

Global Demography Concepts and Population Pyramids

- Define demography
- Describe major sources of population data
- List the important factors that determine population growth and calculate measures of these factors
- Interpret the population pyramid and differentiate between features of developed and developing countries
- Understand the concept and determinants of demographic equilibrium
- Describe and understand the theory of demographic transition
- Define, compute and interpret the population distribution measures



Color index:

- Main text
- Males slides
- Females slides
- Doctor notes
- Golden notes
- Important
- Extra





Demography

What is demography?

It is the specific study of human populations. It encompasses three domains:

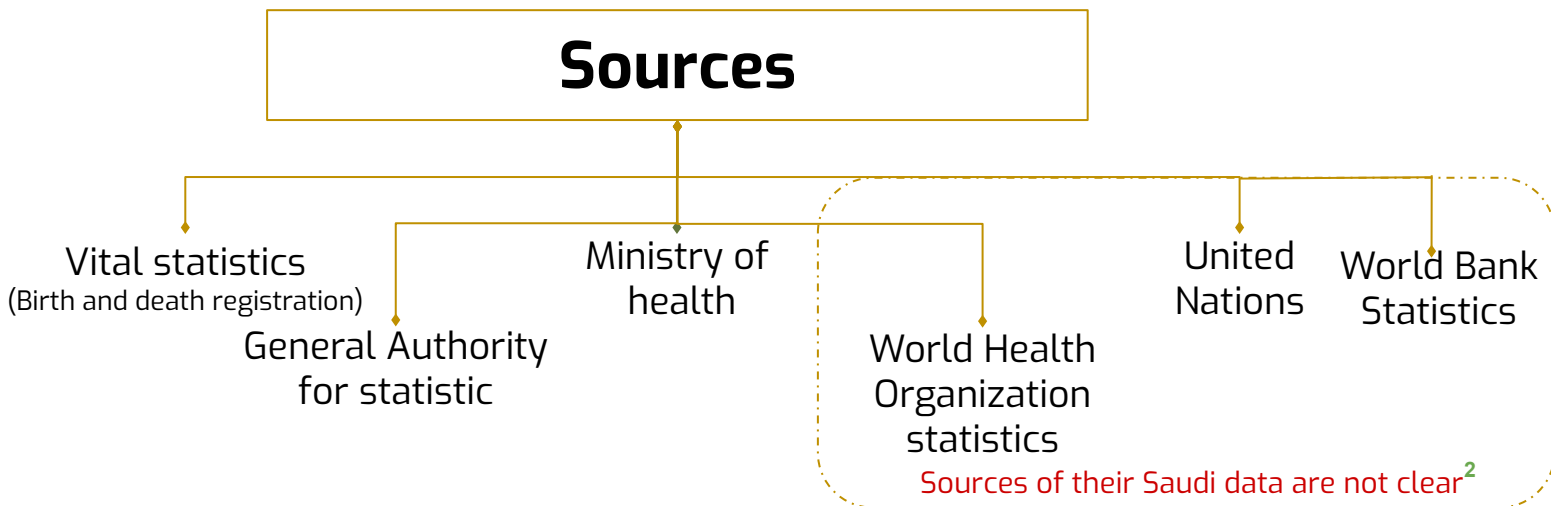
1. Change in population size
2. Composition of a population
3. Distribution of a population in space



Why demography is important?

