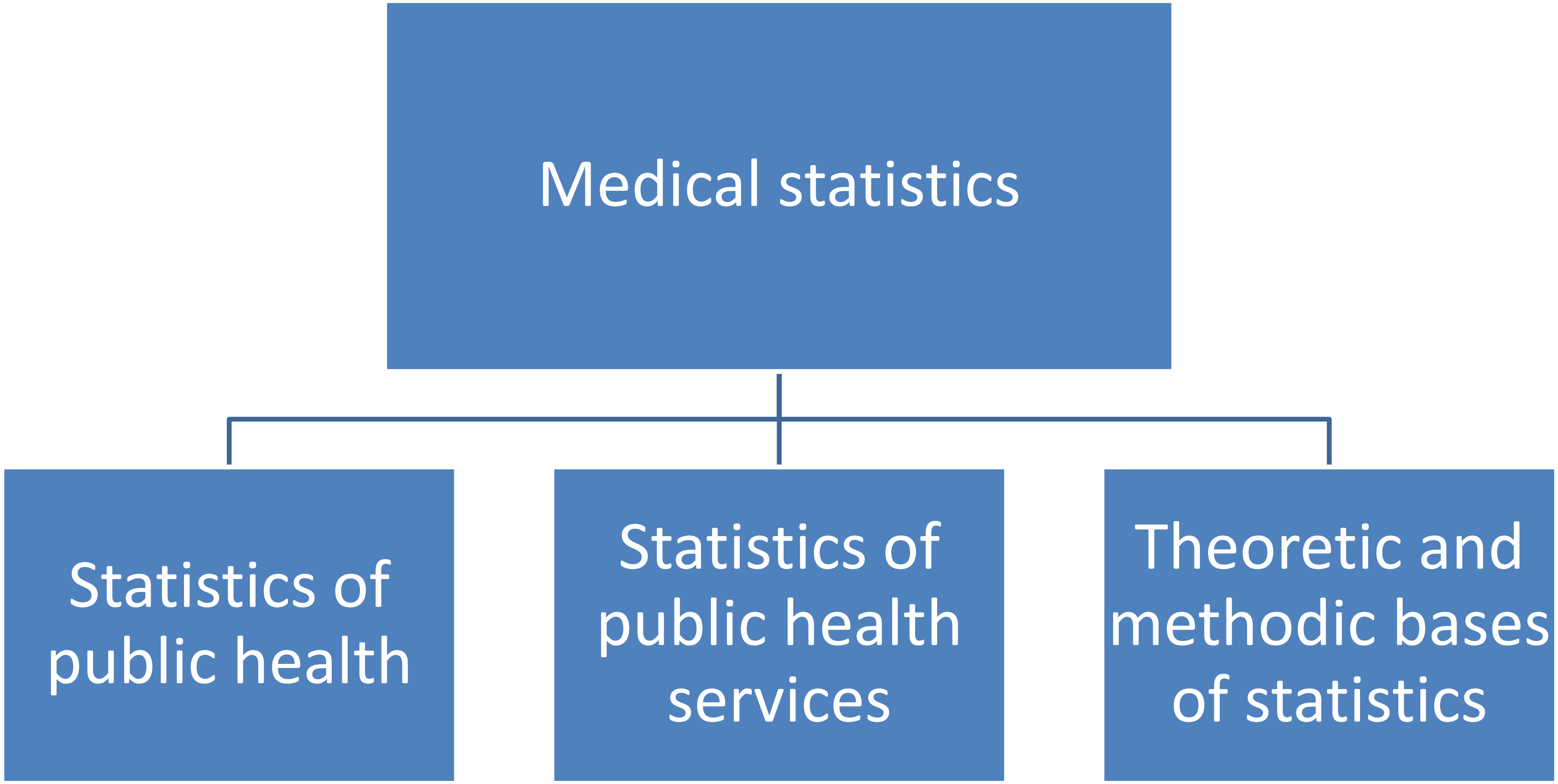
INTRODUCTION INTO MEDICAL STATISTICS

Statistics

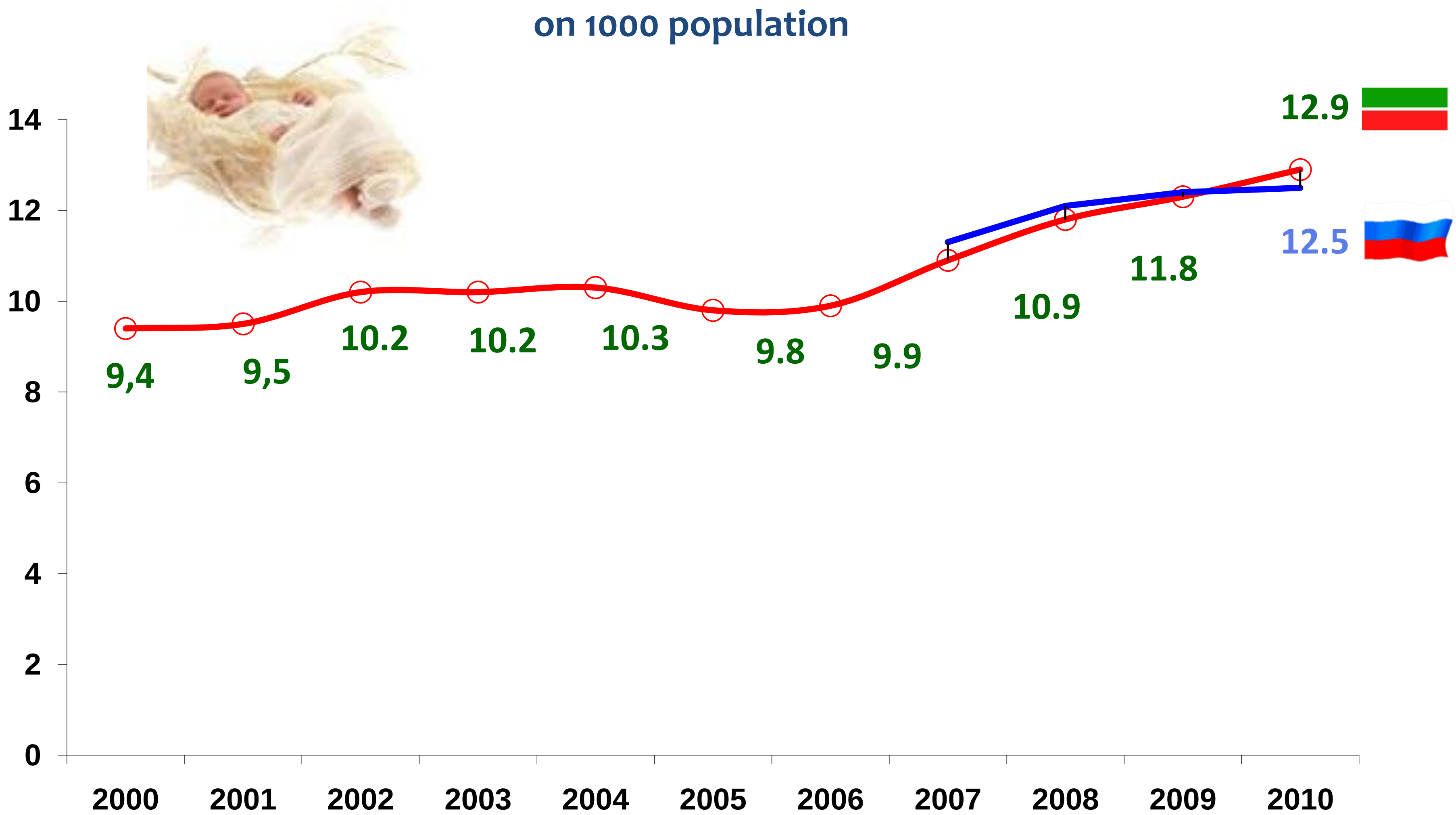
- is a social science studying the quantitative part of the mass public phenomena in indissoluble communication with their qualitative peculiarities.

