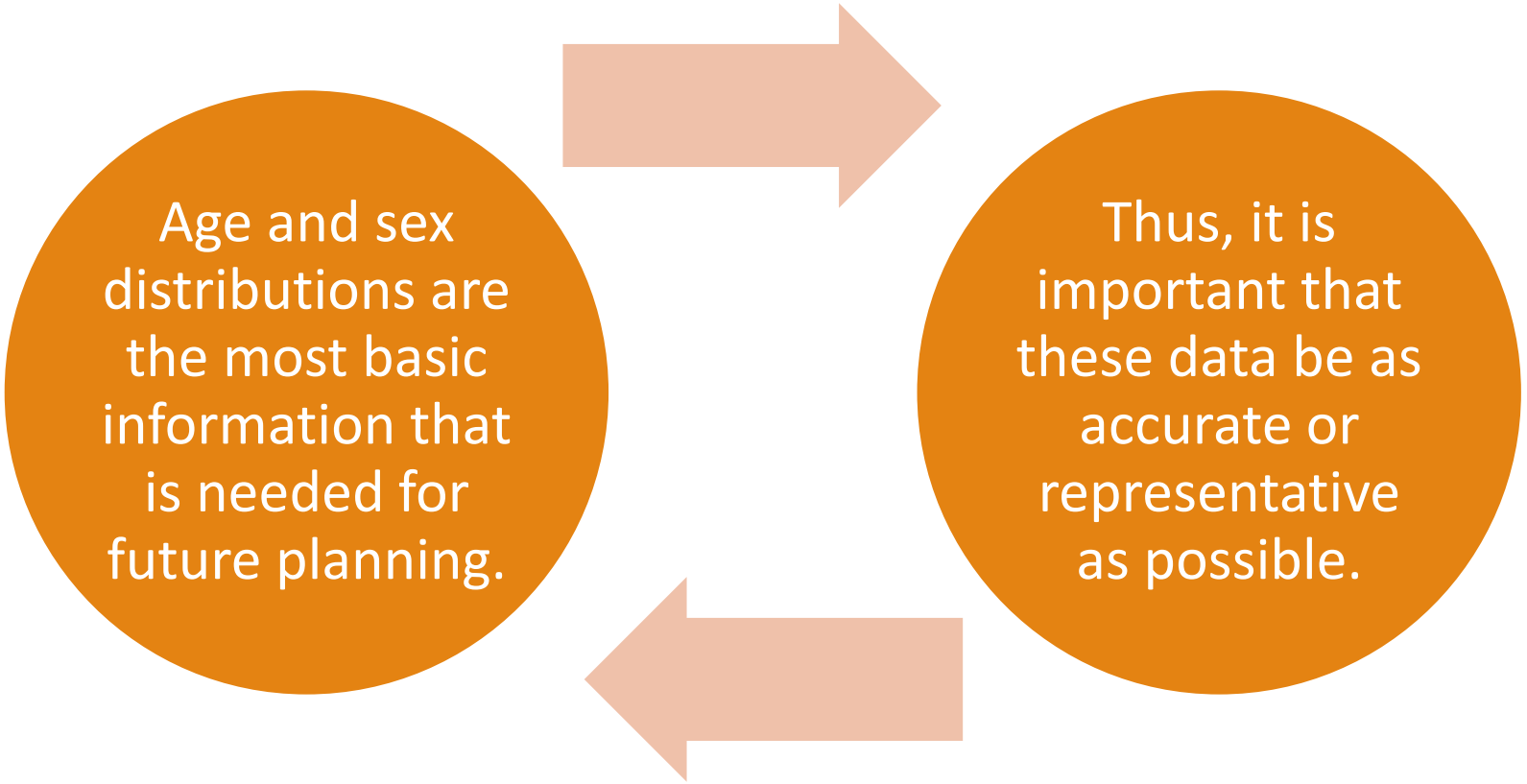
Introduction

The personal characteristics of age and sex hold positions of prime importance in demographic studies. Separate data for males and females and for ages are important in themselves, for the analysis of other types of data, and for the evaluation of the completeness and accuracy of the census counts of population.

