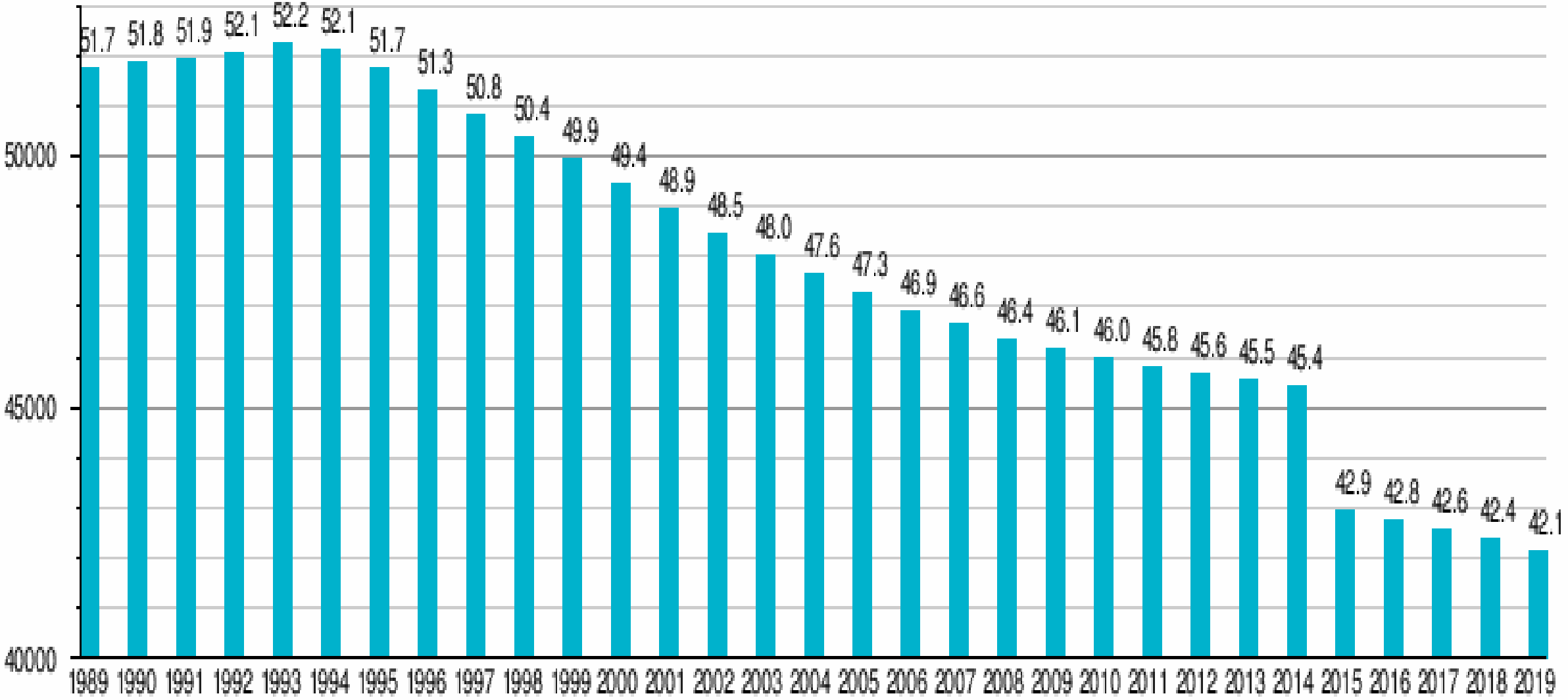
- Children (0-14 years)
- Early working age (15-34 years)
- Main working age (35-54 years)
- Ripe working age (55-64 years)
- Elderly people (65 and more)

* *Excluding the occupied territories*

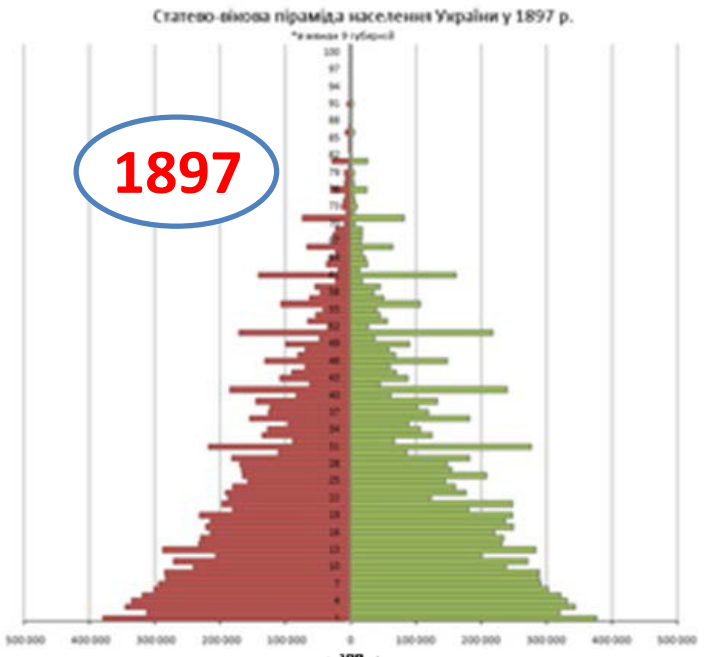
Data: Cabinet of Ministers of Ukraine

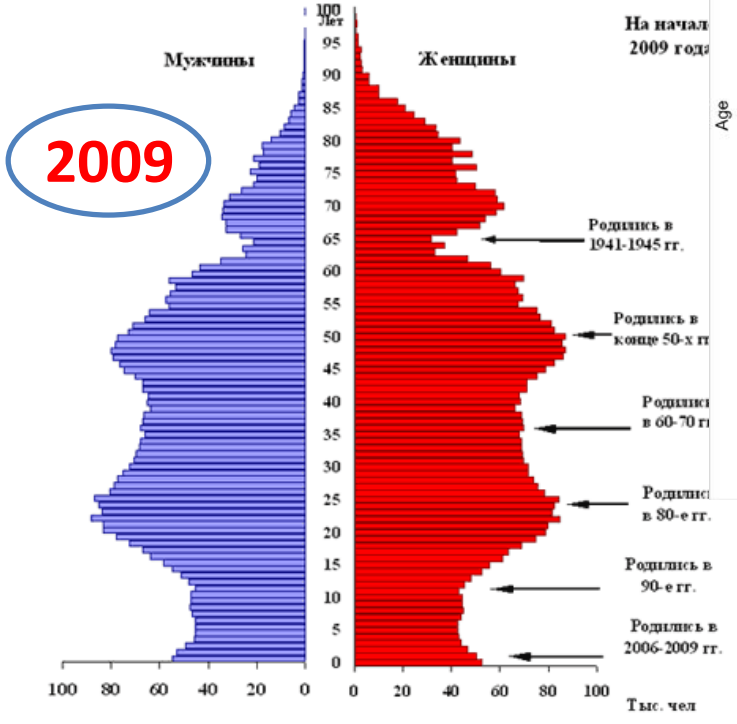
METHOD: Combined method of estimating the size of the existing population (data from mobile operators, statistical survey of households, data from registers); Data on the age structure of the population, data from various registers

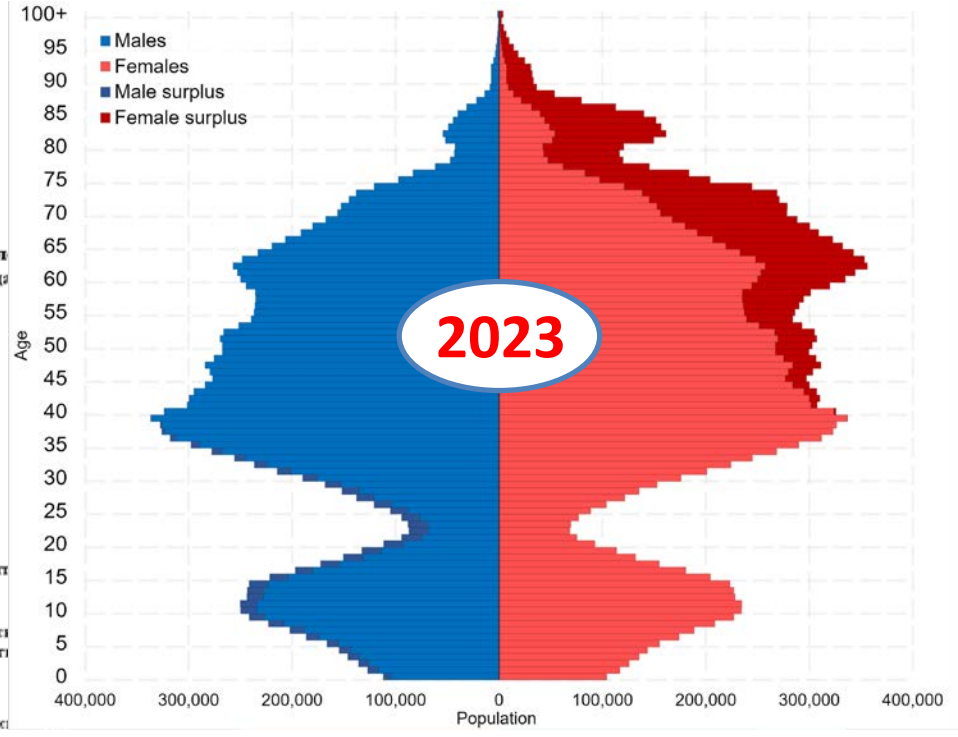
Dynamics of the population of Ukraine (1989-2019)

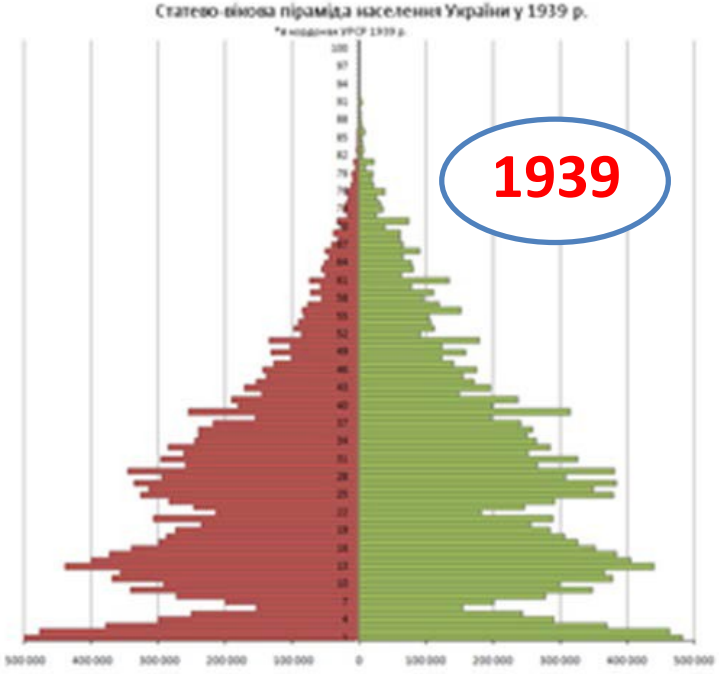


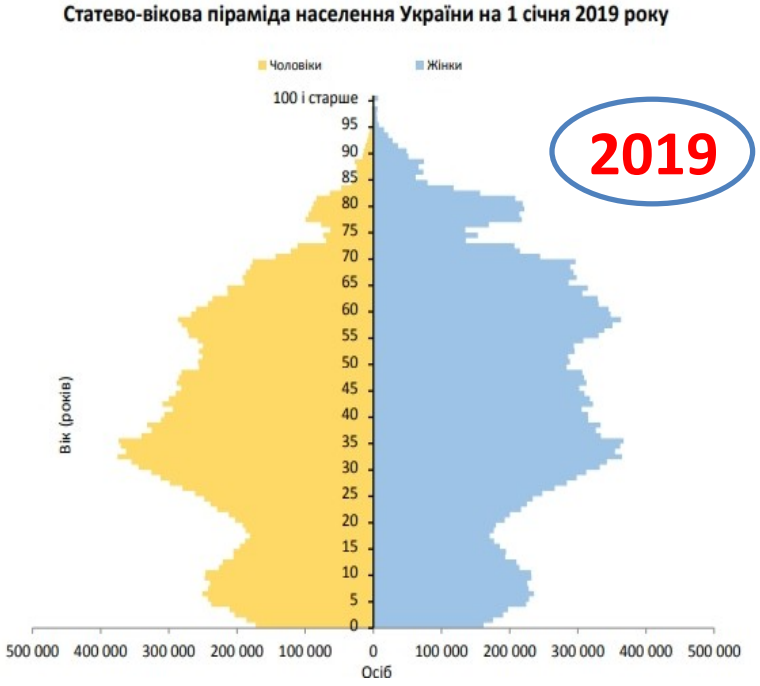
DEMOGRAPHIC PYRAMIDS (UKRAINE)











Demographic indicators are calculated according to the following formulas:

RELATIVE VALUES

Intensive indicator (level)

$$\frac{Phenomenon * 1000}{Environment}$$

Extencive indicator (structure)

$$\frac{Phenomenon\ (part) * 100\%}{Phenomenon\ (full)}$$

Visibility indicator (changes)

$$\frac{Level\ (reported) * 100\%}{Level\ (basic, taken\ as\ 100\%)}$$

AVERAGE VALUES

Average life expectancy,

Expected average life expectancy

Average age of the population group

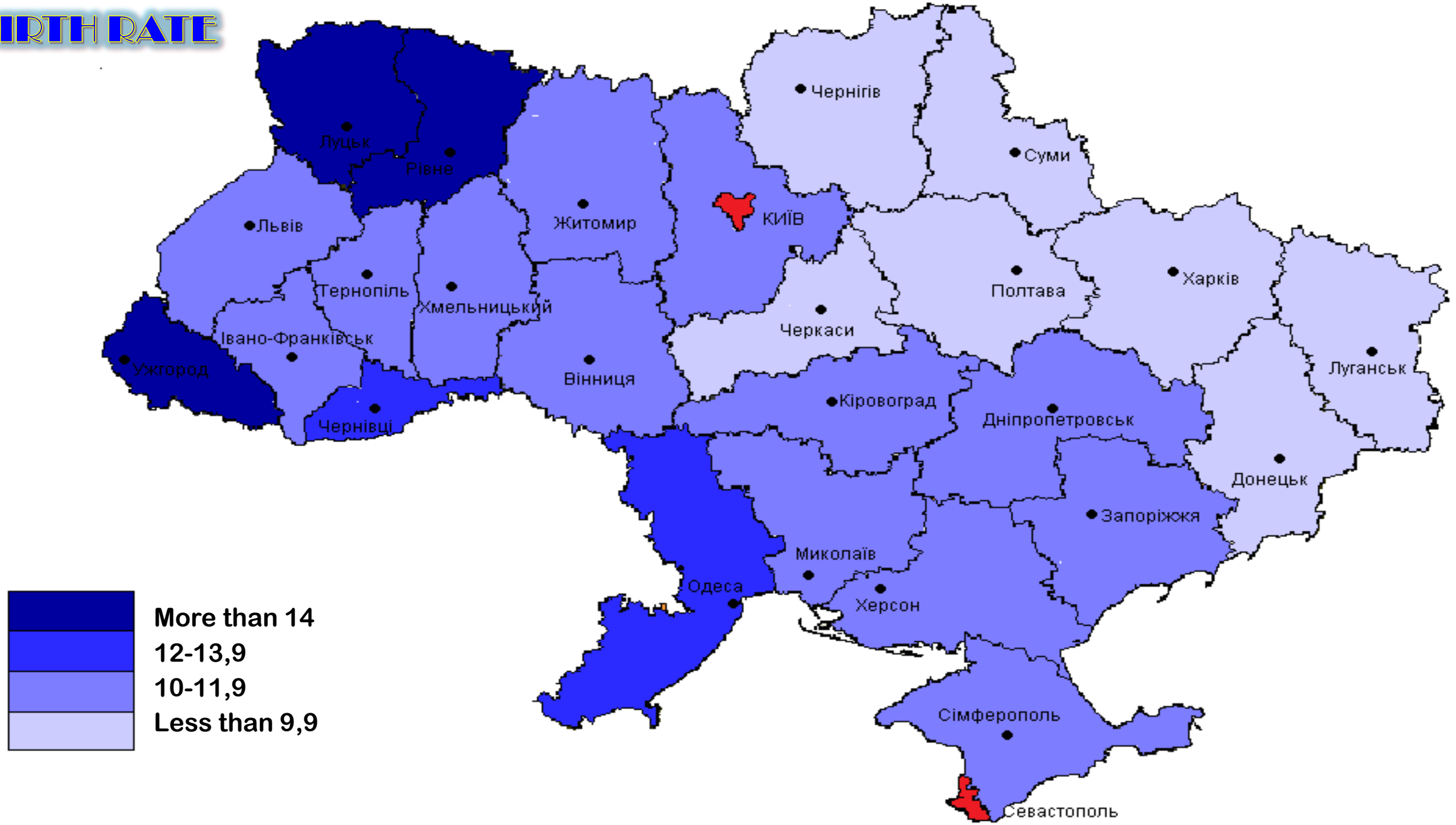
etc.

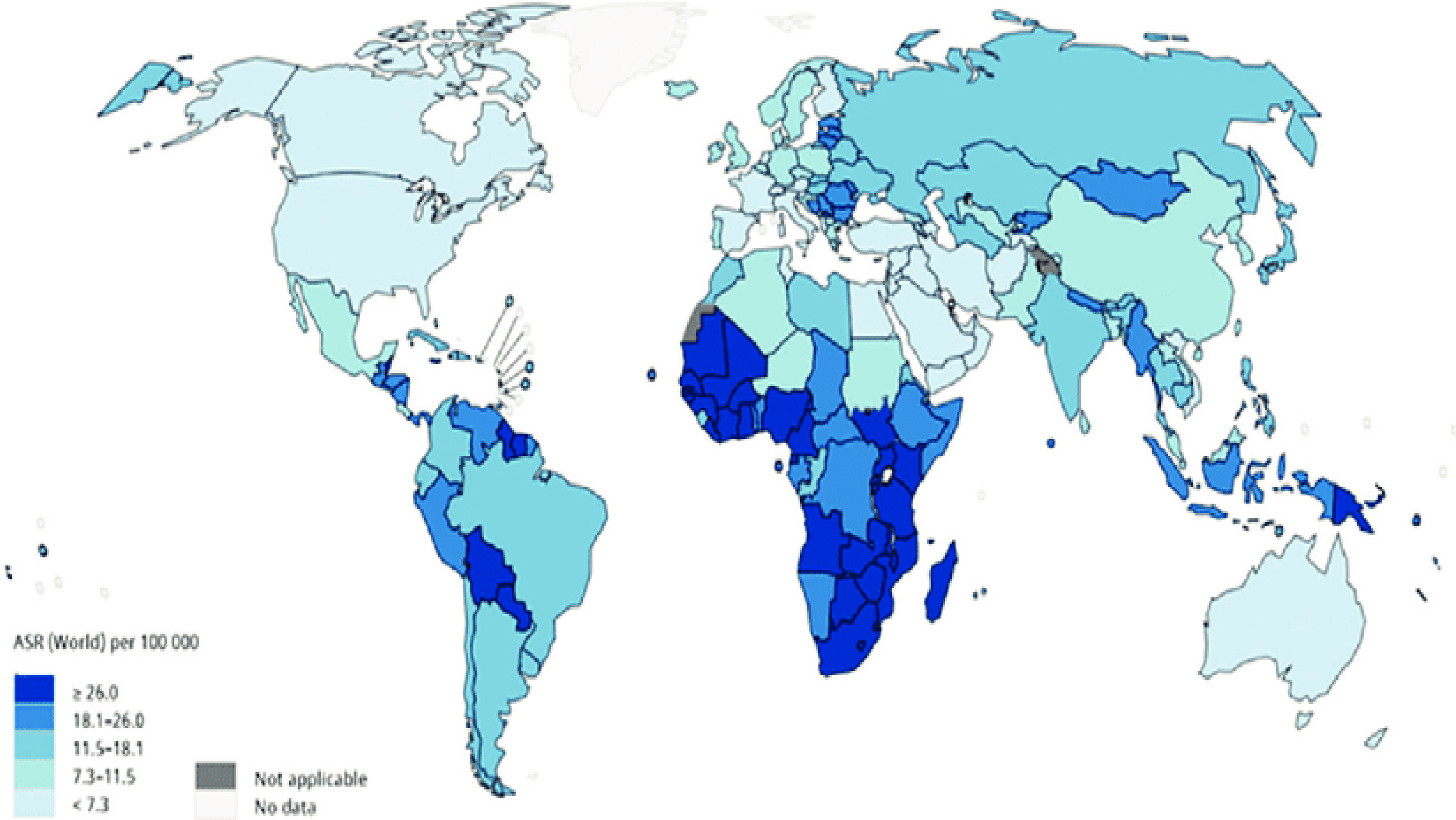
BIRTH RATE

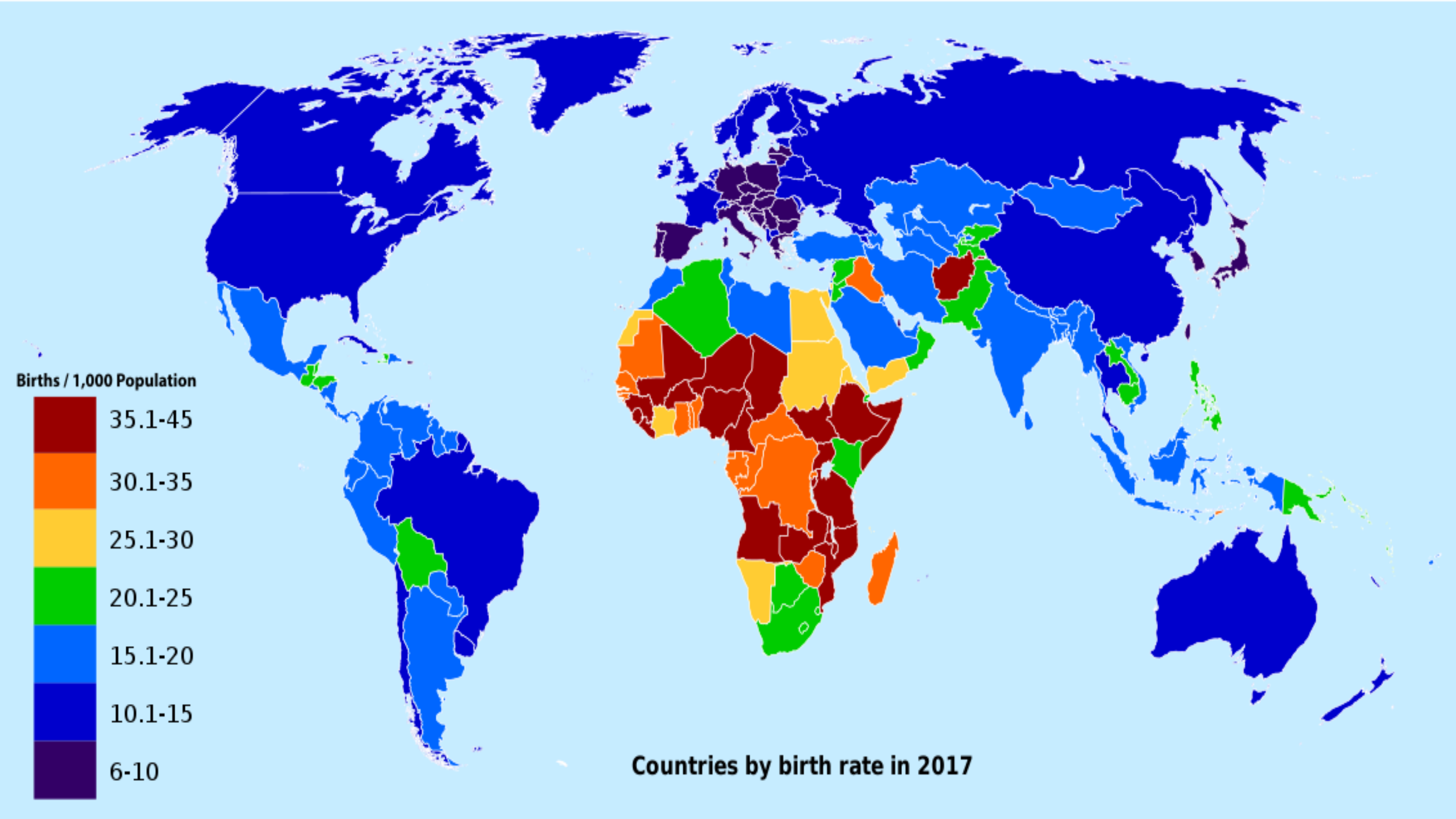
$$Birth\ rate = \frac{Number\ of\ live\ births\ per\ year * 1000}{Average\ annual\ population}$$

Data per 1000 of people	Value
Less than 10‰	Very low
10–14,9‰	Low
15–19,9‰	Lower Middle
20–24,9‰	Middle
Over than 30‰	Hgh

BIRTH RATE


Чернігів
Суми
Луцьк
Рівне
Житомир
КИЇВ
Львів
Полтава
Харків
Тернопіль
Хмельницький
Черкаси
Івано-Франківськ
Ужгород
Вінниця
Луганськ
Кіровоград
Дніпропетровськ
Чернівці
Донецьк
Запоріжжя
Миколаїв
Одеса
Херсон
Сімферополь
Севастополь
More than 14
12-13,9
10-11,9
Less than 9,9


ASR (World) per 100 000
≥ 26.0
18.1–26.0
11.5–18.1
7.3–11.5
< 7.3
Not applicable
No data


Births / 1,000 Population
35.1-45
30.1-35
25.1-30
20.1-25
15.1-20
10.1-15
6-10
Countries by birth rate in 2017

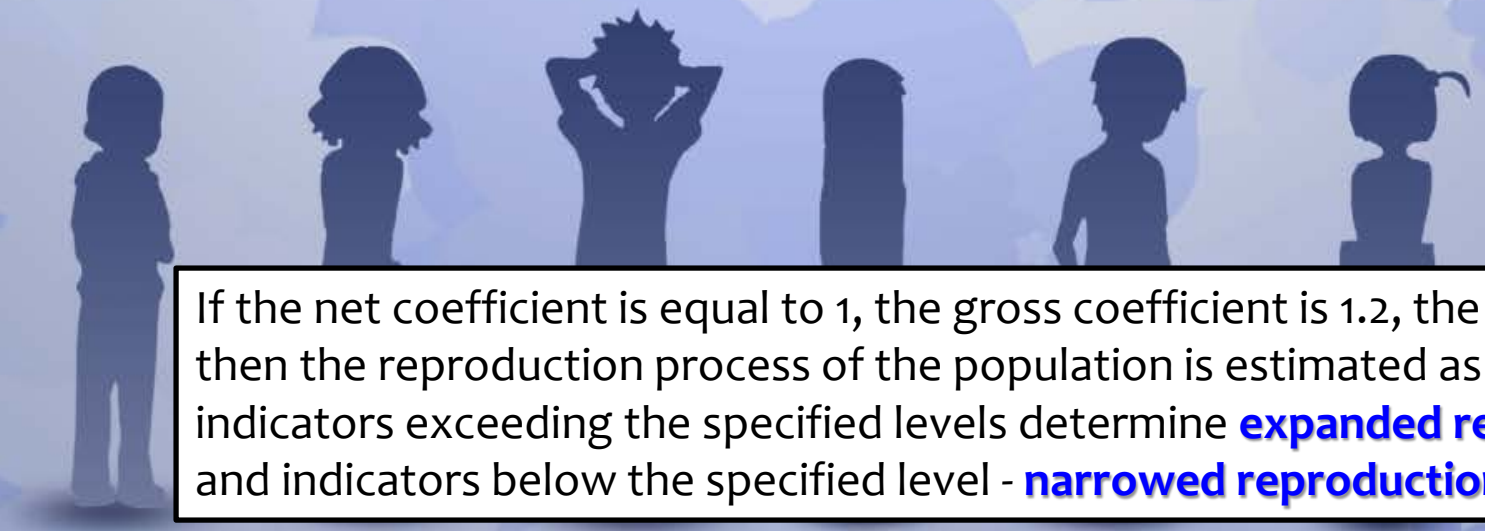
FERTILITY

$$Fertility = \frac{Number\ of\ live\ births\ per\ year * 1000}{Amount\ of\ fertility\ women\ (aged\ 15-49)}$$

Special reproduction indicators

Total population reproduction rate – the number of children born to a woman during the fertile period of her life (15–49 years):

- gross reproduction rate – the average number of live-born daughters that a group of women would have if the age-specific fertility rate were to apply to them in a given period (usually a calendar year).
- net reproduction rate, or purified reproduction rate, is the average number of daughters that would be born alive to a hypothetical cohort of women if they experienced the same age-specific fertility throughout their lives that women in each age group experienced in a given year, or period of years, and if they were also subjected to the mortality rates of the same year or period of years.