The health of people in a community depends on the dynamic interaction between size of the population and the space they occupy

Sources of demographic data¹



Available Demographic Indicators from GAS³

- ▶ 1. Age group (reported in 5-year bins)
- ▶ 2. Gender
- ▶ 3. Region of residence
- ▶ 4. Nationality (Saudi vs. Non-Saudi)
- ▶ 5. Marital status
- ▶ 6. Education status
- ▶ 7. Number of live birth
- ▶ 8. Use of OCP
- ▶ 9. Number of deaths
- ▶ 10. Disability

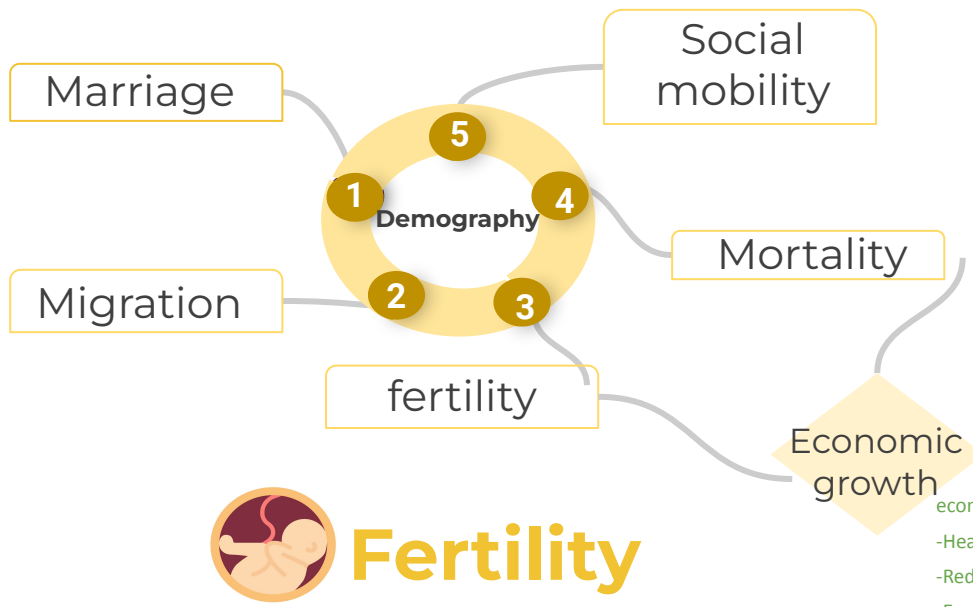


1. When we want to collect data of Saudi population, we first look at vital statistic , GAS, MOH. We look on outside sources when we don't find data we look for.

2. The way they communicate with other countries and How they get and collect data is unknown.

3. Because of the cost, data is collecting every 10 years, not every year.

Population size, distribution and composition are determined by



Fertility

economic growth on:

- Healthcare systems
- Reducing mortality (whether child or all age)
- Empowering women (reduces fertility)

→ It is the actual bearing of children, determined by:

- ▶ 1. Age of marriage¹
- ▶ 2. Duration of married life
- ▶ 3. Spacing of children
- ▶ 4. Education²
- ▶ 5. Economic status³
- ▶ 6. Religion
- ▶ 7. Nutrition
- ▶ 8. Family planning
- ▶ 9. Other factors (physiological, biological, cultural, social)

Measures for fertility

1 Crude birth rate

2 General fertility rate

3 General marital fertility rate

4 Age-specific fertility rate

5 total fertility rate

1 **Crude birth rate:**

$$\frac{\text{N of live births in a year in a specific locality}}{\text{Estimated mid-year population size in that same year and locality}} \times 1000$$

2 **General fertility rate:**
 Number of live births per 1000 women in the reproductive age-group (15-44 or 49 years) in a given year
 Example: - Number of live births in 2019=90,254. - Mid-year female population aged 15-49 = 2,374,912

$$\text{GFR} = \frac{\text{N of live births in a year in a specific locality}}{\text{Mid - year female population aged 15-49 In that same year and locality}} \times 1000 \longrightarrow \text{GFR} = \frac{90,254}{2374912} \times 1000 = 38$$

Problem? Not all women in denominator at risk for childbirth or married

3 **General marital fertility rate:**
 Number of live births per 1000 **married** women in the reproductive age-group (15-44 or 49 years) in a given year

$$\frac{\text{N of live births in a year in a specific locality}}{\text{Mid - year married female population aged 15-49 In that same year and locality}} \times 1000$$

1. The older a person get, the lower fertility.

2. More educated women, less number of children.

3. **At population level:**

- * low income countries—> high fertility
- * High income countries—> less fertility

At individual level:

- * Low income—> less number of children
- * High income—> large number of children "if we get a collected group of people with high income, number of children is lower than those who have low income."

