



Measuring & Evaluating Health of a Population

Public Health. Lecture 5
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Learning Outcomes



- Upon completion of this lecture you should be able to:
 - Define DEMOGRAPHY
 - Discuss measures of health of the population
 - Explain population pyramid, aging and young population
 - Explain reasons of demographic transition
 - Explain factors and calculation of fertility, morbidity, disability and mortality
 - Discuss relation between migration and health

Quiz 1



1. What is demography?
2. What word is this term derived from?

DEMOGRAPHY



- Composition of population: ethnic, age, sex (including or excluding are non-citizens)
- Distribution: % rural, % urban, % suburban. Also, how many citizens live overseas
- Growth: rapid growth, slow growth, population decline



DEMOGRAPHY



Scientific study of population

- Births (Fertility)
 - Sickness (Morbidity)
 - Deaths (Mortality)
 - Population movements (Migration)
 - Other e.g. abortion rates, divorce rates etc.
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- subtopics e.g. teenage fertility, immigrant fertility, infant mortality, maternal mortality



Quiz 2



1. How to calculate the total population in a country?

DEMOGRAPHY



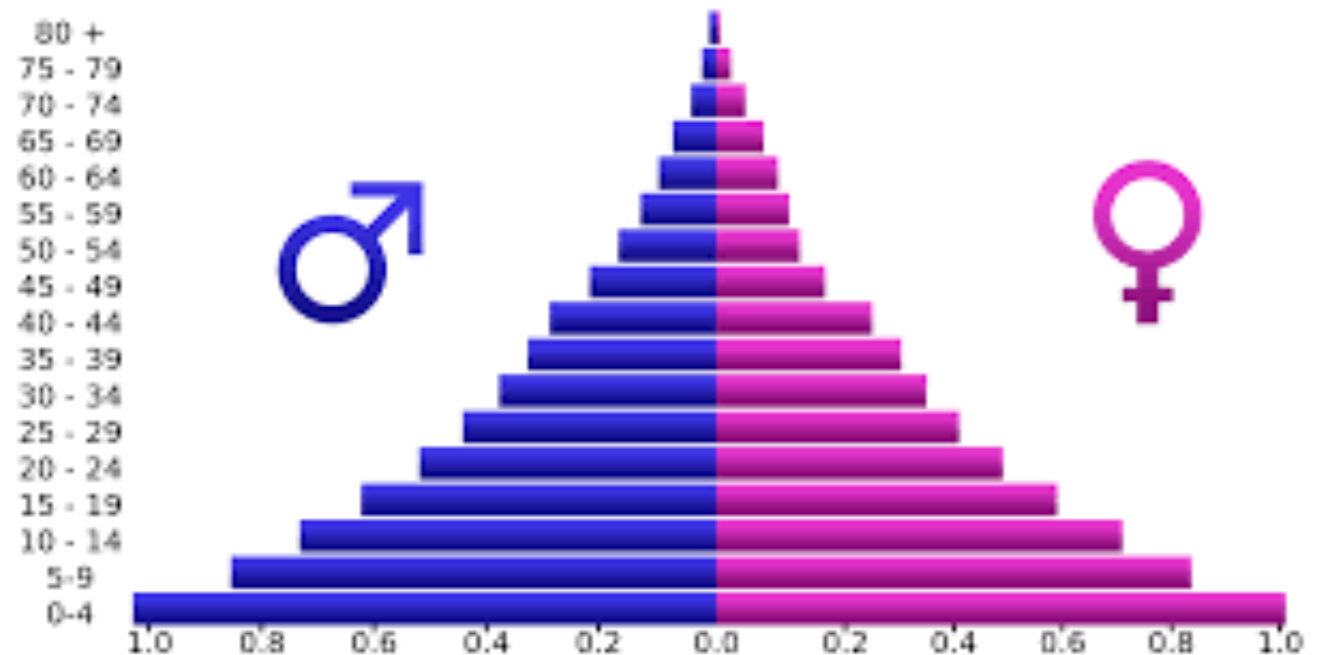
- Population is affected by fertility, mortality and migration rates
- Final population = Initial population + (Births - Deaths) + (Immigration - Emigration)