Age and Sex Composition



Definition and Classification

Age is a more complex demographic characteristic than sex. The age of an individual in censuses is commonly defined in terms of the age of the person at his or her last birthday. Other definitions are possible and have been used.

(1) sex-ratio score (SRS),

(2) index of the age-ratio score (ARSM and ARSF for males and females)

The Joint Score Index (JS) is defined as JS = 3 * SRS + ARSM + ARSF.

arithmetic mean of the population

$$\overline{S} = \frac{S_0 + S_1}{2};$$

Chronologic mean

$$\bar{S} = \frac{1/2S_1 + S_2 + \cdots + S_{n-1} + 1/2S_n}{n-1}.$$

arithmetic weighted mean

$$\bar{s} = \frac{\sum s \cdot t}{\sum t},$$

Analysis of population dynamics

- absolute increase (decrease) in the population (chain and base);

-relative growth (decrease) in the population (chain and base);

- relative increase (decrease) in the population (chain and base);

- absolute percentage growth (decrease) in the population.

Example: To find absolute change from 40000 to 42000, the difference between numbers is calculated:

42000 – 40000 = 2000

Example: If the population of a town increased from 40,000 in 2017 to 42,000 in 2014, the population in 2017 was 105% of the population in 2014. Therefore, on a 2014 = 100 base, the population index for the town was 105 in 2017.

Numerical Measures

1. The percentage of males in the population, or the masculinity proportion;

2) The sex ratio, or the masculinity ratio;

3) The ratio of the excess or deficit of males to the total population.