Measures for fertility cont.

4) Age-specific fertility rate:

Number of live births in a year to 1000 women in any specified age-group

$$\frac{\text{N of live births among a specific age group}}{\text{Mid-year female population in that age group}} \times 1000$$

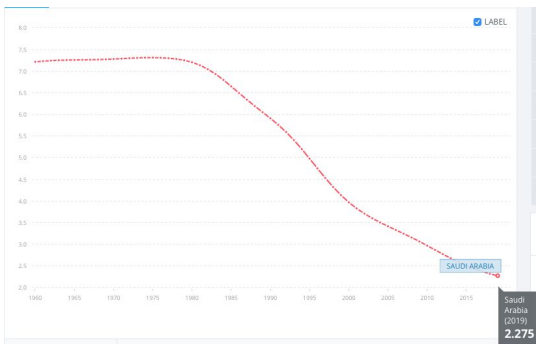
5) Total fertility rate: (rate per woman)¹

The average number of children a woman would have if she were to pass through the reproductive years bearing children at the same rates as the women now in each age group.

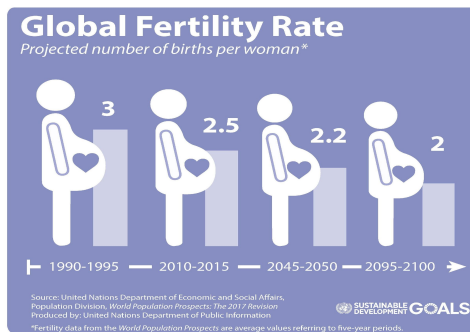
Approximates "completed family size"

$$\frac{\text{Sum of the age specific fertility rates}}{1000} \quad (\text{rate per woman})$$

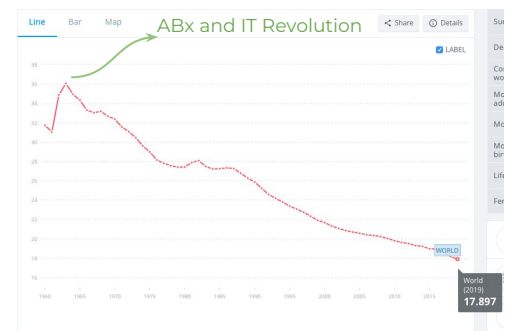
Or **Sum of age specific fertility rate** (rate per 1000 women) if using a 5-year period, then: sum age specific fertility rate * 5



Trend of "total fertility rate" in KSA **2**



Global "total fertility rates" (projection)



Crude Birth Rate Trend (World Bank) **3**

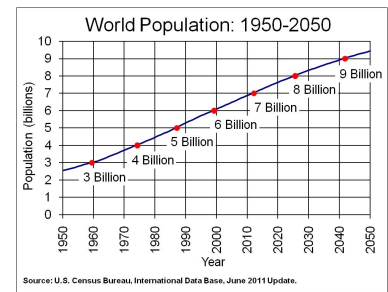
Impact of fertility on age distribution

High fertility
High proportion of young people in the population (e.g. developing countries)

Low fertility
Condensed proportion of retired people in a population (e.g. developed countries)

1. The most reported fertility measure worldwide.
2. Birth rate is lower than death rate → people will increase firstly but then they start to decrease.
3. What cause the birth rate to decrease in this chart? ABx, IT and sexual revolution which means the women gained more control over their bodies and sexuality during the '60s."