AGE-SEX COMPOSITION OF A POPULATION



Depicted by the
Population Pyramid

“Young” population:
pyramid is triangular



“YOUNG” POPULATION



% of total population under age 15 is high

Median age as low as 15 or 16

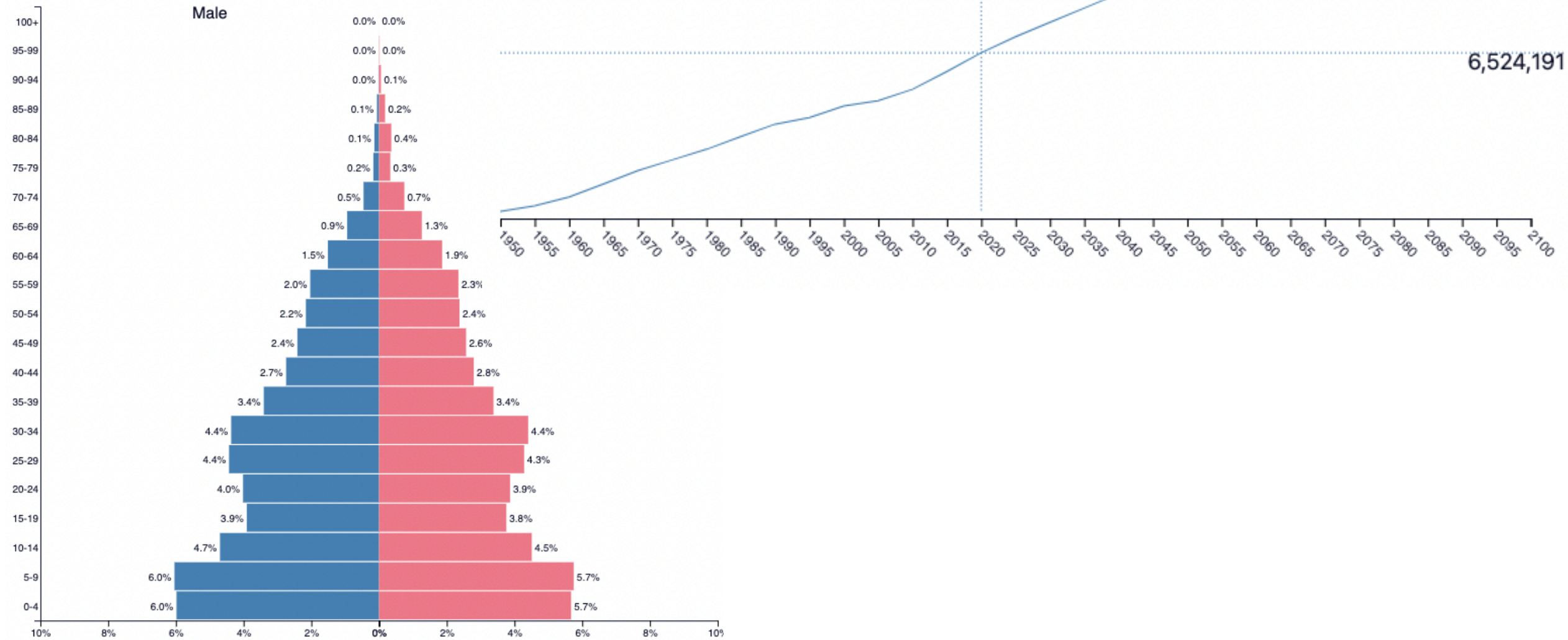
Due to high fertility



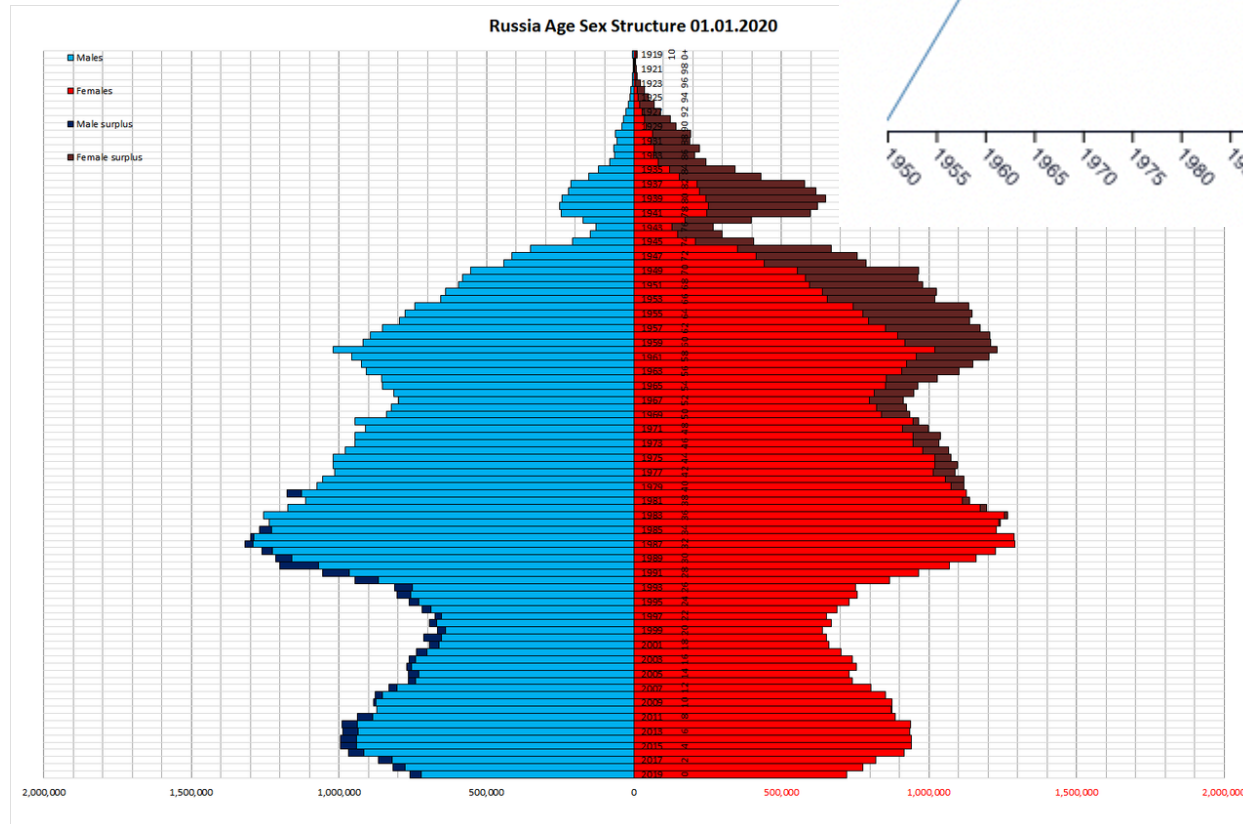
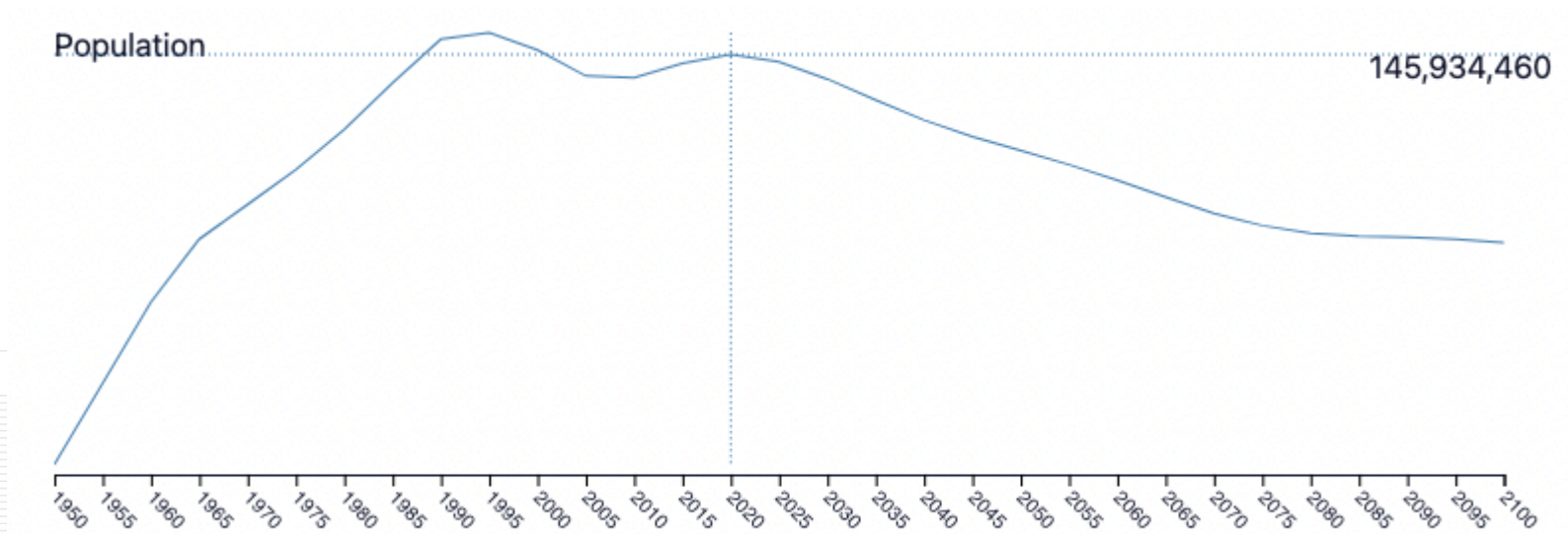
KYRGYZSTAN