The masculinity proportion

$$\frac{P_m}{P_t} * 100$$

The masculinity proportion

$$\frac{15999{,}5}{31120{,}0} * 100$$

Sex ratio

$$\frac{P_m}{P_F} * 100$$

The masculinity proportion

$$\frac{15999{,}5}{16121} * 100$$

sex composition

$$\frac{P_{m-}P_f}{P_t} * 100$$

Indexes of Age Preference

$$\frac{P_{30}}{1/3(P_{29-}P_{30-}P_{31})} * 100$$

$$\frac{P_{30}}{1/5(P_{28-}P_{29-}P_{30-}P_{31-}P_{32})} * 100$$

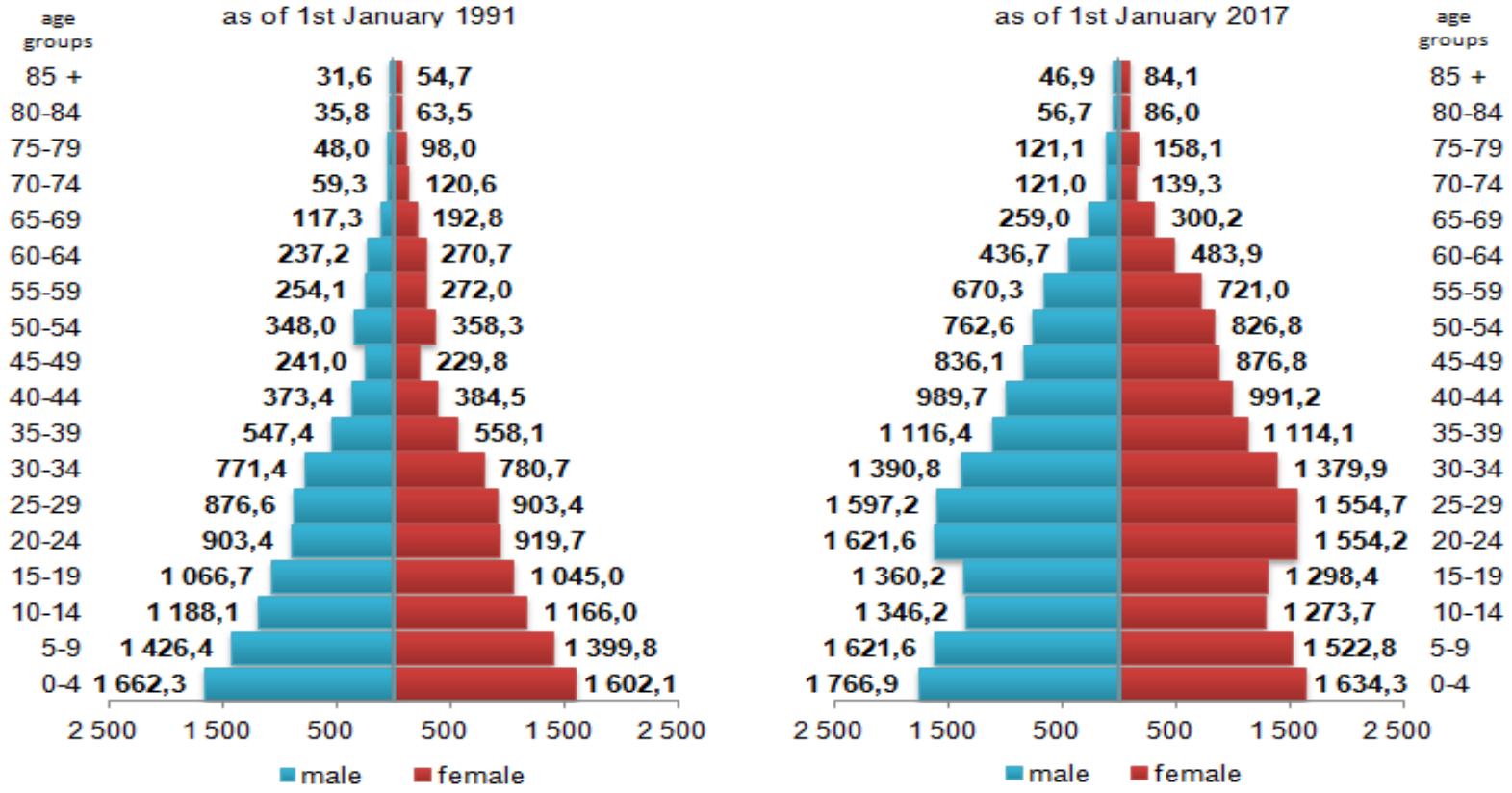