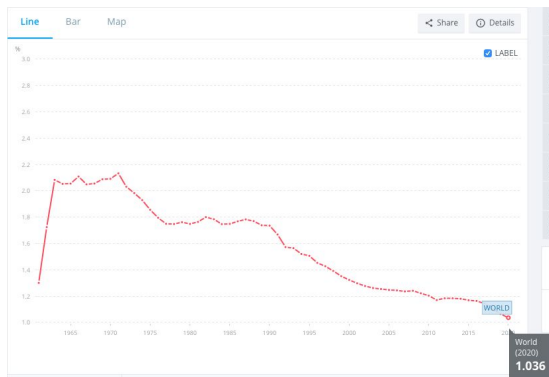
Fertility and population explosion



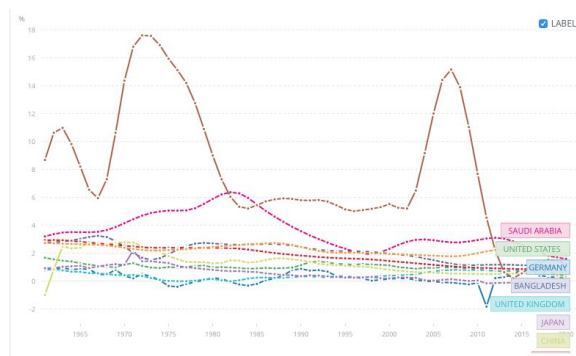
- Conversely starting from the late 1700s
- Thomas Malthus theory: “An essay on the principle of population”¹
- **Argument:**



- **Fallacy in their argument:**
 1. Only focusing on birth control; not meeting healthcare and development needs of disadvantaged populations.
 2. Agricultural revolution made resources more available.²
 3. Better hygiene and health → fertility rates and deaths rates are stable
 3. He didn't consider stages of **demographic transition**.



Annual population growth world



Annual population growth select countries 3

Stages of demographic transition

This explains the changes of birth rates and death rates and describes the population growth cycle in relation to economic development. These have been based on observations of European nations' transitions. However, they are highly applicable to low income nations, too.

<p>1</p> <p>(High stationary)</p> <p>1. High birth rate 2. High death rate.</p> <p>Population growth is not that much increased</p>	<p>2</p> <p>(early expanding)</p> <p>1. Birth rates remain the same 2. Death rates begin to decline</p> <p>E.g. many of the countries in developing world</p> <p>Population growth starts to increase.</p>	<p>3</p> <p>(late expanding)</p> <p>1. Death rates further decline 2. Birth rates begin to fall</p> <p>Birth rates > death rates → population growth</p> <p>Although the birth rate is falling, it still higher than the death rate. So there will be a population growth.</p>	<p>4</p> <p>(low stationary)</p> <p>1. Low birth rate 2. Low death rate 3. Population become stationary:</p> <p>Zero population growth</p> <p>e.g. birth rates = death rates → population equilibrium</p> <p>- Many developed countries</p> <p>Birth rate & death rate are kind of equal to each other such that population is not really growing from year to year.</p>	<p>5</p> <p>(declining)</p> <p>1. Birth rate very low 2. Death rates very low 3. Birth rates < death rates → population decline</p> <p>e.g. Germany and Hungary</p>
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Limitation for this model \ Migration is not considered in the model

1. Thomas Malthus' theory: the population of earth will continue to grow until they cannot support themselves. Additionally, overpopulation, fighting over resources, development of plague or other pandemics will lead to destruction and reduction in populations.
2. Those resources are present, but not equally distributed.
3. Although population size increase, the population growth is decreasing, it means that the people expansion decreases year by year.



Migration



- According to UN reports, 281 million people live outside the country where they were born in 2020*
- Of these, 34 million (12%) are refugees or asylum seekers
- Migration (for economic opportunities) is towards high-income countries, except for refugees mostly migrate to low-income countries
- Median age of migrants is 39 years
- Mostly women → for refuge
- Mostly men → for work

• Ranking of countries that host migrants in 2020 alone:

	Country	No. of migrants hosted
1	USA	51 million
2	Germany	18 million
3	Saudi Arabia	13 million
4	Russia	12 million
5	UK	9 million

- In 2020, Saudi Arabia ranked the **third** worldwide in hosting migrants

Why is migration important to follow?