If the net coefficient is equal to 1, the gross coefficient is 1.2, the total coefficient is 2.2, then the reproduction process of the population is estimated as **stationary**, indicators exceeding the specified levels determine **expanded reproduction**, and indicators below the specified level - **narrowed reproduction**.

Registration of the birth of a child

The application for registration of the birth of a child must be submitted to the civil status registration authorities office no later than *1 month from the day of the child's birth*, and in the case of a stillborn child - *no later than 3 days.*

Registration is carried out upon presentation of a certificate from a medical institution about the birth of a child - "Medical Birth Certificate" (file No. 103/0-95).

In exceptional cases - when a child is born at home or in another city without providing medical assistance - the registration of the birth of a child is carried out by the civil status registration authorities.

In such cases, the fact and time of birth must be confirmed by the signatures of two witnesses, as well as by filling out the "Medical certificate on the child's stay under the supervision of a medical institution" (file No. 103-1/0-96) [issued by the medical institution where the newborn is registered].


ПОВТОРНО

СВІДОЦТВО ПРО НАРОДЖЕННЯ

Пощук

Сергій Сергійович

11 Березня 2006 року

одинадцятого березня дві тисячі шостого року

Україна

Чернівецька область

Заставнівський район

село Чуньків

20 березня 2006

№ 22

БАТЬКИ

Пощук

Сергій Іванович

Громадянин України

Пощук

Ярослава Ярославівна

Громадянка України

Виконком Чуньківської сільської ради

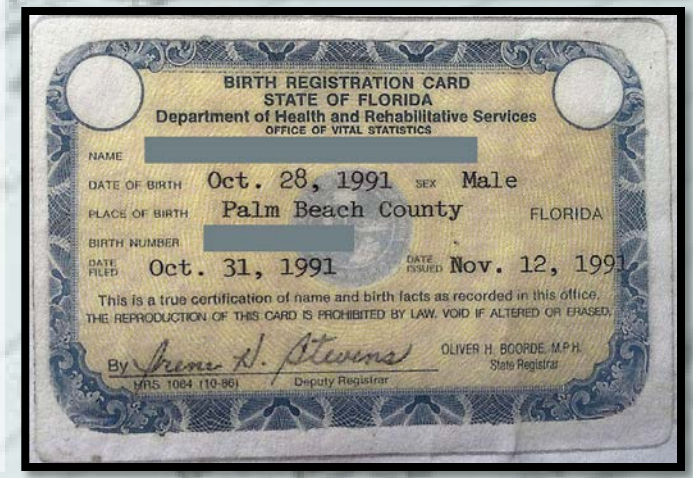
Заставнівського району Чернівецької області

Миколаївський районний у місті Миколаєві відділ державної реєстрації актів цивільного стану головного територіального управління юстиції у Миколаївській області

10 вересня 2018

Т.С. Черна

Серія І-ФП № 315315


BIRTH REGISTRATION CARD
STATE OF FLORIDA
Department of Health and Rehabilitative Services
OFFICE OF VITAL STATISTICS

NAME [redacted]

DATE OF BIRTH Oct. 28, 1991 SEX Male

PLACE OF BIRTH Palm Beach County FLORIDA

BIRTH NUMBER [redacted]

DATE FILED Oct. 31, 1991 DATE ISSUED Nov. 12, 1991

This is a true certification of name and birth facts as recorded in this office.
THE REPRODUCTION OF THIS CARD IS PROHIBITED BY LAW. VOID IF ALTERED OR ERASED.

By Irene N. Stevens Deputy Registrar

OLIVER H. BOORDE, M.P.H. State Registrar

HRS 1064 (10-86)

POPULATION MORTALITY

$$Mortality = \frac{Numberof\ deaths\ per\ year * 1000}{Average\ annual\ population}$$

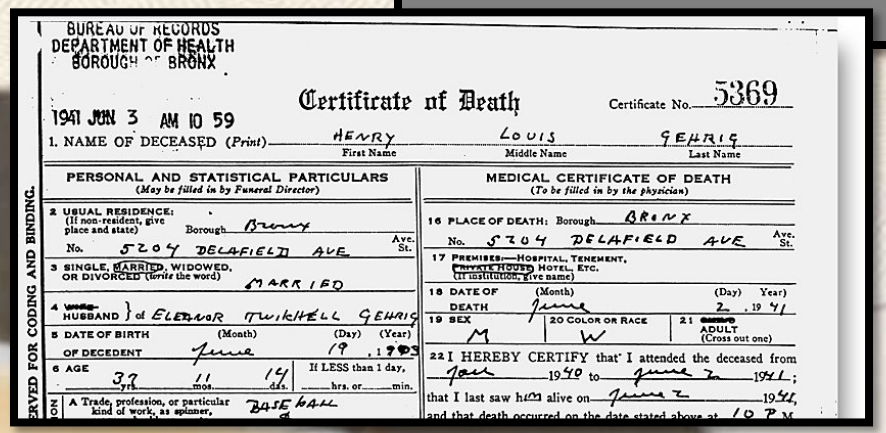
Data per 1000 of people	Value
Less than 10‰	Low
10–14,9‰	Middle
15–24,9‰	Hgh
More than 25‰	Very high

Registration of the death

Death registration is carried out by civil status registration authorities (RAGS) at the last place of residence of the deceased, at the place of death or discovery of the corpse.

The application for registration must be made no later than 3 days after the day of death or discovery of the corpse.

The basis for registration is the "Medical Death Certificate" (file No. 106/0-95) or "Paramedic Death Certificate" (file No. 106-1/0-95) issued by the medical institution. All health care institutions that have the right to issue these documents keep a record of the dead.



BUREAU OF RECORDS
DEPARTMENT OF HEALTH
BOROUGH OF BRONX

Certificate of Death — Certificate No. 5369

1941 JUN 3 AM 10 59

1. NAME OF DECEASED (Print) HENRY (First Name) LOUIS (Middle Name) GEHRIG (Last Name)

PERSONAL AND STATISTICAL PARTICULARS (May be filled in by Funeral Director)

2 USUAL RESIDENCE: (If non-resident, give place and state) Borough Bronx
No. 5204 DELAFIELD AVE. Ave. St.

3 SINGLE, MARRIED, WIDOWED, OR DIVORCED (write the word) MARRIED

4 HUSBAND of ELEANOR TWITCHELL GEHRIG

5 DATE OF BIRTH OF DECEDENT (Month) June (Day) 19 (Year) 1903

6 AGE 37 yrs. 11 mos. 14 dys. If LESS than 1 day, ___ hrs. or ___ min.

7 A Trade, profession, or particular kind of work, as spinner, BASE BALL

MEDICAL CERTIFICATE OF DEATH (To be filled in by the physician)

16 PLACE OF DEATH: Borough BRONX
No. 5204 DELAFIELD AVE. Ave. St.

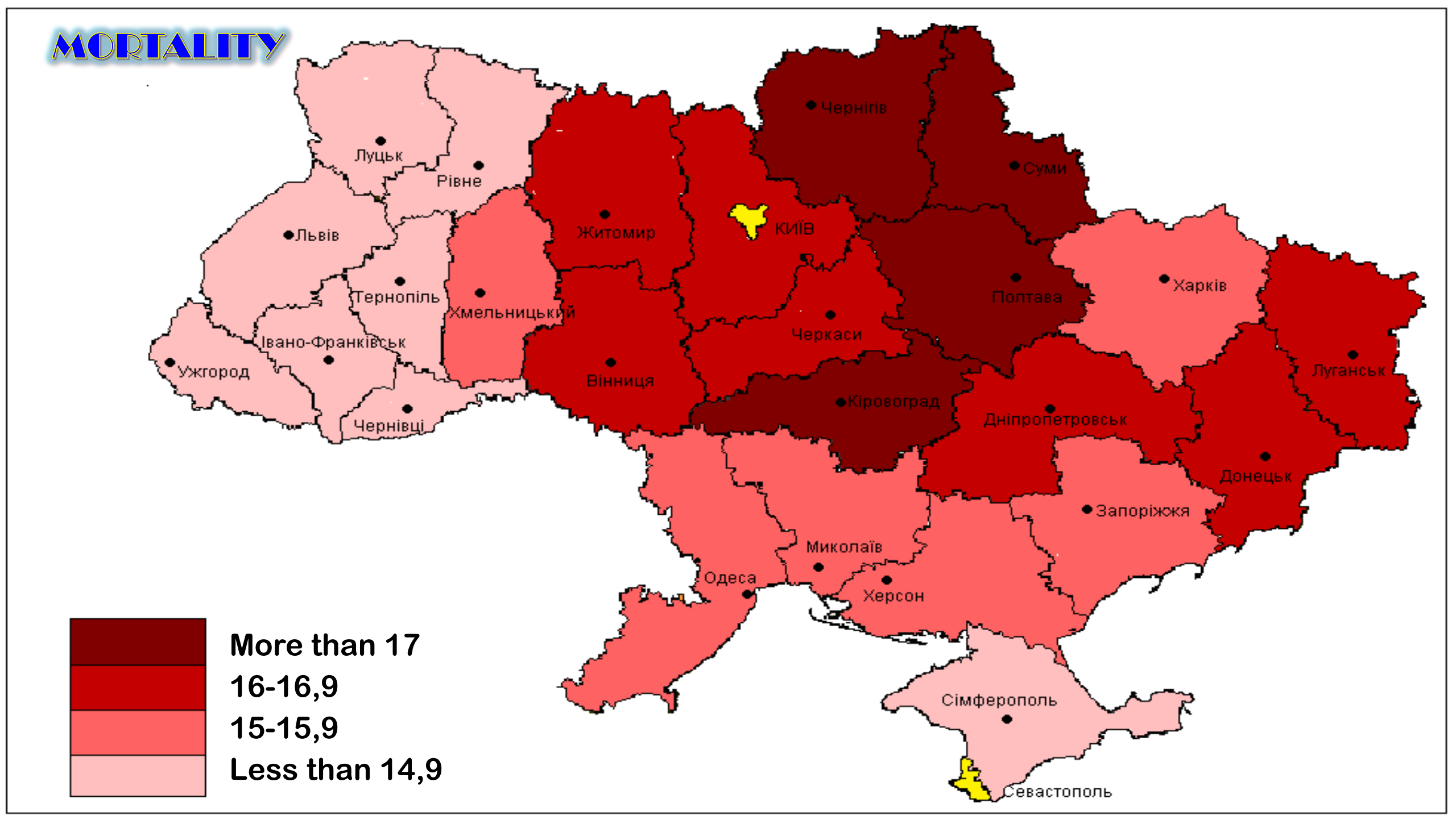
17 PREMISES—HOSPITAL, TENEMENT, PRIVATE HOUSE, HOTEL, ETC. (If institution, give name)