2020

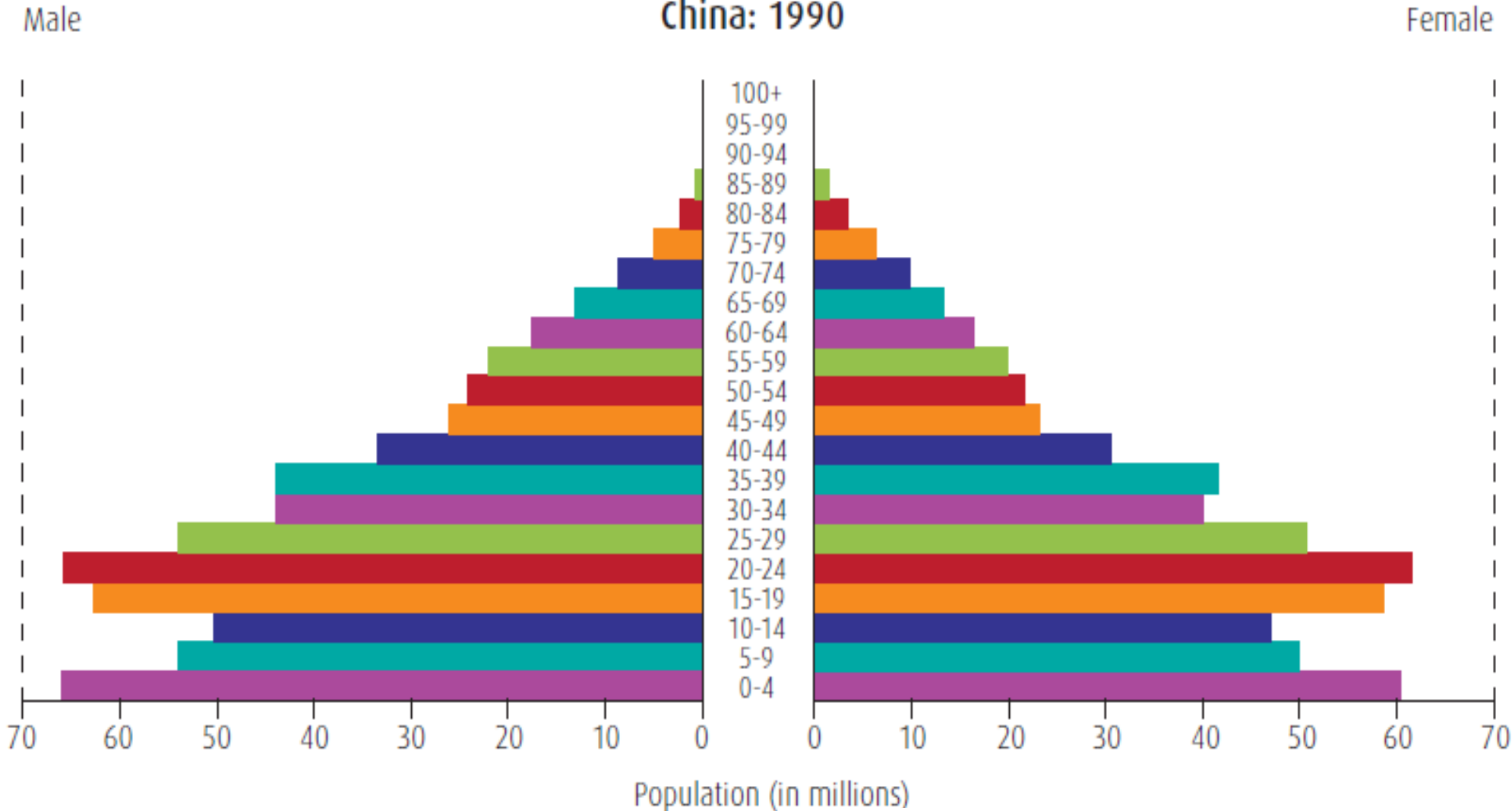
Population



RUSSIA 2020

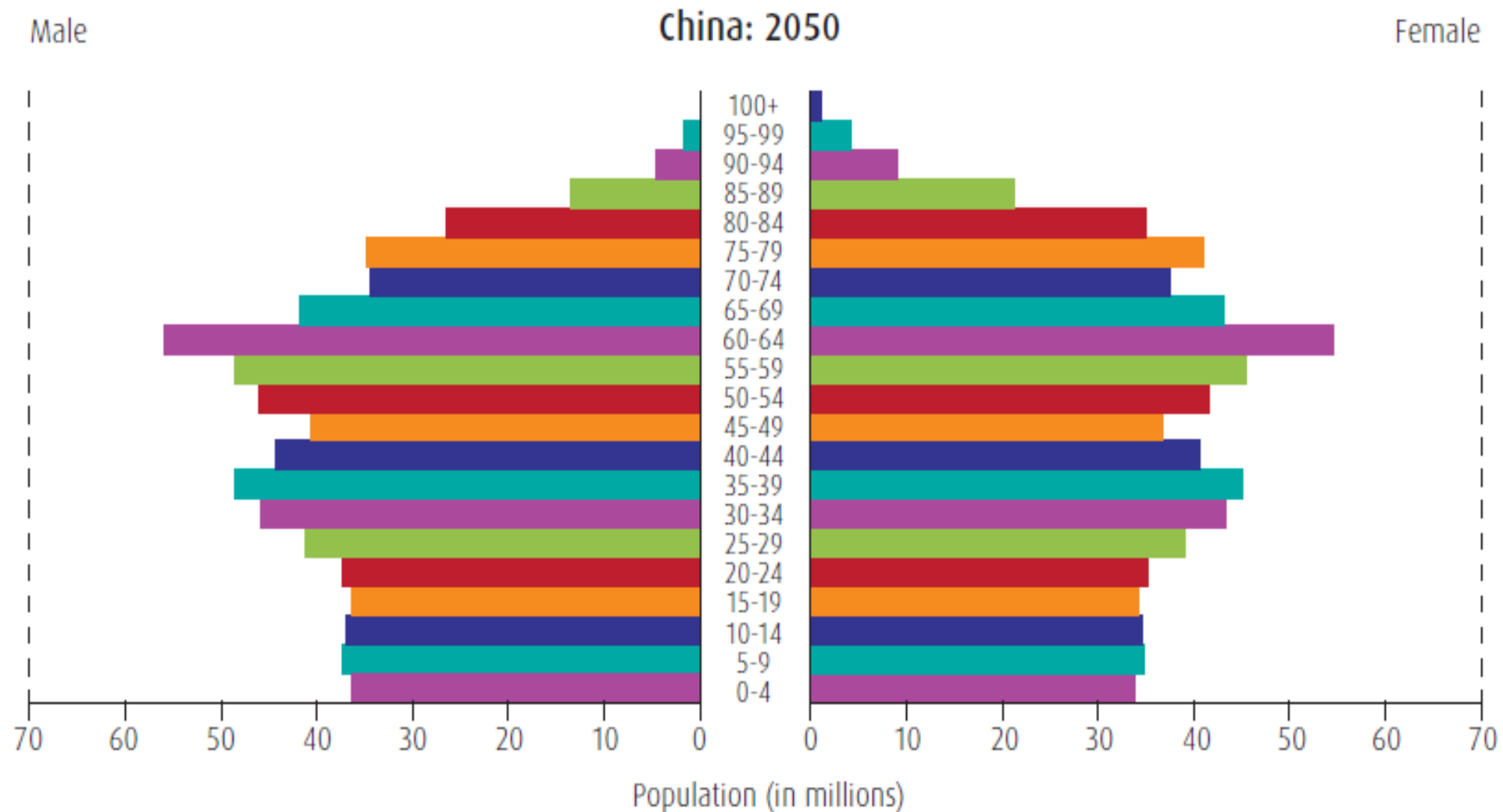


CHANGING POPULATION AGE STRUCTURE FOR CHINA 1990-2050



Source: U.S. Census Bureau, International Data Base.

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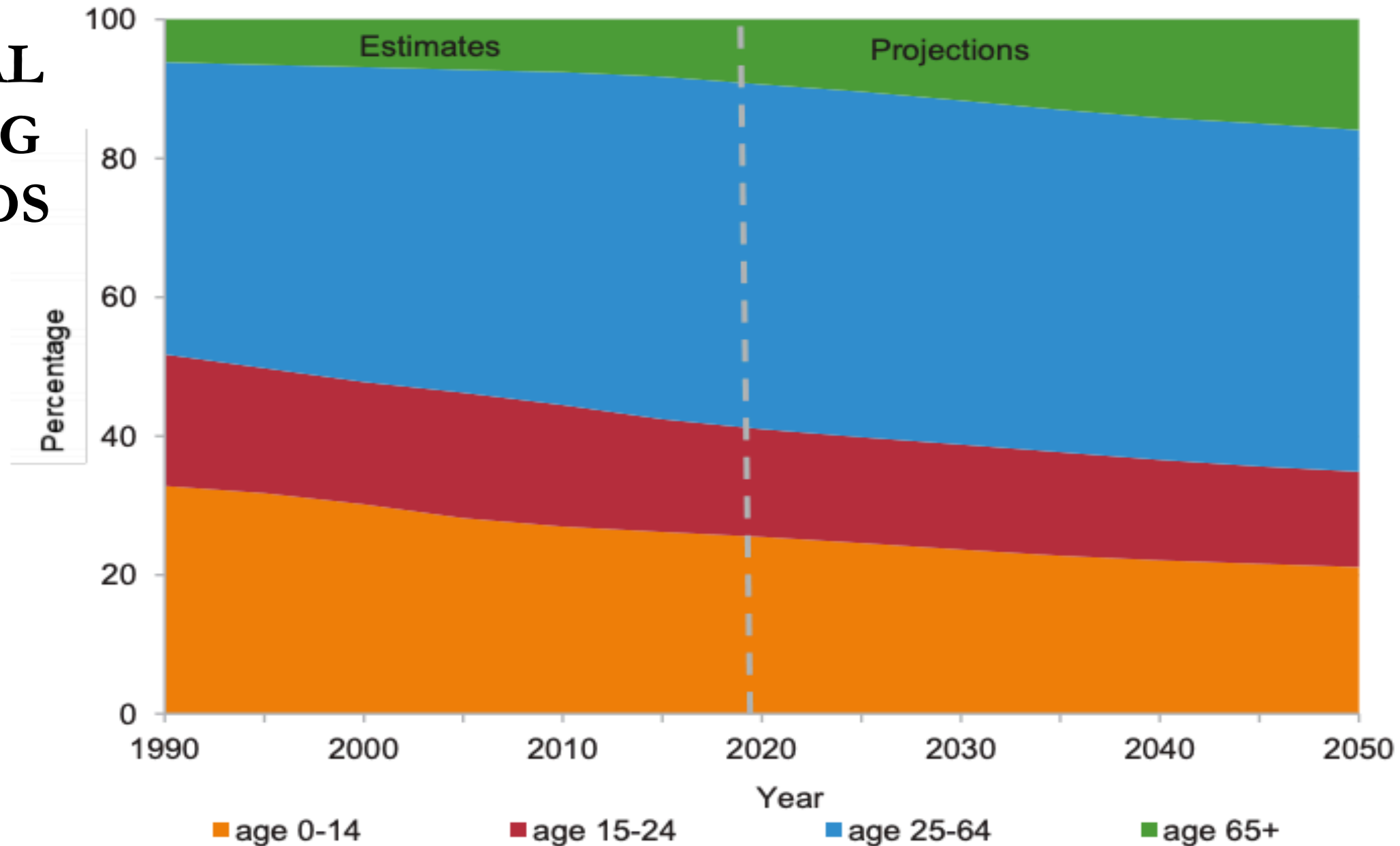


Source: U.S. Census Bureau, International Data Base.



**“Ageing”
population in
the developed
world: pyramid
becomes more
and more
rectangular**

GLOBAL AGEING TRENDS



Source: United Nations, Department of Economic and Social Affairs, Population Division (2019). *World Population Prospects 2019*.