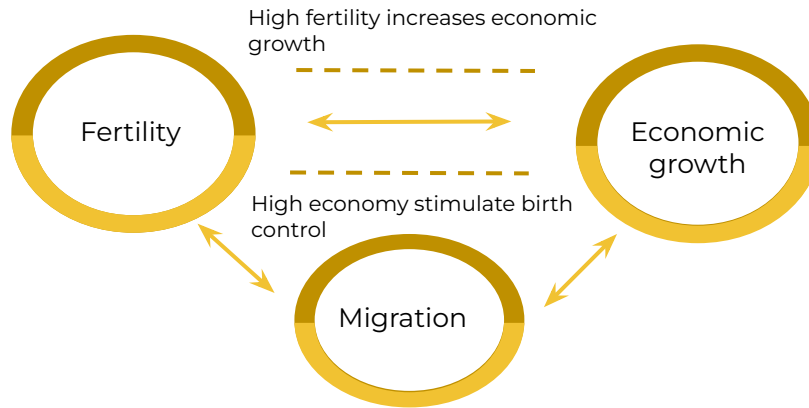
1 It helps predict how the population will be shaped

2 Migration usually goes from low income to more industrialized countries (more economic opportunity)

3 Younger and healthier people migrate to more industrialized areas to work

4 Migration affects economic growth and is affected by economic growth

Relationship between fertility, migration and economic growth



Mortality

Mortality rate:

- Number of deaths in a given population in a specific period of time
- Expressed as per 100 population or per 1000 population

$$\text{MR} = \frac{\text{\# of deaths in a given period of time} \times 100 \text{ (or 1000)}}{\text{Total population in the same given period of time in that same population}}$$

Crude death rate

- Number of deaths in a given population in a specific period of time over the mid-year population of that same time period.

$$\text{CDR} = \frac{\text{\# of deaths in a given period of time} \times 1000}{\text{mid-year population in the same given period of time in that same population}}$$

Other measures of mortality

1. Age specific mortality rate
2. All cause mortality rate
3. Cause-specific mortality rate
4. Infant mortality rate
5. Perinatal mortality rate
6. Neonatal mortality rate
7. Postnatal mortality rate
8. Maternal mortality rate
9. Maternal mortality ratio

How do we measure population growth?

Annual population growth rate:

$$\frac{\text{Crude birth rate} - \text{crude death rate}}{\text{Population size at the beginning of the period}} \times 100$$



Exponential growth and doubling time concept ¹

- In the 1970s a theory was developed that population size grows
- Actual data historical data until now rebuke this theory
- Based on exponential growth, the time needed to double population size (population doubling time) was calculated:
(70/growth rate)
- Doubling time should NOT be used, as population growth is determined by many factors, and DOES NOT show exponential growth

Example how “doubling time” is flawed

Using World Bank data:

- In 1988:
 - Annual growth rate=4.2%, size=15,070,082
 - Exponential growth theory suggests 16.6 years for population to double
- In 2013: 30,052,518
- In 2014: 30,916,994
- Took 26 years for KSA population to double in size

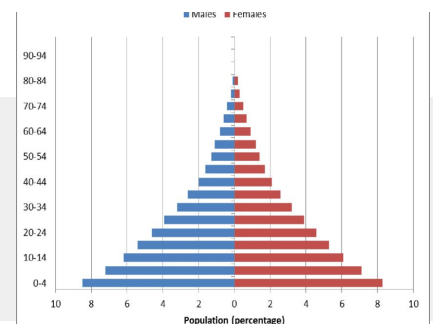
<https://data.worldbank.org/indicator/SP.POP.TOTL?locations=SA&view=chart>

Population Pyramids ²

This shows the age structure in a certain population

By looking at the shape, you will be able to get an idea about:

- Proportion age groups in a population
- Male to female ratio



1. Mathematics for predicting population growth doesn't work because there are many factors play roles in growth.
2. Population pyramid is a graph for group distribution, vertical line represents the age group, while horizontal one represents the percentage of each group.