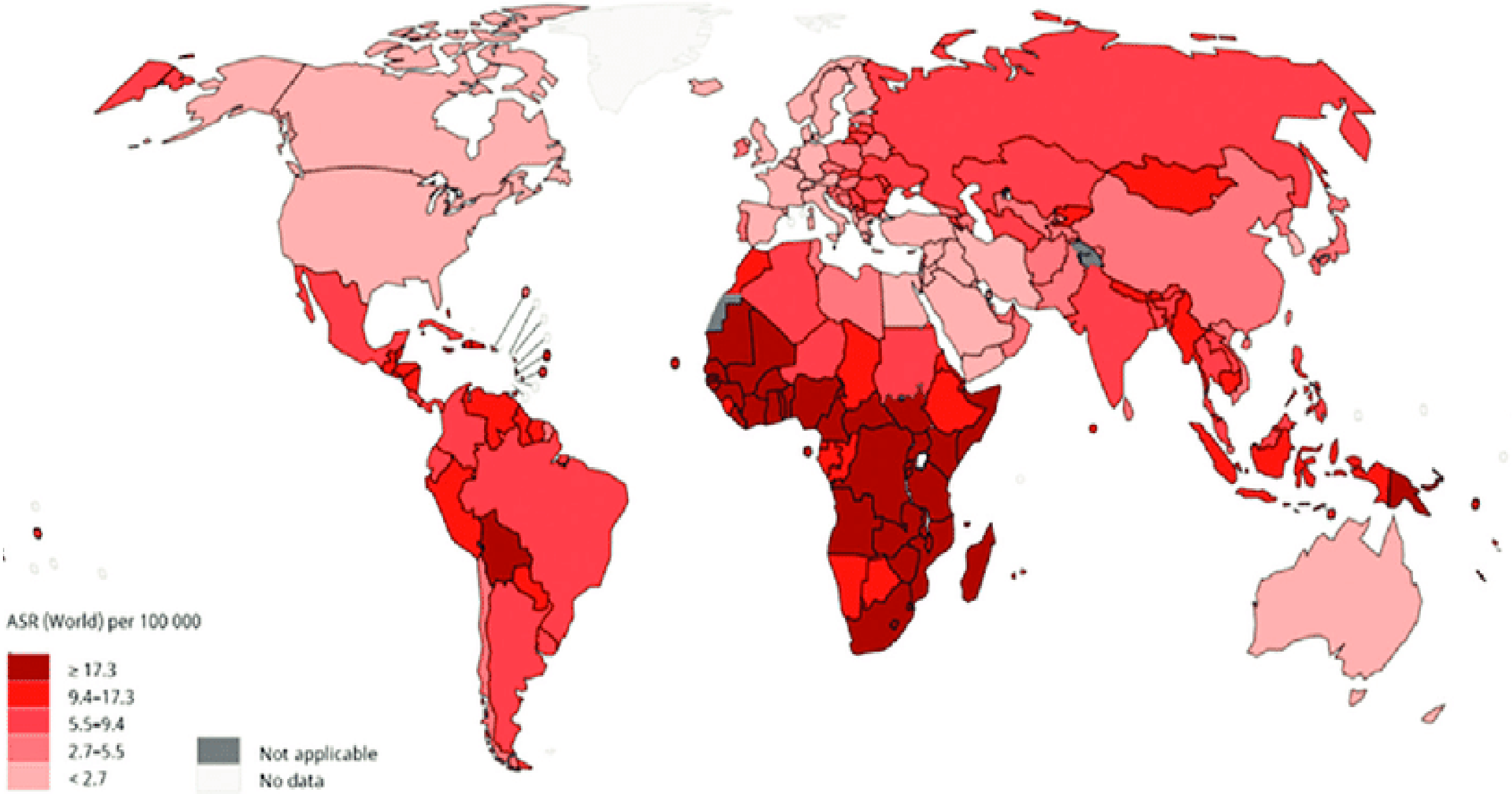
18 DATE OF DEATH (Month) June (Day) 2 (Year) 19 41

19 SEX M | 20 COLOR OR RACE W | 21 ADULT (Cross out one)

22 I HEREBY CERTIFY that I attended the deceased from June 1940 to June 2 1941; that I last saw him alive on June 2 1941, and that death occurred on the date stated above at 10 P.M.

SERVED FOR CODING AND BINDING.


MORTALITY
Луцьк
Рівне
Львів
Тернопіль
Хмельницький
Івано-Франківськ
Ужгород
Чернівці
Житомир
Вінниця
Чернігів
КИЇВ
Суми
Черкаси
Полтава
Харків
Кіровоград
Дніпропетровськ
Луганськ
Донецьк
Запоріжжя
Миколаїв
Одеса
Херсон
Сімферополь
Севастополь
More than 17
16-16,9
15-15,9
Less than 14,9

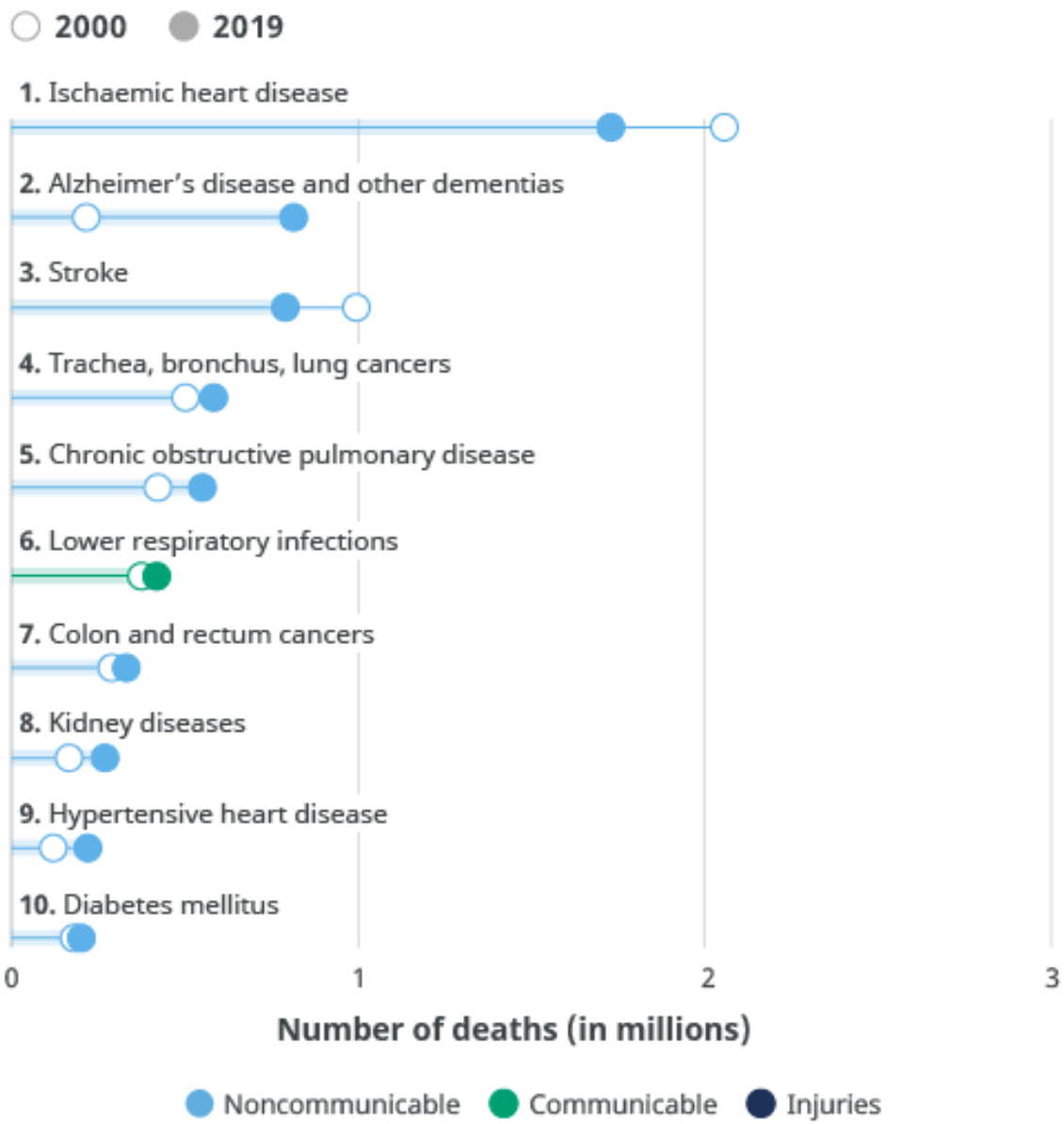

ASR (World) per 100 000
≥ 17.3
9.4–17.3
5.5–9.4
2.7–5.5
< 2.7
Not applicable
No data

Mortality rate in the countries of the world

	Country/Territory	OECD 2011		CIA WF 2020[3][4]	
		Rate per 1,000	Rank	Rate per 1,000	Rank
	World	*8.30*		*7.70*	
1	Afghanistan	18.20	2	12.70	12
2	Albania	6.90	144	7.10	121
3	Algeria	4.40	207	4.40	208
4	Andorra	3.50	221	7.70	99
5	Angola	15.20	8	8.50	72
6	Antigua and Barbuda	5.40	188	5.80	174
7	Argentina	7.90	108	7.40	107
8	Armenia	8.60	87	9.50	44
9	Australia	6.50	155	6.90	128
10	Austria	9.10	75	9.80	39
11	Azerbaijan	5.90	171	7.00	124
12	Bahamas	6.00	168	7.40	108
13	Bahrain	2.00	233	2.80	226
14	Bangladesh	5.60	181	5.50	182
15	Barbados	8.00	106	8.80	65
16	Belarus	14.30	15	13.10	8
17	Belgium	9.60	60	9.80	40
18	Belize	4.00	217	4.10	212
19	Benin	8.20	95	8.40	75
20	Bhutan	6.90	140	6.30	147

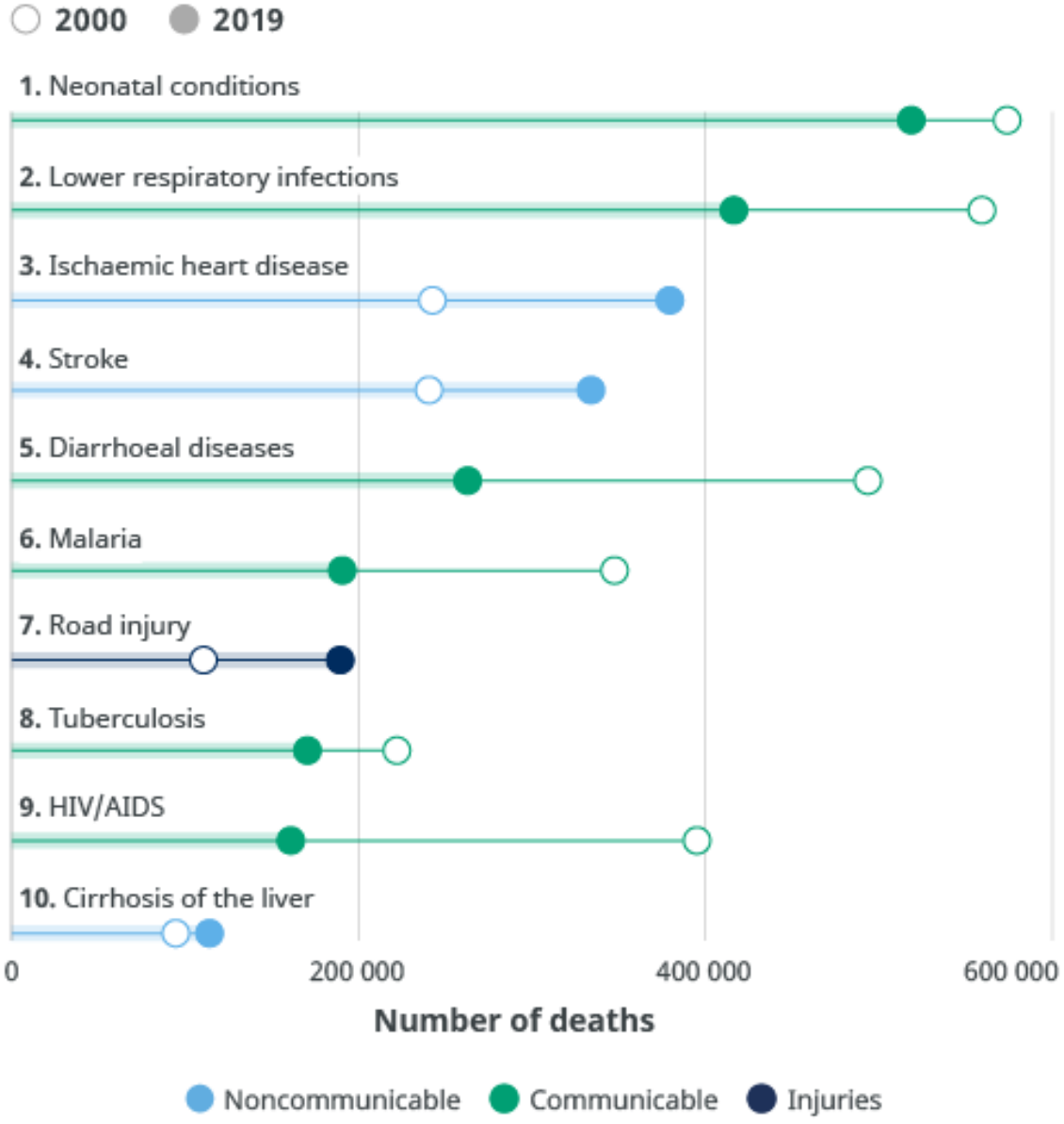
	Country/Territory	OECD 2011		CIA WF 2020[3][4]	
		Rate per 1,000	Rank	Rate per 1,000	Rank
	World	*8.30*		*7.70*	
21	Bolivia	7.20	131	6.30	148
22	Bosnia and Herzegovina	9.20	72	10.20	33
23	Botswana	9.10	73	9.20	54
24	Brazil	6.30	162	6.90	129
25	Brunei	2.90	231	3.80	216
26	Bulgaria	14.70	10	14.60	3
27	Burkina Faso	11.30	37	8.20	84
28	Burundi	12.90	27	6.20	154
29	Cambodia	8.10	100	7.30	110
30	Cameroon	13.20	25	8.10	88
31	Canada	7.30	130	7.90	92
32	Cape Verde	5.60	183	5.90	169
33	Central African Republic	15.70	6	12.30	15
34	Chad	14.00	17	10.00	38
35	Chile	5.90	174	6.50	142
36	China	7.10	135	8.20	85
37	Colombia	5.80	178	5.60	180
38	Comoros	6.00	167	6.90	130
39	DR Congo	15.80	4	8.40	76
40	Congo	12.30	30	8.70	68