AGEING POPULATION



- Elderly rises from 5% to more than 20% of total population
- The pace of population ageing is much faster than in the past
- Today the number of people aged 60 years and older is over than children under 5 years
- Between 2015 and 2050, the share of the world's population over 60 years will nearly double from 12% to 22%
- In 2050, 80% of older people will be living in low- and middle-income countries (LIC, LMIC)
- By 2050, 400 million persons over 80 years; 100 million in China alone
- By 2050, 1 in 6 people in the world will be over the age of 65, up from 1 in 11 in 2019

AGEING POPULATION



- Due mainly to low fertility (Japan, Singapore)
- “Young-old” versus “old-old” (Russia : Japan)
- More and more elderly women
- More chronic & degenerative diseases
- Multiple health problems are common in elderly people
- All countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift
- Aging is measured by **the old-age dependency ratio** (OADR)
- the number of old-age dependents (persons aged 65 years or over) per 100 persons of working age (aged 20 to 64 years)
- In 2019, OADR=16. in 2050 - 28



THE DEMOGRAPHIC TRANSITION



This refers to the change from:

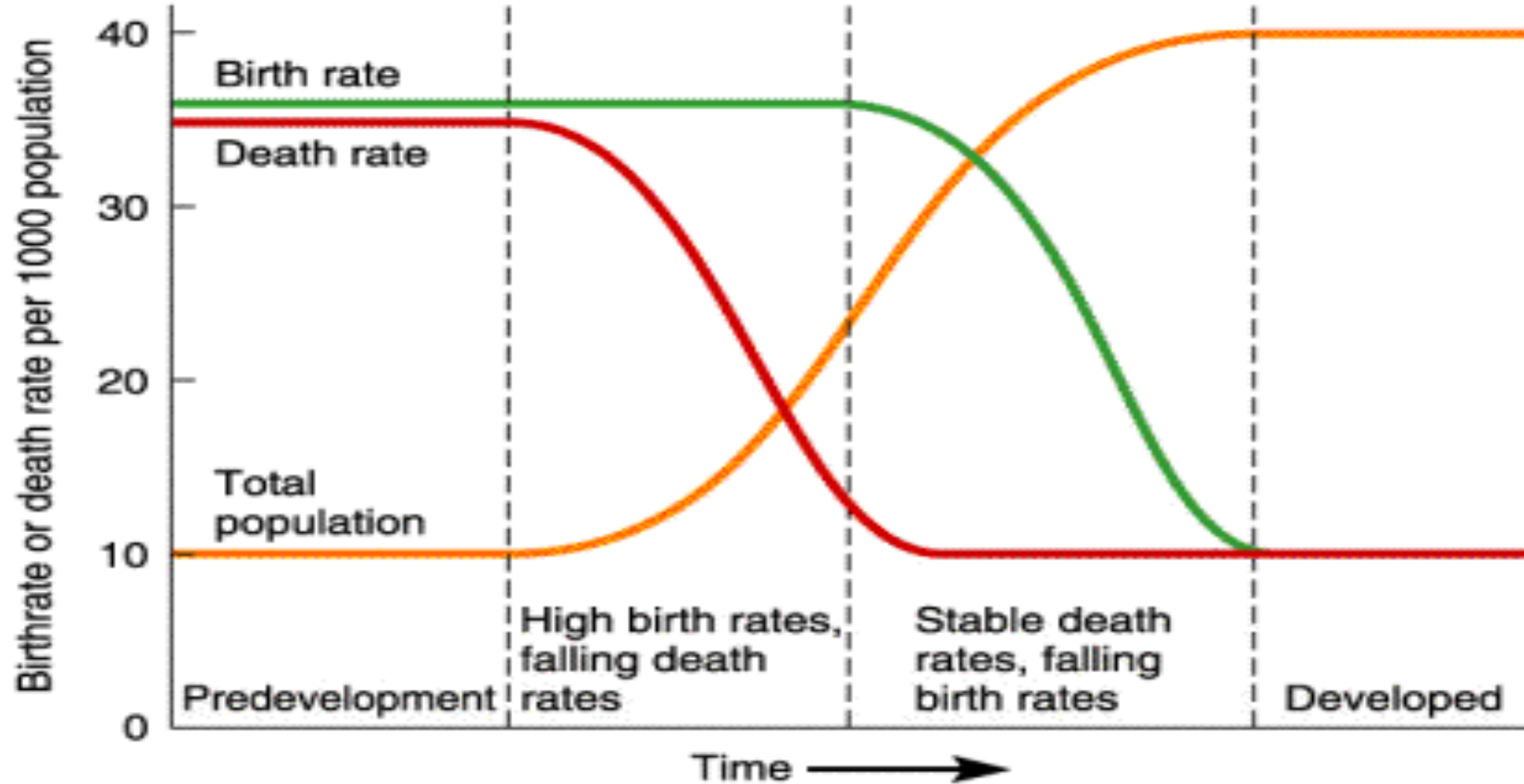
High rates (births and deaths) to

Low rates (births and deaths)

Death rates drop before birth rates: therefore, there is a period of rapid population growth. This ends when birth rates finally drop.