Components of population pyramids

Base:

wide => high birth rate
 narrow => low birth rate

Apex:

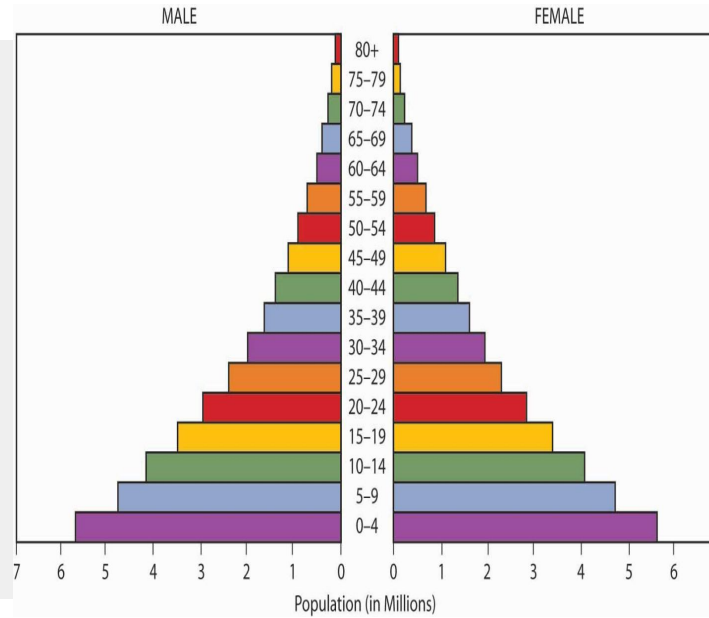
old population (retired population)
wide? narrow?

Height:

life span

Side:

change in population
 size due to death or migration



Important demarcating points

Less than 15

60+ years

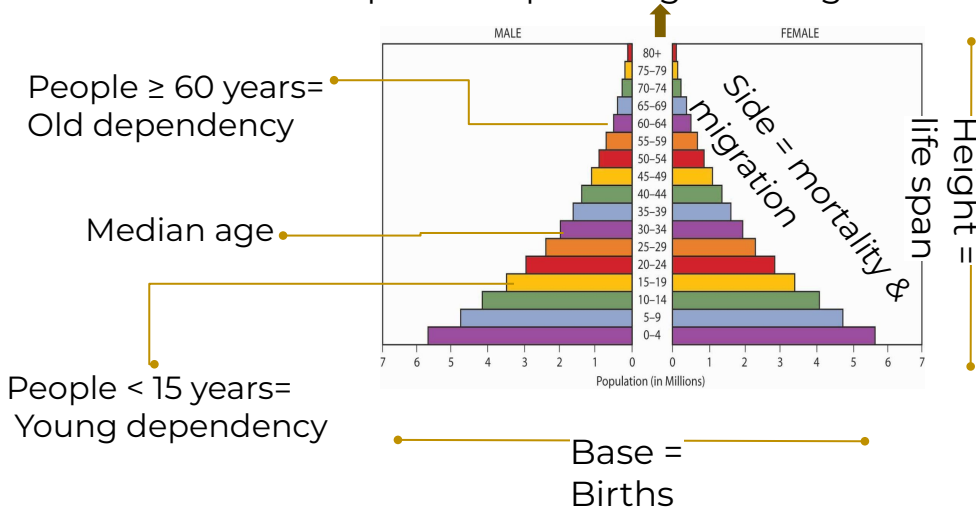
Median age

- Size of dependent youth < 15
- Large size in rapidly growing population
- Small size in slowly growing population