Leading causes of death in high-income countries



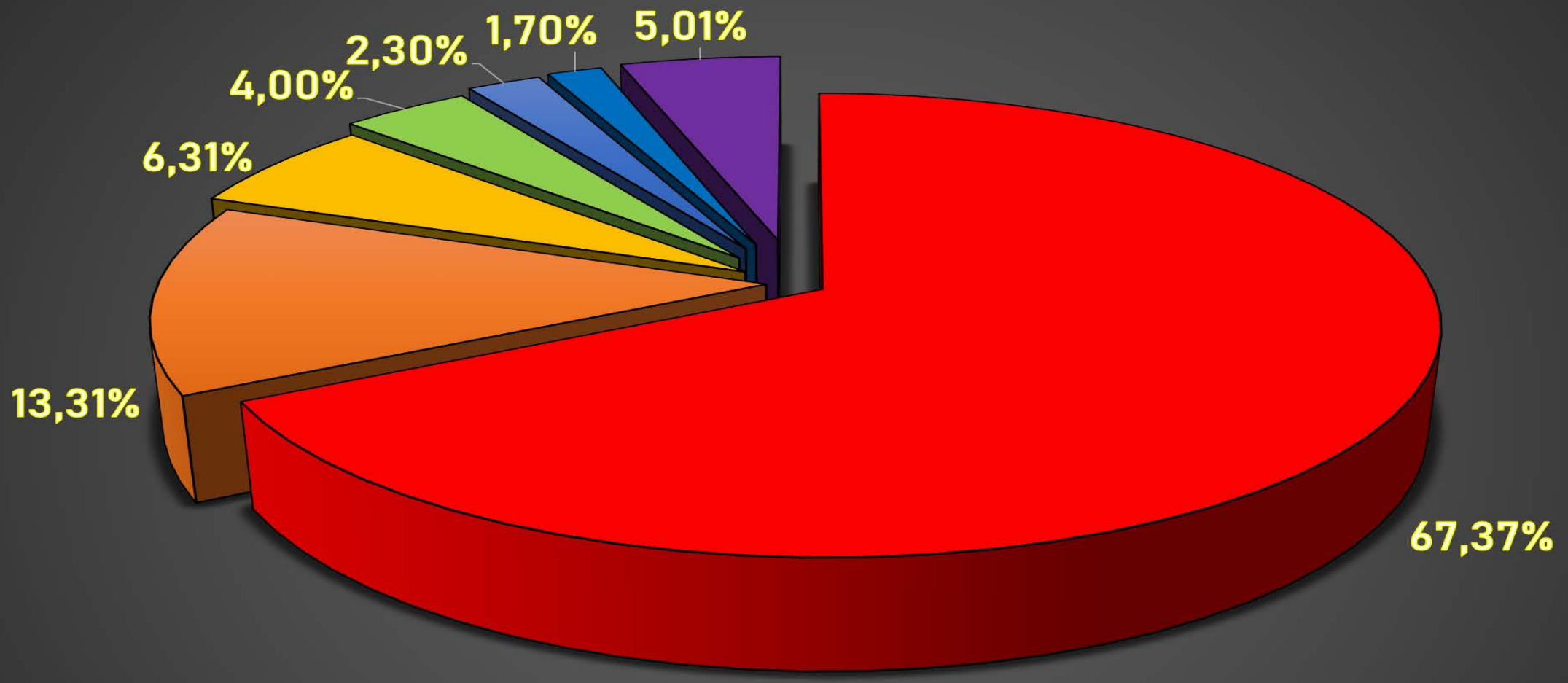
Source: WHO Global Health Estimates. Note: World Bank 2020 income classification.

Leading causes of death in low-income countries



Source: WHO Global Health Estimates. Note: World Bank 2020 income classification.

STRUCTURE OF MORTALITY IN UKRAINE



The sense of studying the structure of the causes of mortality

World Health Organization

WHO proposed a European classification of preventable causes of death, based on different levels of prevention, grouped into 3 groups:

I group - causes of death that can be prevented by primary prevention, that is, by influencing the risks of diseases. This group includes reasons largely determined by the lifestyle and living conditions of the population.

II group - causes for which secondary prevention is responsible, i.e. timely detection and early diagnosis;

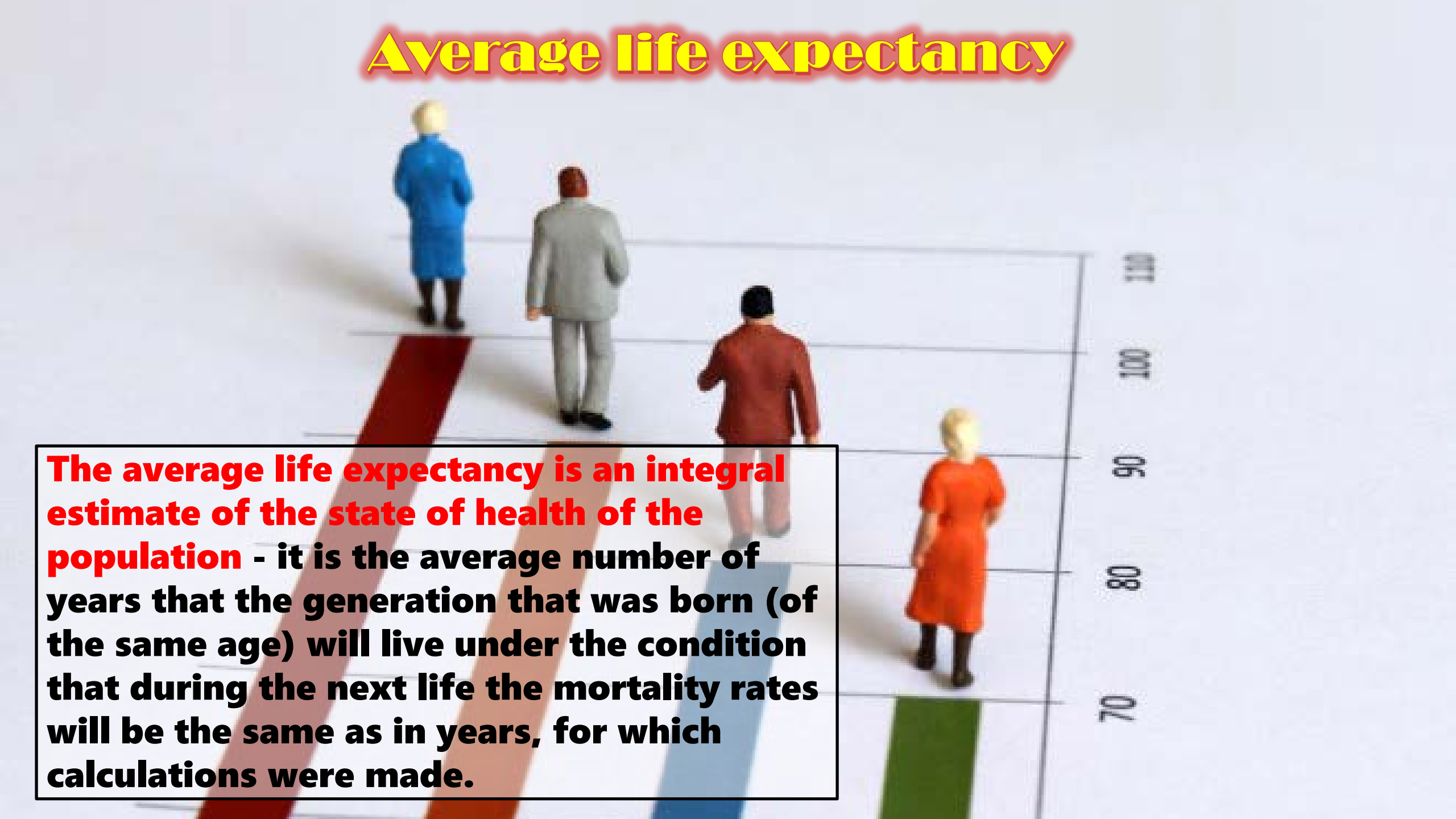
III group - causes that determine the quality of treatment and availability of medical care

Group I
Infectious diseases
Pregnancy-related diseases
Perinatal diseases
Nutritional diseases

Group II
Neoplasms
Cardiovascular diseases
Gastrointestinal diseases
Renal diseases
Anaemia, non-nutritional
Other noncommunicable diseases

Group III
Traffic accidents
Complications of medical and surgical care
Other injuries (either intentional or unintentional)

Average life expectancy

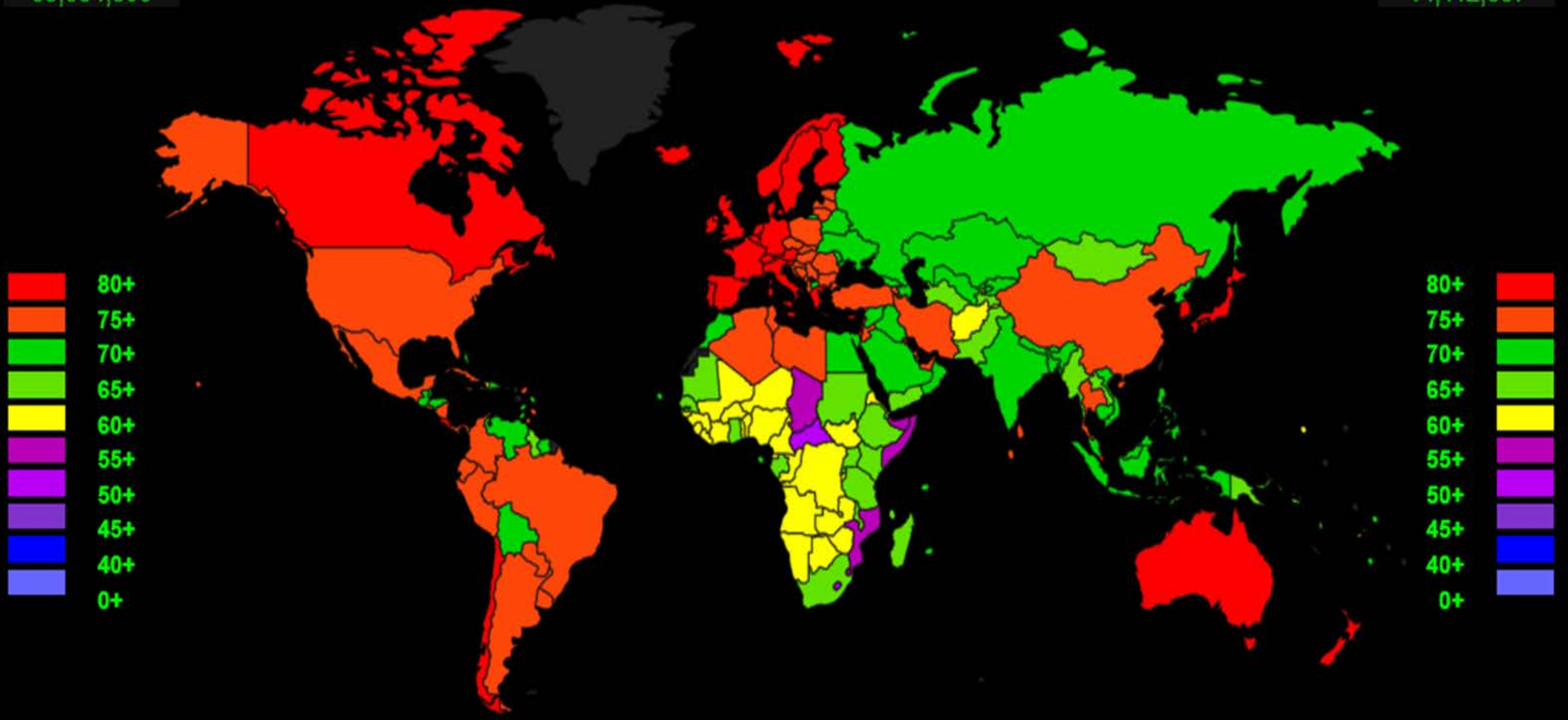


The average life expectancy is an integral estimate of the state of health of the population - it is the average number of years that the generation that was born (of the same age) will live under the condition that during the next life the mortality rates will be the same as in years, for which calculations were made.