Better health care, nutrition and other social care, higher standards of living lead to longer life of population

THE DEMOGRAPHIC TRANSITION



THE DEMOGRAPHIC TRANSITION



Falling death rates are due to better nutrition and higher standards of living

Falling birth rates are due to social and economic changes:

- **Women stay in school longer**
- **More women work outside the home**
- **Women marry later**
- **Women postpone childbearing**
- **People choose to have fewer kids**



(1) FERTILITY

- **Fertility rates differ by social variables:**
 - **religious group e.g. Catholic Church and contraception**
 - **social class - lower classes tend to have higher fertility**
 - **region - people in rural areas tend to have higher fertility**
 - **people in poor countries tend to have higher fertility**



(1) FERTILITY

Fertility rates can be affected by:

- **Public policy e.g. some governments pressure couples to have fewer kids, other governments encourage them to have more!**
- **Culture e.g. religion and contraception**
- **Economics e.g. expense of having kids in industrial versus agricultural societies**
- **Technology e.g. are effective contraceptive methods available?**



FERTILITY AND HEALTH

- High fertility can increase maternal and child mortality
- Continuous child-bearing can have a negative impact on maternal health
- Closely-spaced births (<18 months apart) & low birth weight babies (<2,500g) at higher risk
- Illegal abortions and maternal mortality
- “Female genital mutilation” & maternal mortality
- Sex-selective abortion in China and India



FERTILITY AND HEALTH

- Problem of teenage pregnancies in many countries, incl. Kyrgyzstan
- STDs such as gonorrhea can lead to infertility in women
- Use of condoms reduce transmission of STDS e.g. HIV/AIDS
- Monogamous women at risk of being infected with HIV by husbands and boyfriends

INFERTILITY AND “ASSISTED REPRODUCTION”



Infertility = inability to conceive children

Options for infertile couples:

Adoption

In some societies: second spouse, or even divorce or even abandonment of “infertile” spouse

Treatment for infertility

Ethical issues e.g. surrogate motherhood,

Baby M case in USA, sperm donors and sperm banks

(2) MORBIDITY AND MORTALITY



The Epidemiological Transition

- **This refers to the change in disease patterns from mostly infectious diseases to mostly chronic and degenerative diseases**
- **Cancer, heart disease, stroke, injuries, diabetes, arthritis etc versus HIV/AIDS, SARS etc**

MEASURES OF MORBIDITY



Very important:

- Incidence rate
- Prevalence rate

INCIDENCE RATE



No. of NEW cases in fixed time period X 1,000
Population at risk



PREVALENCE RATE

$$\frac{\text{No. of people with a disease}}{\text{Population at risk}} \times 1,000$$

Quiz 3



1. What is infant mortality rate (IMR)?
2. What is neonatal mortality rate?
3. What is postneonatal rate?
4. How to calculate IMR?

MORTALITY-BASED MEASURES



- Crude death rate
- Age-specific mortality rate
- Age-adjusted mortality rate
- Life expectancy
- Years of potential life lost (YOLL)



MORTALITY-BASED MEASURES

- Infant mortality rate (deaths of babies under 1 year old)
- Neonatal mortality rate (<28 days after birth)
- Postneonatal mortality rate (between 28 days and 1 year old)

$$\text{IMR} = \frac{\text{Deaths of babies under 1 year}}{\text{Total live births}} \times 1,000$$



MORTALITY-BASED MEASURES

- **IMR = Neonatal Mortality Rate + Postneonatal Mortality Rate**
- **Low Birth Weight (<2.5 kg at birth) greatly increases the risk of infant mortality**

OTHER MEASURES OF MORTALITY



- Cause-specific mortality rates
- Maternal mortality rate

HEALTH-RELATED QUALITY OF LIFE



- Health-related quality of life (**HRQoL**) measures have been developed to capture both morbidity and mortality in a single number, to capture the cumulative effects of multiple conditions, and to reflect both psychological and physiological dimensions of illness
- Tools to find HRQoL index (from 0 to 1):
 - EQ-50 (EuroQoL) survey
 - Health Utilities Index marks 2/3
 - QWB-SA
 - SF-6D and SF-36v2
- QALY and QALE



(3) MIGRATION

- Involuntary: slavery, ethnic persecution, wars, natural disasters, famines
- Voluntary: to seek jobs (skilled or unskilled), to get an education, because of marriage, upon retirement

- Internal migration: within a country e.g. rural to urban
- International migration: skilled professionals to other countries