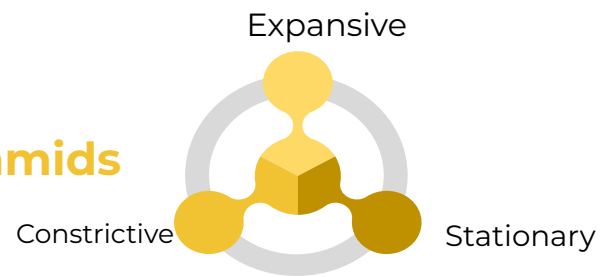
- Represents the size of dependent old ≥ 60
- Large size in population with longer life span
- Small size in population with short life span

- Age that divide the population into two halves
- Small in population with high births
- Large in population with low births

Apex= People living to old age



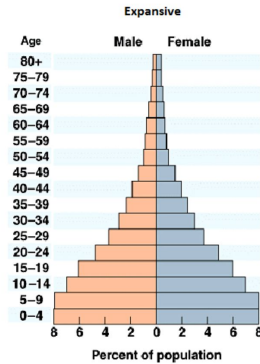
Types of population pyramids



1- Expansive population pyramid

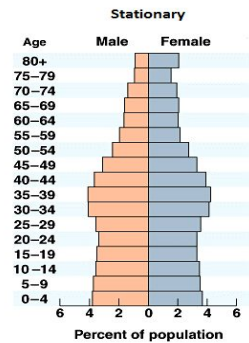
Expansive or expanding pyramid usually presents itself in the form of triangular shape with concave edges

- High population growth due to:
 - High birth rate
 - Shorter life expectancy
 - (high death rate)
- Usually associated with lower standard of living



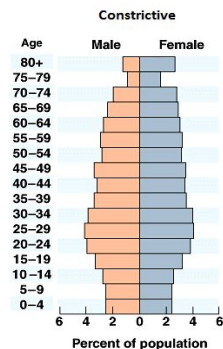
2-Stationary population pyramid

- It is showing unchanging pattern of fertility and mortality
- Age groups almost equal, but it is expected to see smaller figures at the oldest age group



3-Constrictive population pyramid

- Narrow base
- Apex wider
- It is more common when immigrants are factored out
- Indicated:
 - High level of education
 - Use of birth control
 - Good health care system



Other important population distribution measures

• Sex Ratio

What was the M:F ratio in KSA 2020?

Population by Age Groups ,and Gender
 mid year 2020
 منتصف العام ٢٠٢٠

الفئة العمرية Age group	Total Population جملة السكان		Total جملة
	MALE ذكور	FEMALE إناث	
4 - 0	1,477,523	1,421,656	2,899,179
9 - 5	1,536,843	1,479,509	3,016,352
14 - 10	1,343,659	1,297,303	2,640,962
19 - 15	1,228,939	1,177,551	2,406,490
24 - 20	1,429,072	1,248,976	2,678,048
29 - 25	1,850,713	1,492,533	3,343,246
34 - 30	2,002,357	1,393,121	3,395,478
39 - 35	2,394,363	1,414,266	3,808,629
44 - 40	2,181,209	1,227,215	3,408,424
49 - 45	1,676,347	850,177	2,526,524
54 - 50	1,208,823	549,702	1,758,525
59 - 55	807,534	404,701	1,212,235
64 - 60	500,209	296,964	797,173
69 - 65	241,585	201,494	443,079
74 - 70	153,697	140,182	293,879
79 - 75	94,134	82,602	176,736
+ 80	104,418	104,037	208,455
Total جملة	20231425	14781989	35013414

* Preliminary estimates are in the middle of the year
 * تقديرات أولية في منتصف العام

Dependency ratio (x 100)

The proportion of persons above 65 years of age and children below 15 years of age are considered to be dependant on the economically productive age group (15-64 years)

Total dependency ratio (x 100)

The ratio of the combined age groups 0-14 years plus 65 years and above to the 15-65 years age group is referred to as the total dependency ratio.