Whipple's Index

$$\frac{\sum (P_{30} + P_{40} + P_{50} + P_{60})}{1/10 \sum (P_{23} + P_{24} + P_{25} + \ldots P_{60} + P_{61} + P_{62})} \times 100$$

$$\frac{\sum (P_{25} + P_{30} + \ldots P_{55} + P_{60})}{1/5 \sum (P_{23} + P_{24} + P_{25} + \ldots P_{60} + P_{61} + P_{62})} \times 100$$

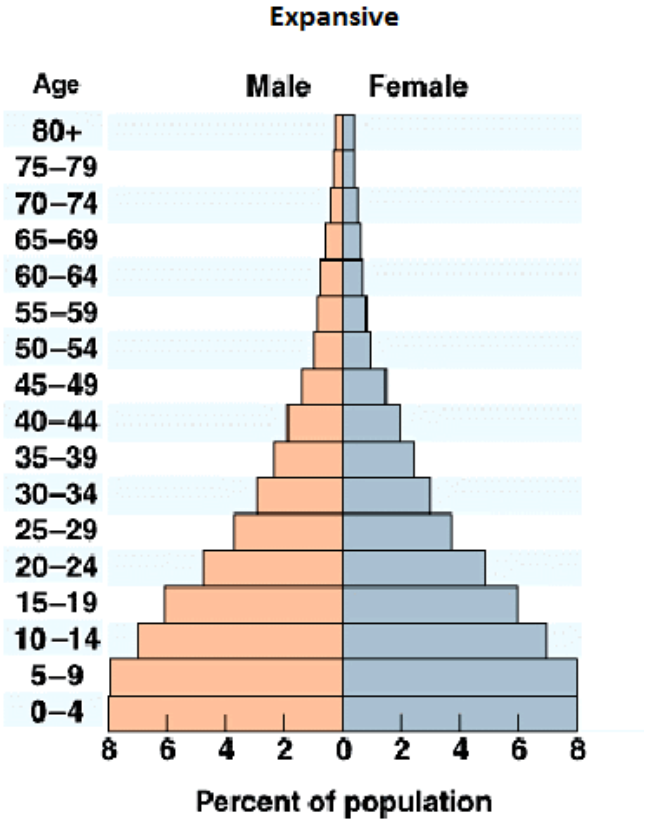
$$= \frac{\sum_{23}^{62} P_a \text{ ending in 0 or 5}}{1/5 \sum_{23}^{62} P_a} \times 100$$