MEDICAL STATISTICS

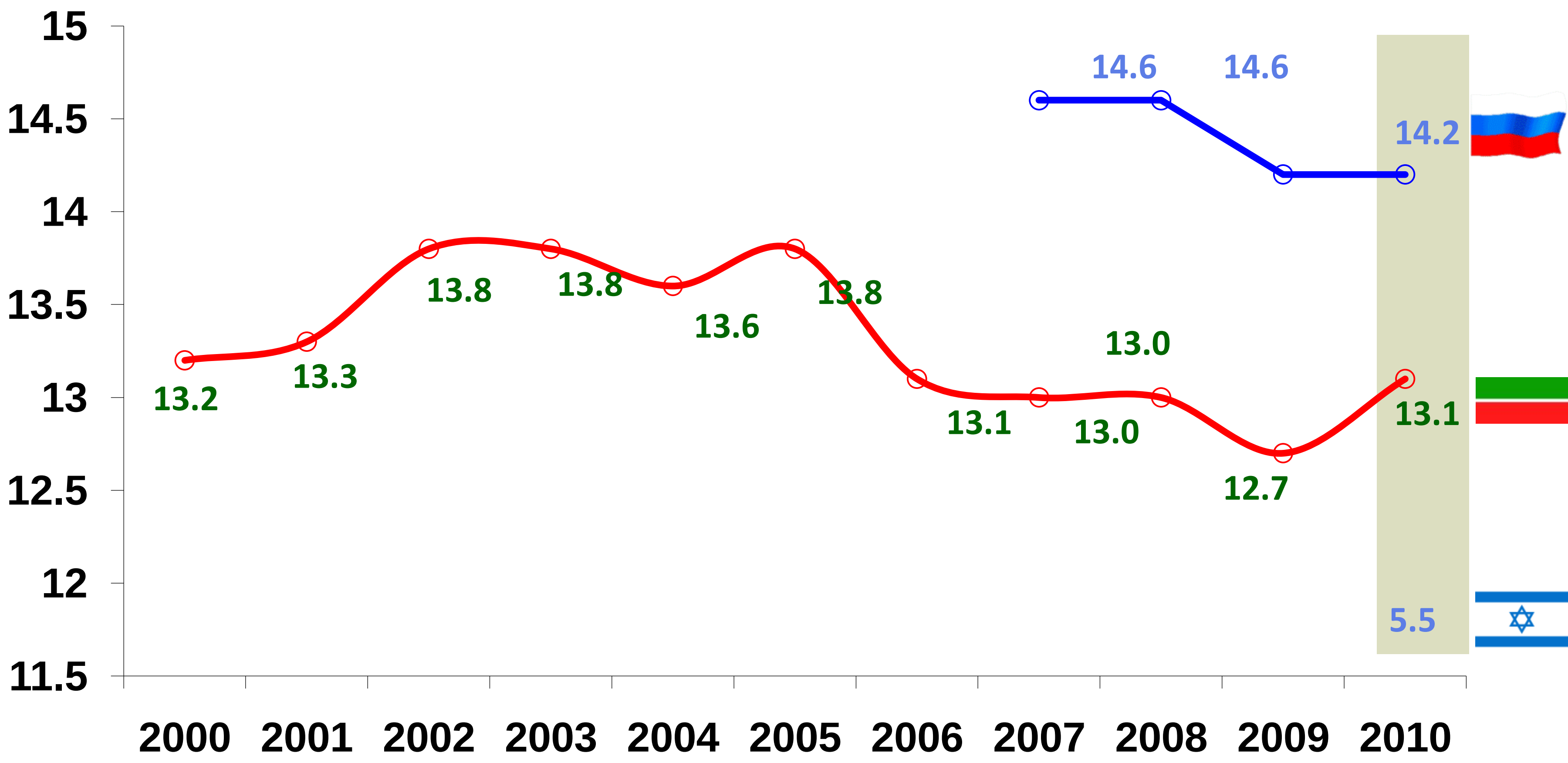
- is a statistic branch studying phenomena related to medical service, hygiene and social health


Medical statistics
Statistics of public health
Statistics of public health services
Theoretic and methodic bases of statistics

BIRTH RATE


on 1000 population
14
12
10
8
6
4
2
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
9,4
9,5
10.2
10.2
10.3
9.8
9.9
10.9
11.8
12.9
12.5