(3) MIGRATION

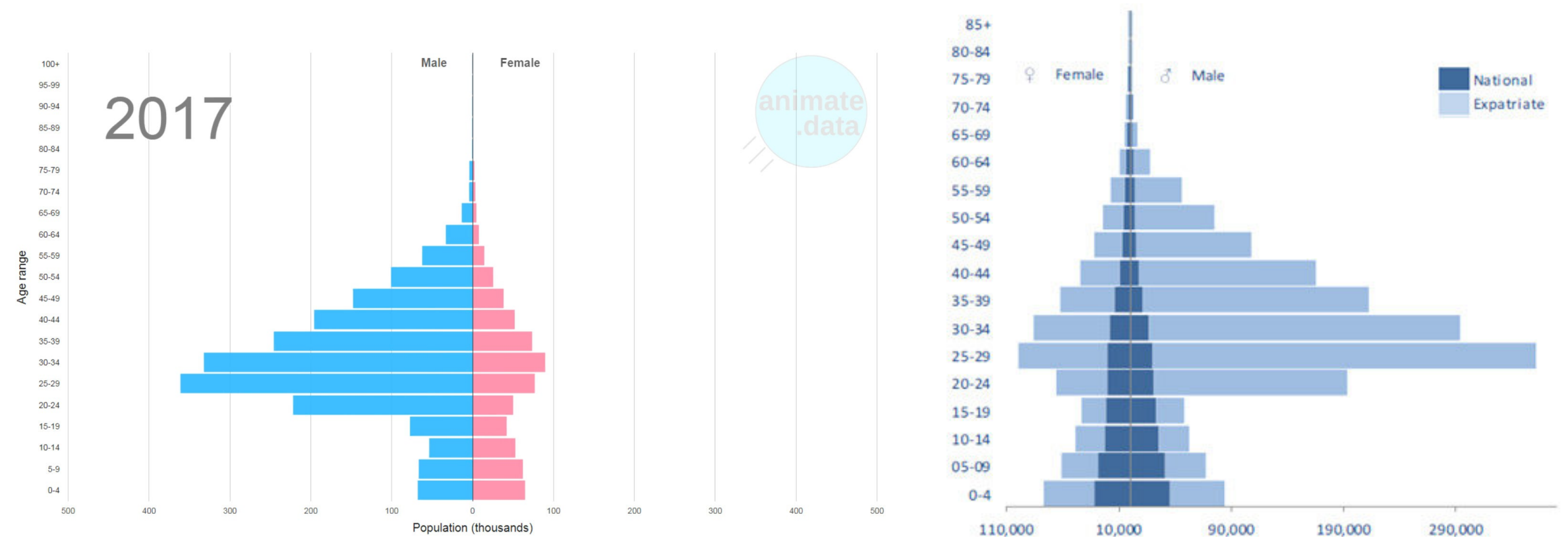


- $\approx$ 1 billion migrants
- International migration: 281 mln skilled professionals → 450 mln by 2050
- International Organization of Migration
- Global Forum on Migration Development (GFMD)
- Global Migration Group (GMG)

MIGRATION AND DEMOGRAPHY



- Population of Qatar & Dubai, 2017
- Immigration of males, etc



REASONS FOR INCREASED MIGRATION



- Globalization & economic pressures
- Low transportation costs
- Demographic trends (specifically, ageing societies worldwide and youth bulges in developing countries)
- Environmental degradation
- Violence and human rights abuses

MIGRANTS' HEALTH AT PRE-DEPARTURE STAGE



- Pre migratory events, particularly trauma, such as war, human rights violations, torture, sexual violence, especially for forced migration flows
- Linguistic, cultural and geographic proximity to destination, including health beliefs and behaviors
- Epidemiological profile and how it compares to the profile at destination
- “Efficiency of health system in providing preventive and curative health care”

Source: WHO: INTERNATIONAL MIGRATION, HEALTH AND HUMAN RIGHTS, 2013

MIGRANTS' HEALTH AT TRAVEL STAGE



- Travel conditions and mode (perilous, lack of basic health necessities), especially for irregular migration flows
- Duration of journey
- Traumatic events, abuse, (sexual)
- Violence
- Alone or mass movement

Source: WHO: INTERNATIONAL MIGRATION, HEALTH AND HUMAN RIGHTS, 2013

MIGRANTS' HEALTH AT HOST COMMUNITY STAGE



- Migration related policies/health policies
- Inclusion or discrimination
- Legal status and access to services
- Language and cultural values
- Separation from family partner
- Duration of stay
- Culturally, linguistically, and epidemiologically adjusted services
- Abuse, (sexual) violence exploitation
- Working and living conditions

Source: WHO: INTERNATIONAL MIGRATION, HEALTH AND HUMAN RIGHTS, 2013

MIGRANTS' HEALTH AT RETURN STAGE



- Level of home community services (possibly destroyed), especially after crises situations: Remaining community ties
- Duration of absence
- Behavioural and health profile as acquired in host communities

Source: WHO: INTERNATIONAL MIGRATION, HEALTH AND HUMAN RIGHTS, 2013

CROSS-CUTTING ASPECTS OF MIGRANTS' HEALTH



- Age
- Gender
- Socioeconomic status
- Genetic factors

MIGRATION AND HEALTH



- Migrants (workers, prostitutes, truck drivers) may spread infectious diseases e.g. HIV/AIDS, TB, diphtheria
- Jet travel speeds up disease transmission
- Migrants often live in urban slums and experience adjustment problems (these can affect their physical or mental health)

FURTHER READING:



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- J-M. Robine, C. Jagger. Demography - Vol. I - *Health and Demography*. UNESCO, Encyclopedia for life support systems, 2014.
- N. Hoque, M.A. McGehee, B.S. Bradshaw. Applied Demography and Public Health. Springer, 2013.
- B. Gushulak, J. Weekers and D.W. MacPherson, Migrants in a globalized world - health threats, risks, and challenges: An evidence-based framework. *Emerging Health Threats Journal*, published online 2010 March 31