The age and sex structure of a population

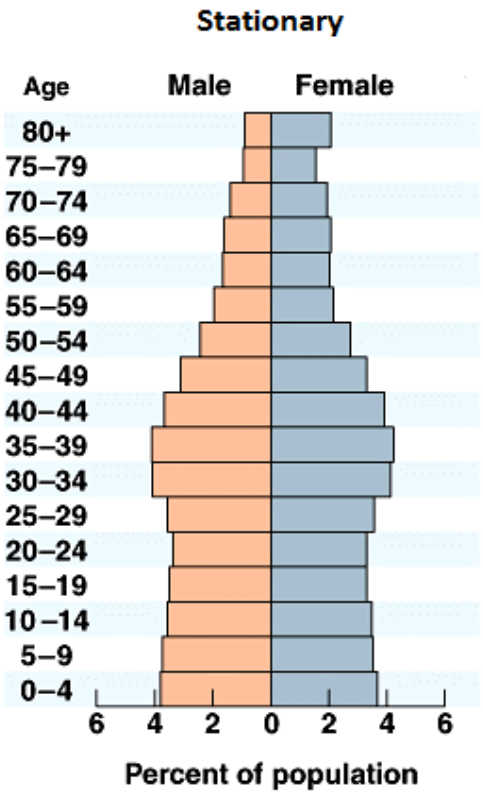


Population pyramid

the young population

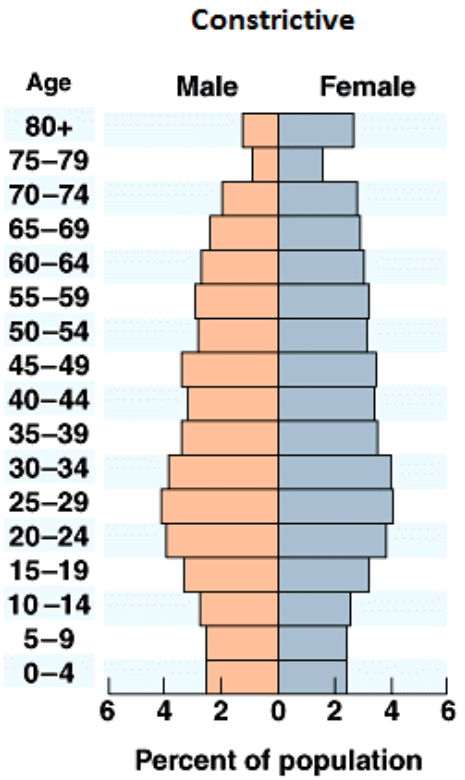


Population pyramid



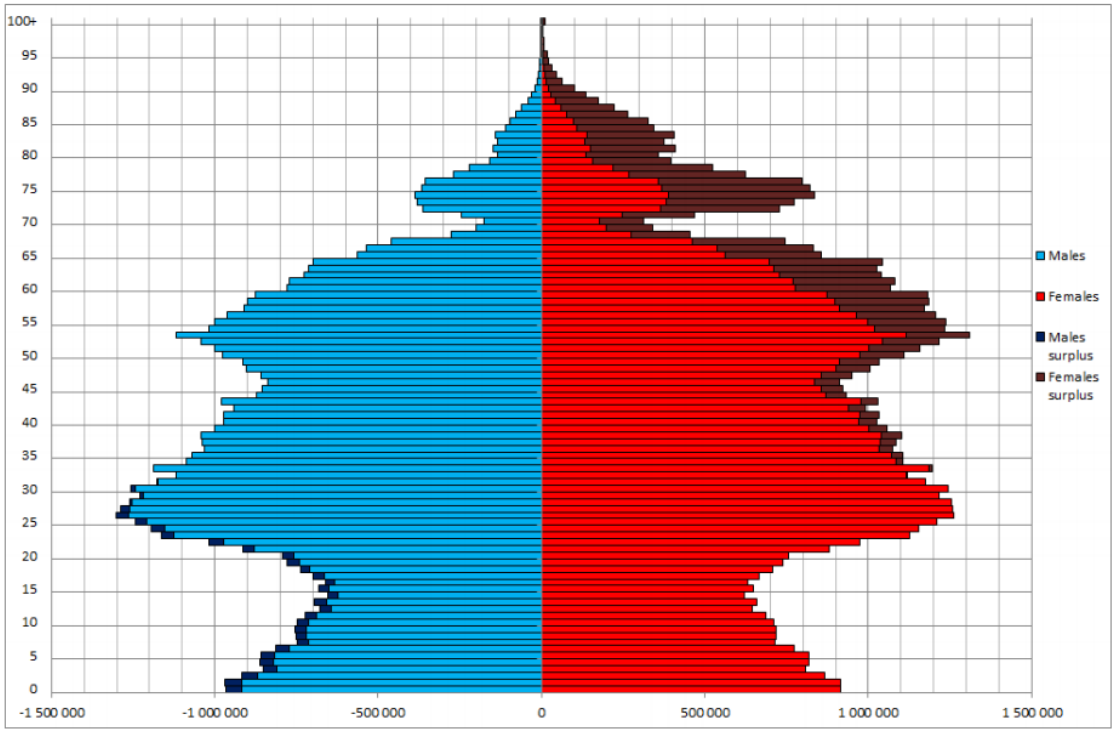
Stationary, or near stationary

Population pyramid



- very old decreasing population - the pyramid expands from the base upwards and only at the top (in the oldest age groups) sharply narrows - the regressive type of the age structure of the population.

Age-and-sex pyramid of the Russian population (2014)



median age

Populations with medians under 20 may be described as “young,” those with medians 30 or over as “old,” and those with medians 20 to 29 as of “intermediate” age.

$$\text{mean} = \frac{70 + 72 + 74 + 76 + 80 + 114}{6} = \frac{486}{6} = 81$$

70, 72, 74, 76, 80, 114

$$\text{median} = \frac{74 + 76}{2} = \frac{150}{2} = 75$$

Populations with 10.0% or more 65 years old and over may be said to be old.

aged-child ratio

$$\frac{P^{65+}}{P_{0-14}} \times 100$$

Age Dependency Ratios

$$\frac{P_{0-14} + P_{65+}}{P_{15-64}} \times 100$$

Studying the population as a source of labor resources requires three groups of the population:

- -Minimum of working age (up to 15 years inclusive);
- - working age: women from 16 to 54 years, male from 16 to 59 years inclusive;
- - older than working age (that is, pension): women from 55 years old, men from 60 years old.

Doubling Time

Growth Rate (% per year)	Doubling Time in years
0.1	700
0.5	140
1	70
2	35
3	23
4	18
5	14
6	12
7	10
10	7

Calculate Doubling Time (sample): Growth rate = 2% Doubling time (in years) = 70/ (growth rate) 70/2 = 35 years

dt = 70/r

Stable population

"Stable" population distribution