DEATH RATE on 1 000 population



Statistics values

- **Absolute values**

  - show real size of the studying phenomenon

- **Relative values**

  - are generalize indicators of a numerical measure of compared absolute sizes

- **Average values**

  - are generalize characteristics of quantitative signs of the set

ABSOLUTE VALUES

Show real dimensions of the phenomenon

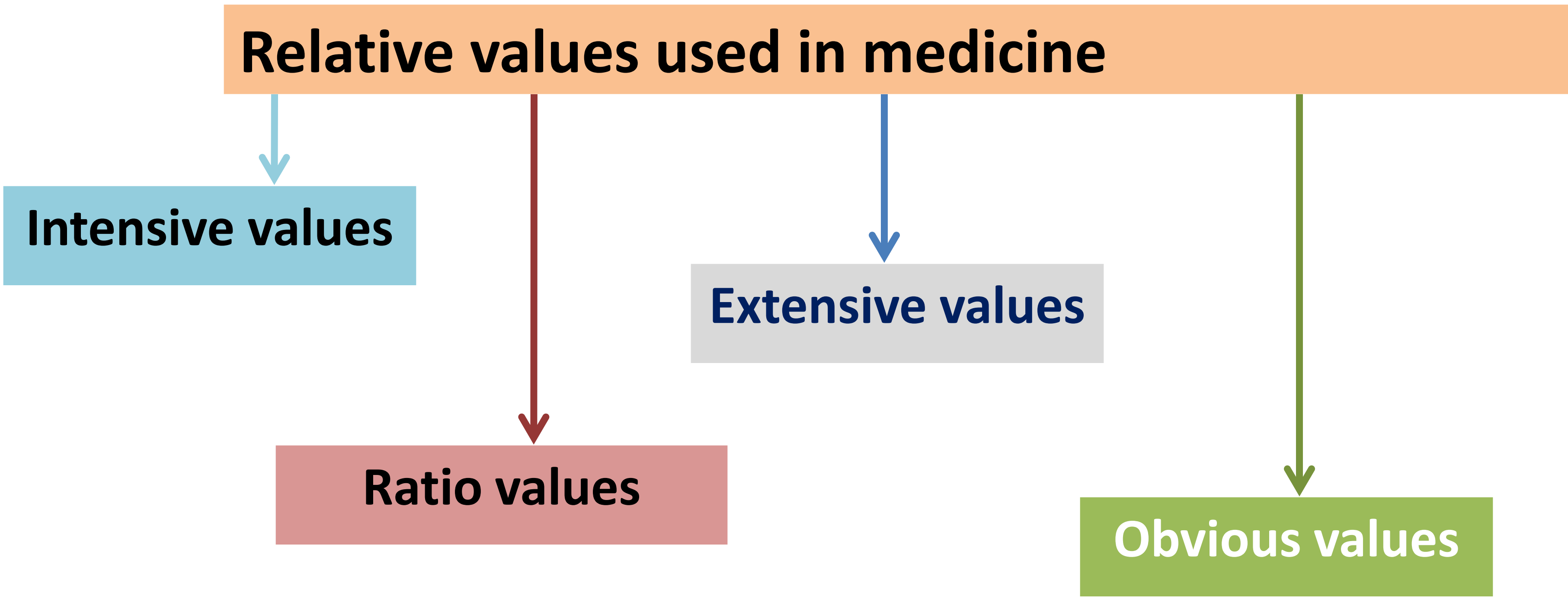
Using:	**when calculating and making reports, because it's easy to add them when doing statistic registration.**
Applying:	**to characterize real absolute values or rare phenomena (exceptional diseases)**
Disadvantages:	**not always can be compared**
	For this reason: apply relative values

Relative values

Relative values – are generalizing indicators of a numerical measure of compared absolute sizes

Applying:	To compare values in different cases
Disadvantages:	Not always suitable to compare
	When we compare two or more heterogeneous sets, method of standartization is applied

Relative values



Relative values: Intensive values

Intensive value characterizes frequency of the phenomenon in the condition where this phenomenon is observed

The calculating formula :

$$\text{Intensive value} = \frac{\text{phenomenon}}{\text{condition connected with phenomenon}} \times 1000\ (100,\ 100\ 000)$$

Coefficient is 1000 or 100 when it is frequent phenomenon
Coefficient is 10 000 or 100 000 when it is rare phenomenon

Intensive values can be GENERAL and SPECIAL

- **GENERAL ratio**
Characterizes the whole phenomenon (e.g., general ratio of birth (death))

- **SPECIAL ratio**
- characterizes a part of the phenomenon (e.g., age ratio of birth (death))

Example of the intensive value's calculating

Number of births – 54 000 cases for the year

Number of population – 3 800 000 people

Birth rate = 54 000 / 3 800 000 x 1000 =

14.2 births on 1000 population

Relative values: Ratio values

Ratio value characterizes a numerical parity of the sets not connected among themselves and compared only under their maintenance

The calculating formula :

$$\text{Ratio value} = \frac{\text{phenomenon}}{\text{condition NOT connected with the phenomenon}} \times 10\,000\ (1000)$$

Example of the ratio value's calculating

Number of hospital beds – 40 000 beds

Number of population – 3 800 000 people

Number of beds on 10 000 population =

40 000 / 3 800 000 x 10 000 =

105,3 beds on 10 000 population

Relative values: Extensive values

Extensive value characterizes structure of the phenomenon and is calculated as the relation of a part to the whole.

The phenomenon should be divided into parts

The calculating formula :

$$\text{Extensive value} = \frac{\text{part of phenomenon}}{\text{whole phemenonon}} \times 100\% \ (1,\ 1000‰)$$

Example of the extensive value's calculating

The whole number of deaths for the year – **40 000** cases
Number of deaths from trauma – **5 000** cases
Number of deaths from cancer – **4 000** cases
Number of deaths from cardiovasculare disease – **20 000** cases
Number of deaths from other reasons – **11 000** cases

Proportion of deaths from CVS's disease =

20 000 / 40 000 x 100% = **50%**

Proportion of deaths from trauma =

5 000 / 40 000 x 100% = **12.5%**

Proportion of deaths from cancer =

4 000 / 40 000 x 100% = **10%**

Proportion of deaths from other reasons =

11 000 / 40 000 x 100% = **27.5%**

Dynamics of maternal mortality in Tatarstan

(for 100 000 survived new-born babies)

years	maternal mortality	Calculation	Obvious value
1997	74,8 →	**100%** →	100%
1998	59,2 →	x_1 →	79,1%
1999	59,8 →	x_2 →	79,9%
2000	19,8 →	x_3 →	26,5%
2001	39,0 →	x_4 →	52,1%
2002	47,3 →	x_5 →	63,2%