WORLD LIFE EXPECTANCY MAP

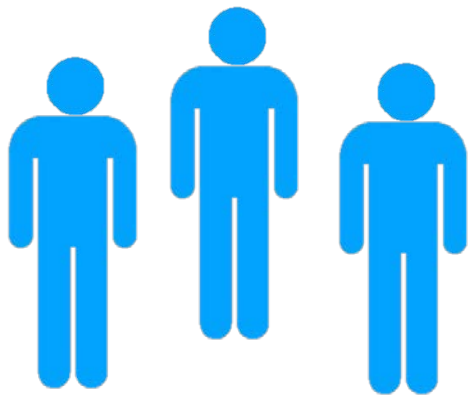
WORLD BIRTHS
33,854,890

WORLD DEATHS
14,112,857



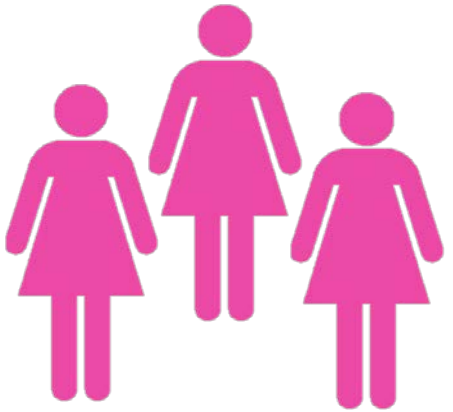
Average life expectancy

Rank	Country	Rate
1	SWITZERLAND	81.8
2	JAPAN	81.5
3	AUSTRALIA	81.3
4	CYPRUS	81.1
5	NORWAY	81.1
6	SINGAPORE	81.0
7	ITALY	80.9
8	SWEDEN	80.8
9	ICELAND	80.8
10	ISRAEL	80.8



173	GUINEA	59.5
174	BOTSWANA	59.0
175	CHAD	58.0
176	ZIMBABWE	57.5
177	GUINEA-BISSAU	57.4
178	KIRIBATI	56.1
179	MOZAMBIQUE	54.5
180	SOMALIA	54.0
181	SWAZILAND	53.4
182	CENTRAL AFRICA	50.2
183	LESOTHO	47.7

173	SWAZILAND	63.2
174	AFGHANISTAN	63.2
175	GUINEA-BISSAU	63.0
176	KIRIBATI	62.8
177	GUINEA	62.3
178	SIERRA LEONE	61.9
179	MOZAMBIQUE	61.7
180	CHAD	61.3
181	SOMALIA	59.2
182	CENTRAL AFRICA	56.3
183	LESOTHO	54.2



Rank	Country	Rate
1	JAPAN	86.9
2	SOUTH KOREA	86.1
3	SPAIN	85.7
4	SINGAPORE	85.5
5	CYPRUS	85.1
6	FRANCE	85.1
7	SWITZERLAND	85.1
8	ITALY	84.9
9	AUSTRALIA	84.8
10	GERMANY	84.8

INFANT MORTALITY

WHO formula

$$IM = \frac{\begin{matrix}\text{The number of deaths}\\ \text{under the age of 1 year}\\ \text{from the generation of}\\ \text{the current year}\end{matrix} * 1000}{\begin{matrix}\text{The number of children}\\ \text{born alive in the}\\ \text{current year}\end{matrix}} + \frac{\begin{matrix}\text{The number of deaths}\\ \text{under the age of 1 year}\\ \text{from past year's}\\ \text{generation}\end{matrix} * 1000}{\begin{matrix}\text{The number of children}\\ \text{born alive in the}\\ \text{past year}\end{matrix}}$$

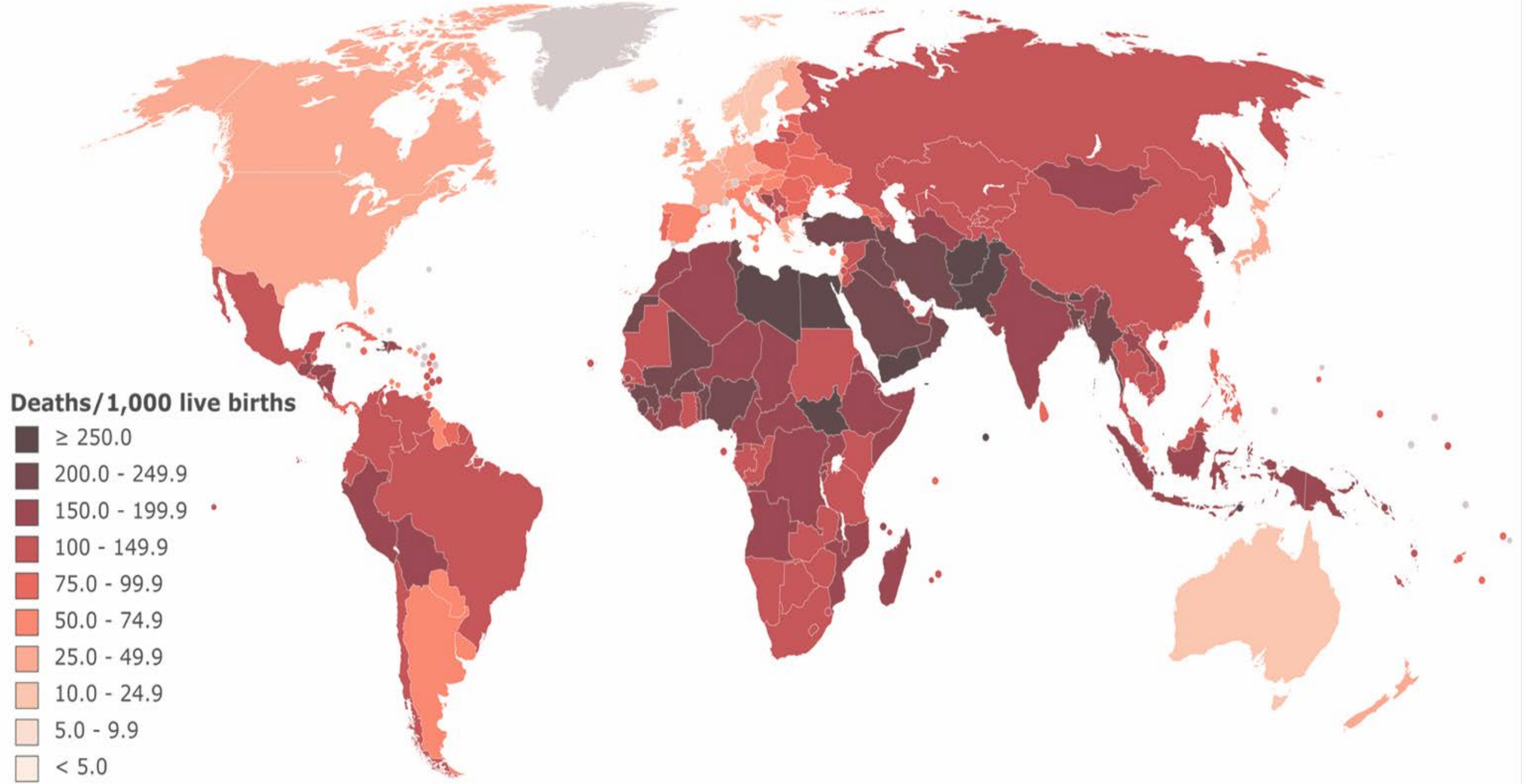
Rahts formula

$$IM = \frac{\begin{matrix}\text{The number of deceased children}\\ \text{under the age of 1 in the current year}\end{matrix}}{\begin{matrix}2/3 \text{ of live births in the current year}\\ + 1/3 \text{ of live births in the past year}\end{matrix}} * 1000$$

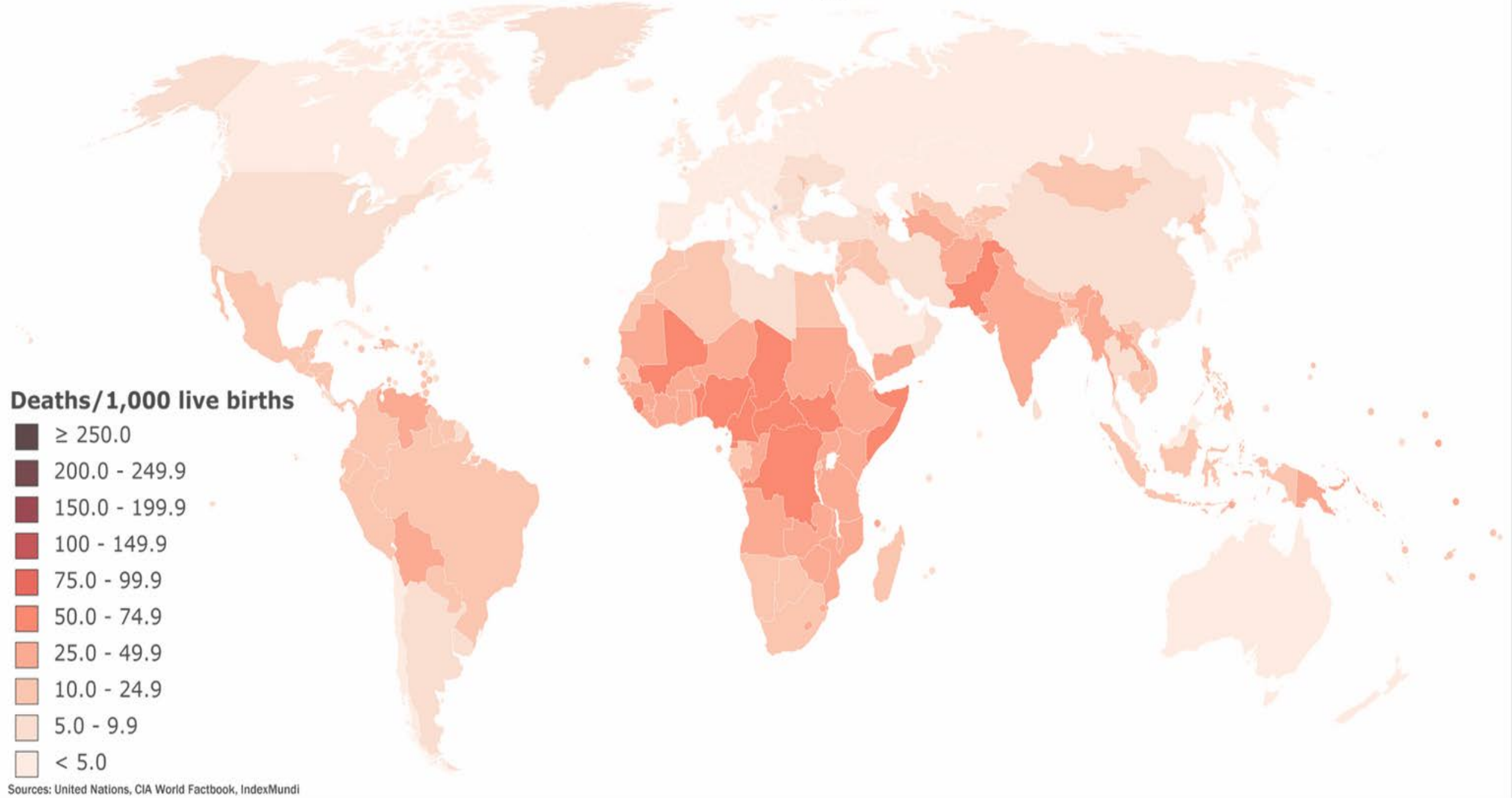
Separately, infant mortality is highlighted

neonatal (died within the first 28 full days of life),
early neonatal (168 hours of life or 7 days)
post-neonatal (29 days - 12 months).

Infant mortality, 1950



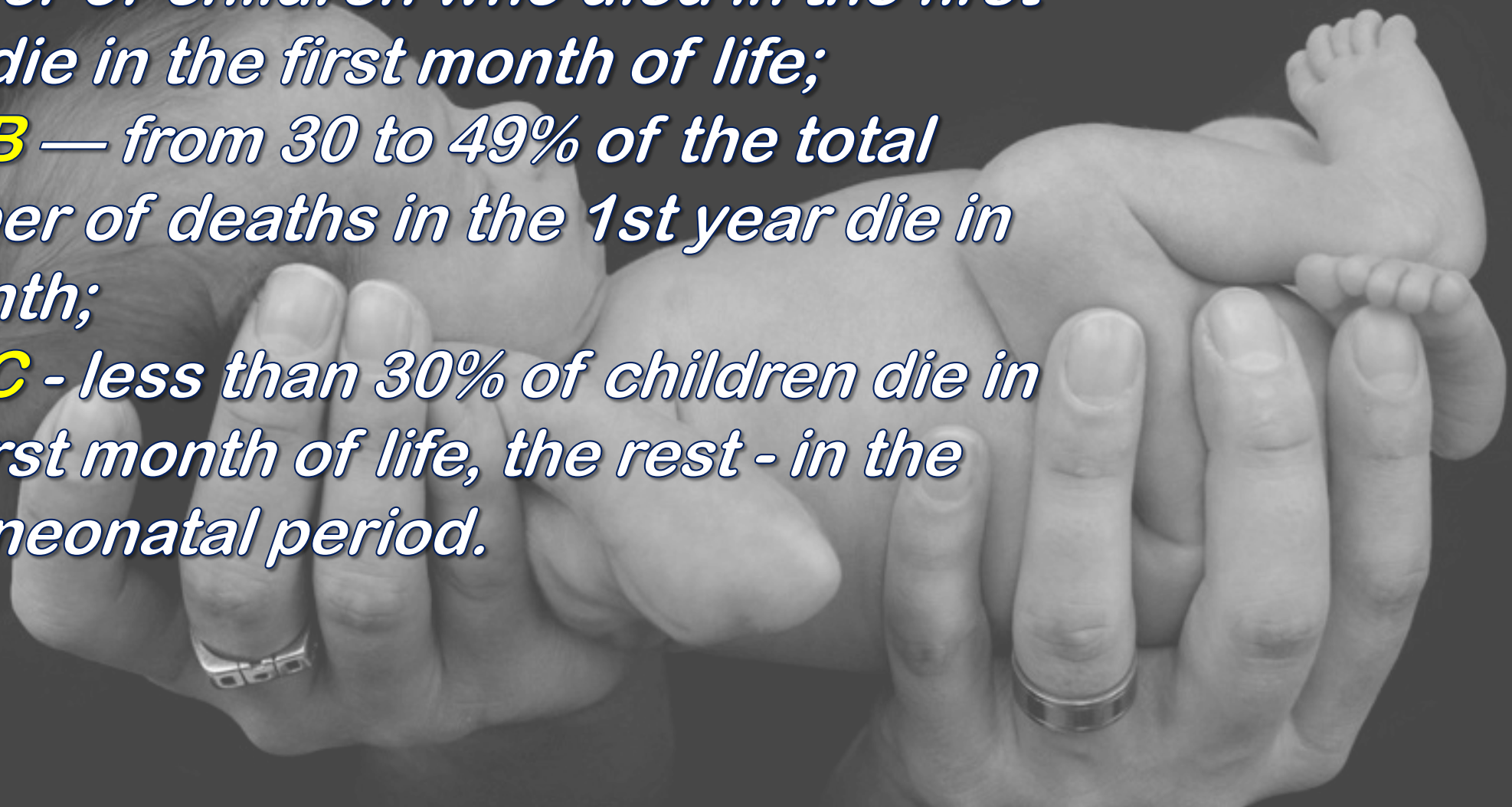
Infant mortality, 2020



Sources: United Nations, CIA World Factbook, IndexMundi

THERE ARE THREE TYPES OF INFANT MORTALITY:

- *type A — 50% or more of the total number of children who died in the first year die in the first month of life;*
- *type B — from 30 to 49% of the total number of deaths in the 1st year die in 1 month;*
- *type C - less than 30% of children die in the first month of life, the rest - in the post-neonatal period.*

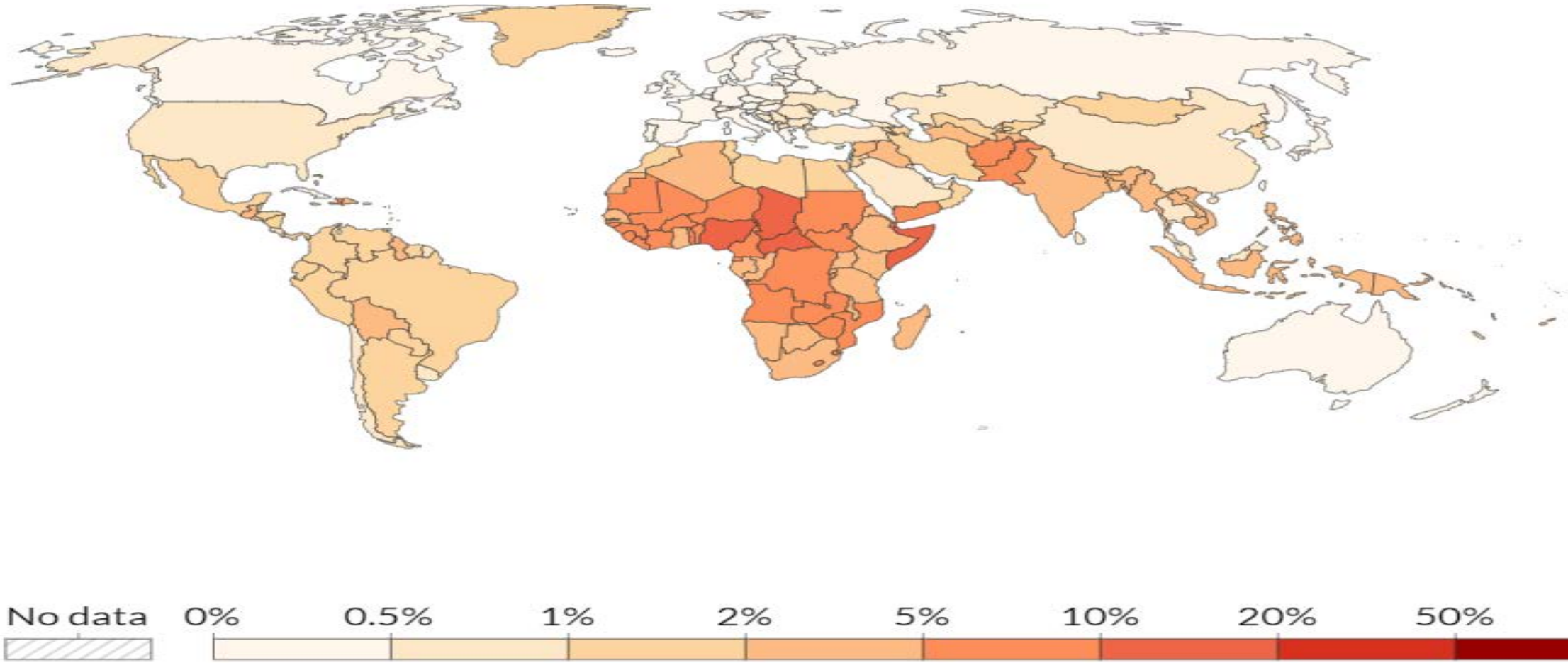


Child mortality rate, 2021

The share of newborns who die before reaching the age of five.

Our World in Data

World



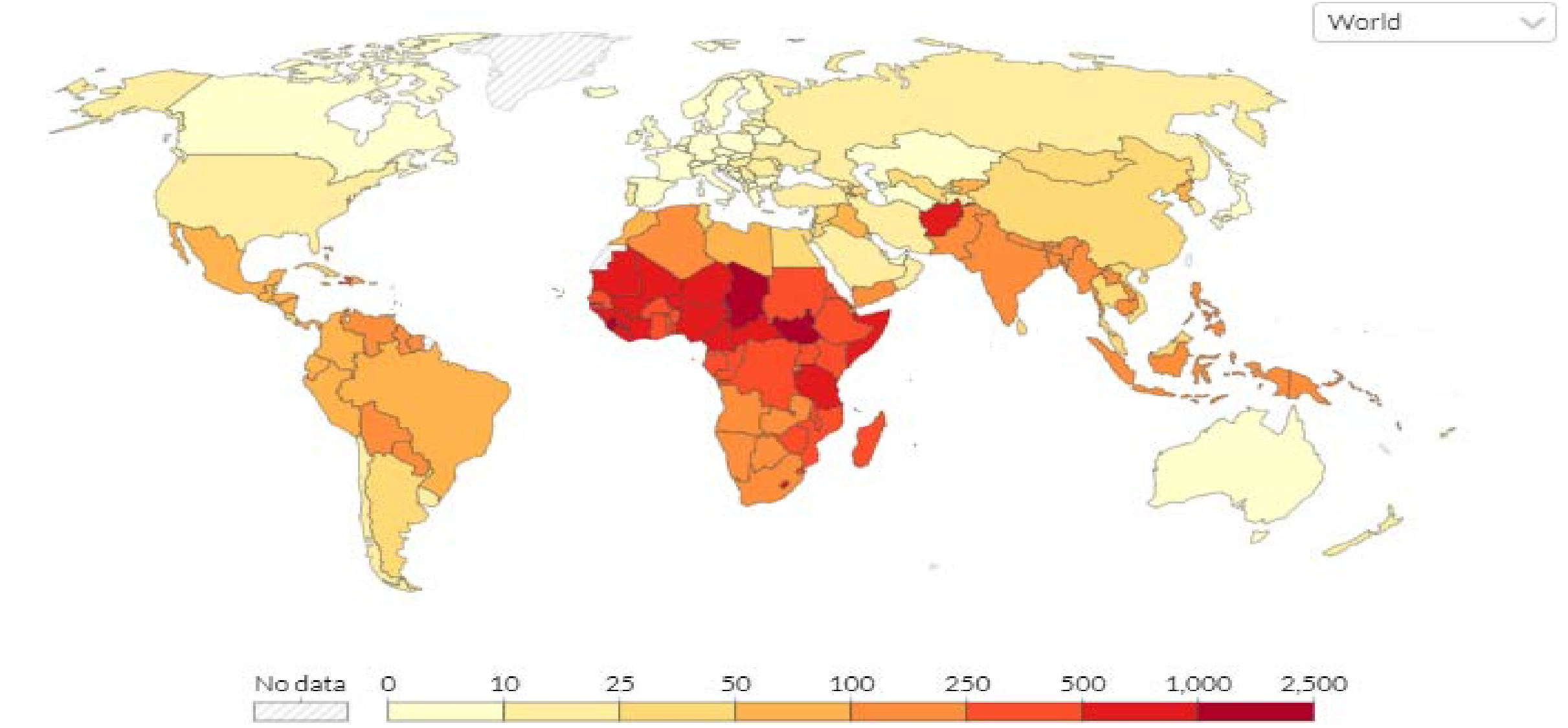
Source: United Nations - Population Division (2022) OurWorldInData.org/child-mortality/ • CC BY
Note: This is the probability of a child born in a specific year or period dying before reaching the age of five, if subject to age-specific mortality rates of that period. This is given as the share of live births.

MATERNAL MORTALITY

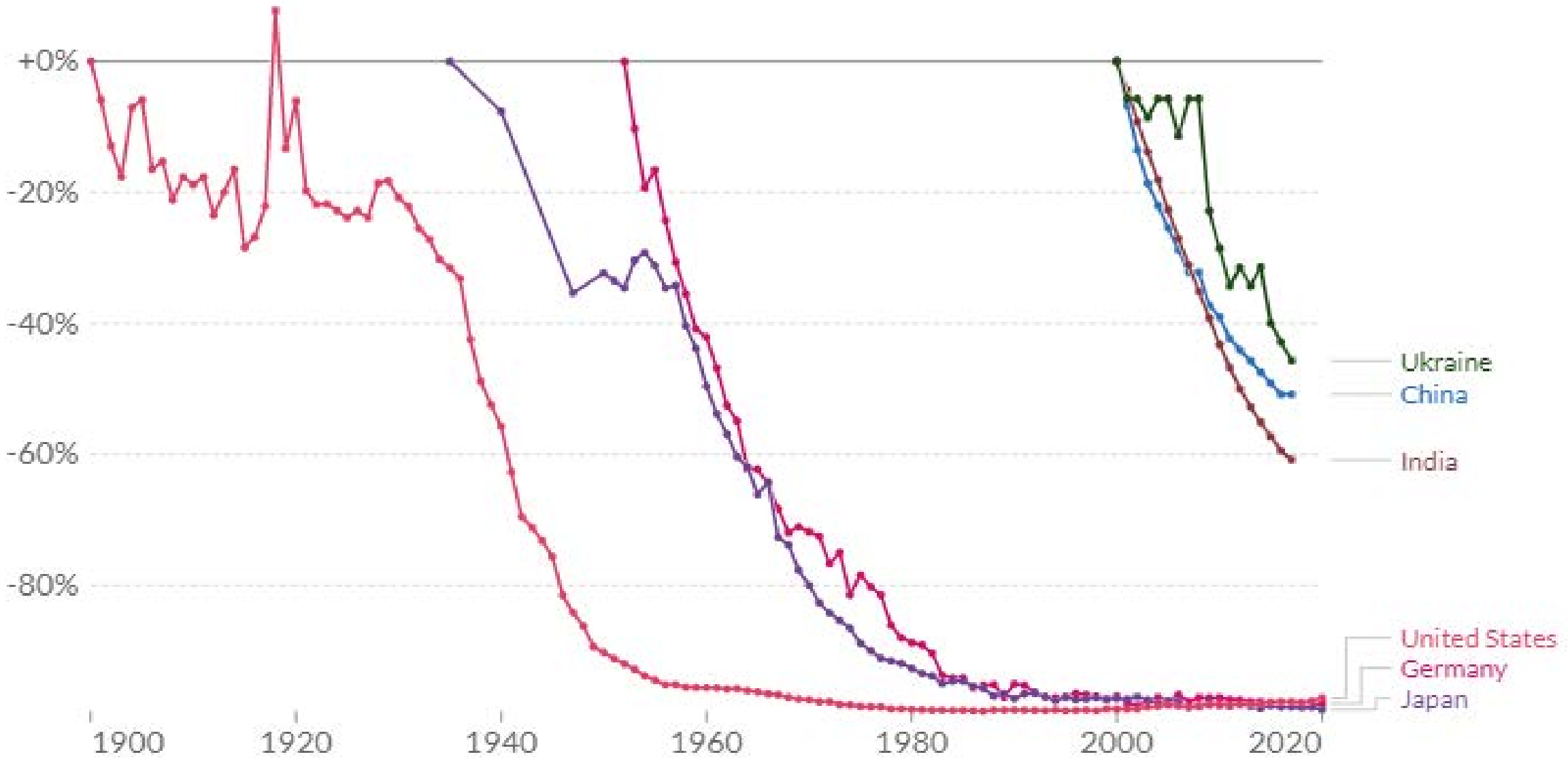
Maternal mortality rate is a statistical indicator that characterizes the frequency of deaths of pregnant women and women giving birth and is an indirect indicator of the quality of medical care.

Fatalities that occurred during pregnancy itself, as well as within 42 days after its end, are analyzed.

MATERNAL MORTALITY



MATERNAL MORTALITY

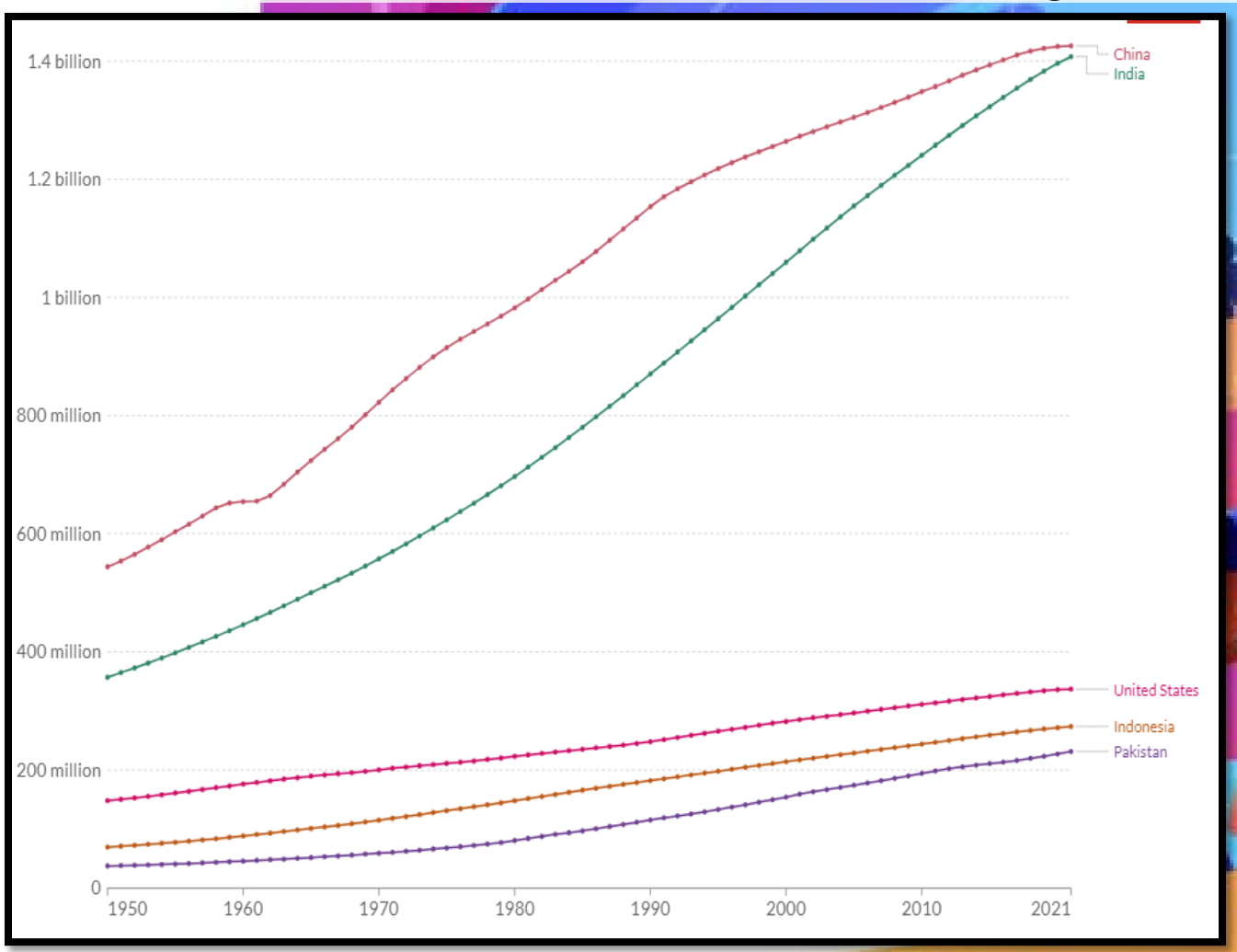


Source: Gapminder (2010); WHO (2019); OECD (2022)

OurWorldInData.org/maternal-mortality • CC BY

NATURAL POPULATION GROWTH (DECREASE)

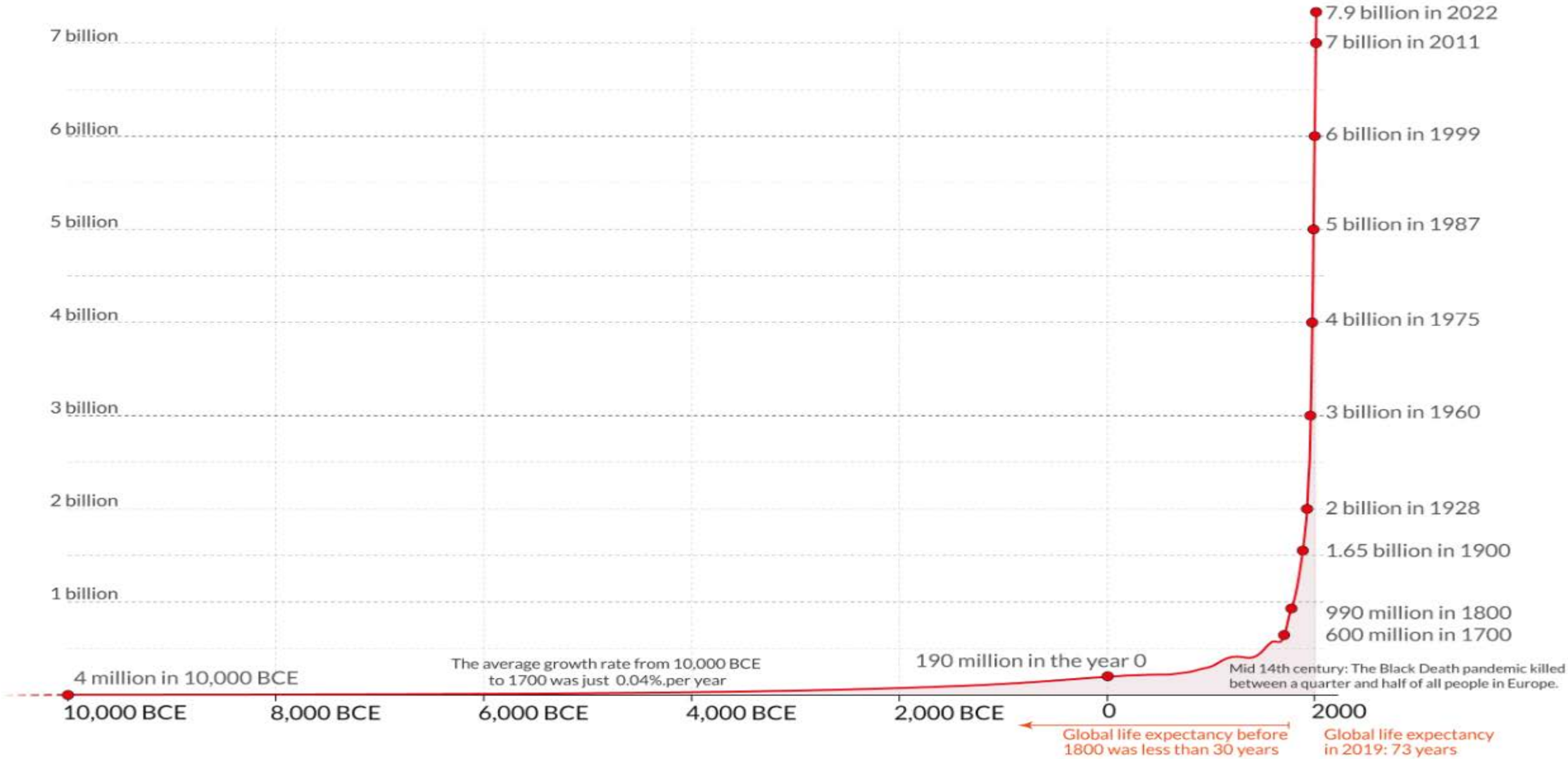
$$Natural\ population\ grovth = \frac{Number\ of\ live\ births\ -\ Number\ of\ deaths}{Average\ annual\ population} * 1000$$



Our World in Data

The size of the world population over the last 12.000 years

Demographers expect rapid population growth to end by the end of the 21st century. The UN demographers expect a population of about 11 billion in 2100.



Based on estimates by the History Database of the Global Environment (HYDE) and the United Nations. On OurWorldinData.org you can download the annual data.
This is a visualization from OurWorldinData.org.

Factors that can affect the mortality rate of the population

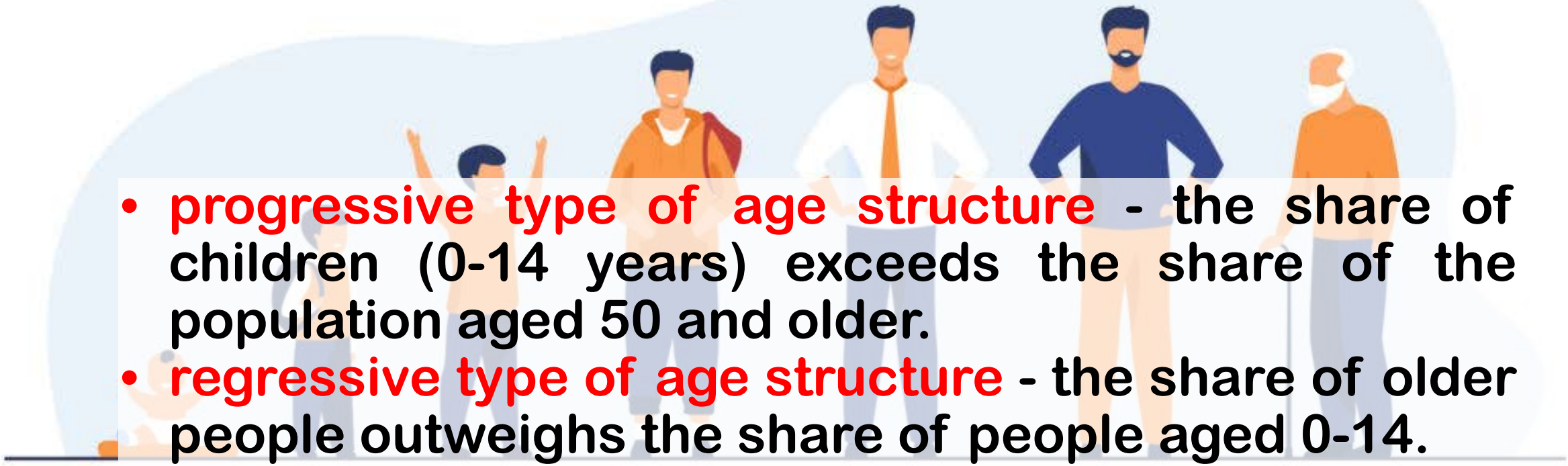
Controllable factors

- behavioral (high blood pressure, smoking, high weight, high cholesterol, vaccination, lack of life-saving behavior, workplace organization, etc.)
- health care organization.

Uncontrollable factors

- age, gender
- heredity, developmental defects, etc.

The type of age structure of the population living in a certain territory



- **progressive type of age structure** - the share of children (0-14 years) exceeds the share of the population aged 50 and older.
- **regressive type of age structure** - the share of older people outweighs the share of people aged 0-14.
- **stationary type of age structure** - the share of people aged 0-14 is approximately equal to the share of people aged 50 and older.

THE WORLD'S POPULATION BY AGE GROUP

The world's population is getting older.

Share of population below 20 years old : 1950 44% 2020 33%

= percentage of population

100+ 0.6M <0.01%

80-99 147.5M 1.9%

60-79 918M 11.9%

40-59 1.8B 23.1%

20-39 2.3B 29.9%

<20 2.6B 33.1%

Europe has the oldest population worldwide, followed by North America.

In the U.S., around 25% of people are 60 or older.

Source: United Nations, Pew Research Centre

Indicator of demographic aging
J. Boje-Garnier - E. Rosset

Stage	Percentage of persons aged 60 years and older,%	The stage of aging and the level of old age of the population
1	< 8	Demographic youth
2	8-10	The first threshold of old age
3	10-12	Actually the threshold of old age
4	12 & more	Demographic aging
	12-14	Initial level of demographic aging
	14-16	The average level of demographic aging
	16-18	High level of demographic aging
	18 and more	Very high level of demographic old age

Demographic aging is an objective, historically determined process, its consequences are irreversible, and the only thing that can and should be done is to realize its inevitability and historical character and take this into account in social practice, in particular, when developing demographic policy measures.

Demographic burden is the ratio of children and persons of retirement age to the number of the working population

Human Development Index (HDI)

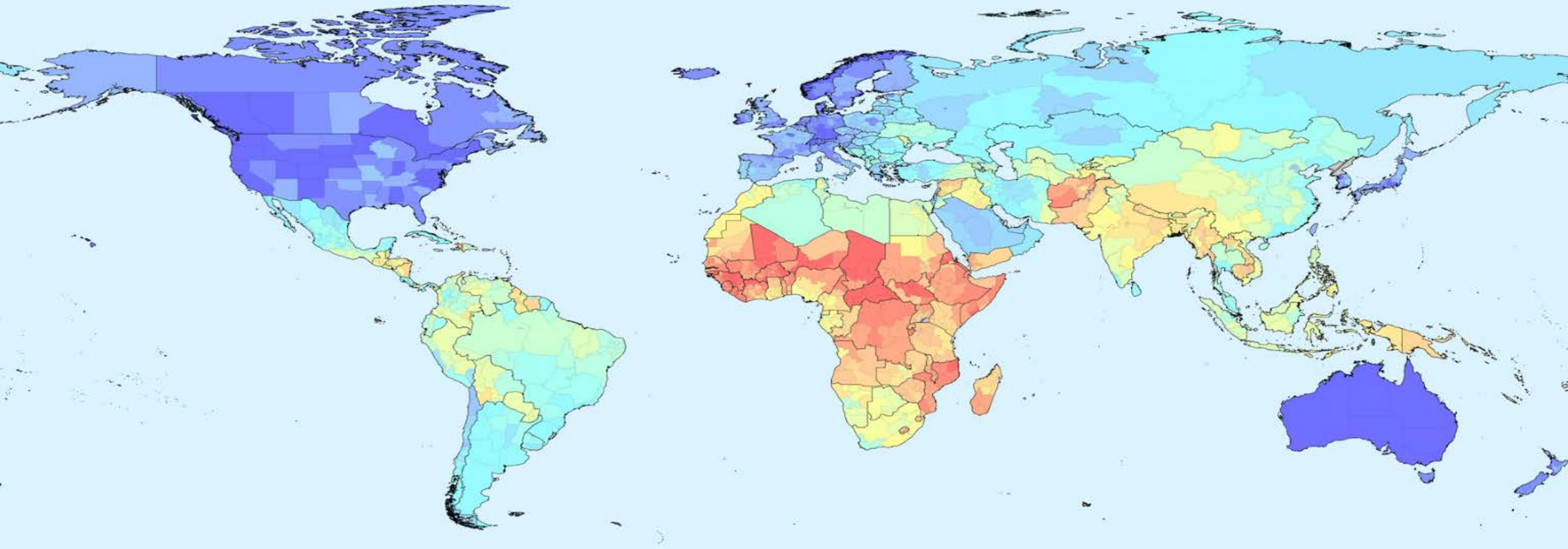
(until 2013 "Human Potential Development Index"(HPDI)

An integral indicator calculated annually for interstate comparison and measurement of the standard of living, literacy, education and longevity as the main characteristics of the human potential of the studied territory. The index is published within the framework of the UN development program in reports on the development of human potential and was developed in 1990.

When calculating HDI, 3 types of indicators are taken into account:

- **Life expectancy — estimates longevity.**
- **The literacy rate of the country's population (average number of years spent on education).**
- Standard of living estimated through GNI per capita at purchasing power parity in US dollars.

Subnational Human Development Index



SHDI Ventile Groups

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

Smits-Permanyer 2018, www.globaldatalab.org


THANKS
FOR
ATTENTION