Population density

• Total population in a certain region divided by the surface area of that same region

$$\text{(Total population / surface area)}$$

* high density population means that the population size is larger than the surface area and this type of populations should be controlled

Population pyramid in Saudi Arabia over the years

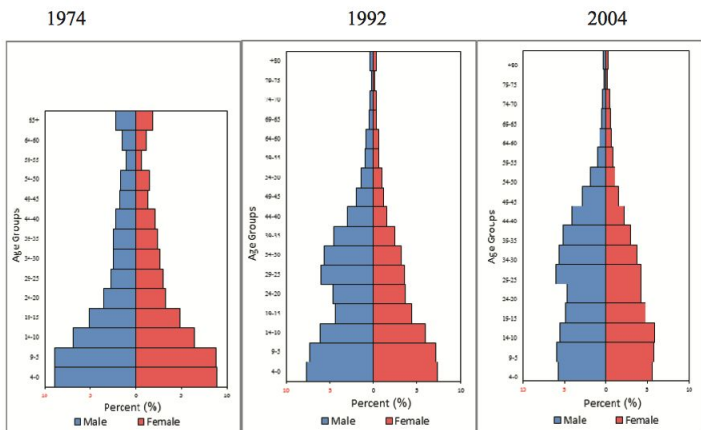


Figure 1. Age pyramid of total population.

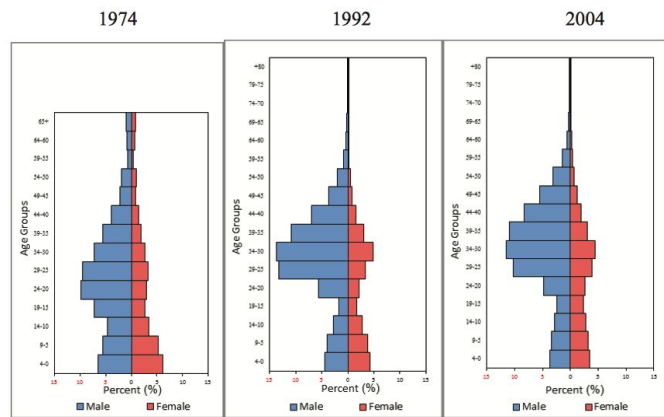
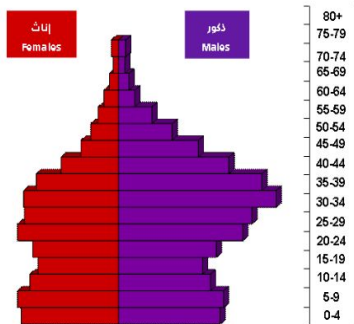


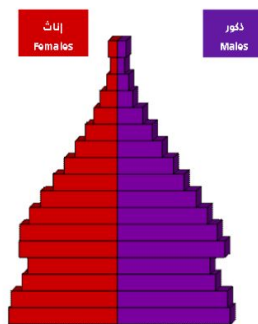
Figure 3. Age pyramid of expatriate population .

KSA population pyramid (2016)

الهيم السكاني لإجمالي السكان
Kingdom's Total Population Pyramid

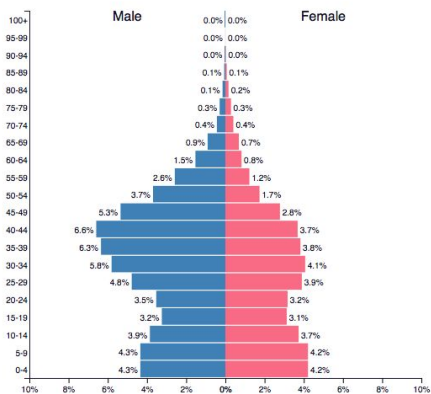


الهيم السكاني للسكان السعوديين
Saudi Population Pyramid

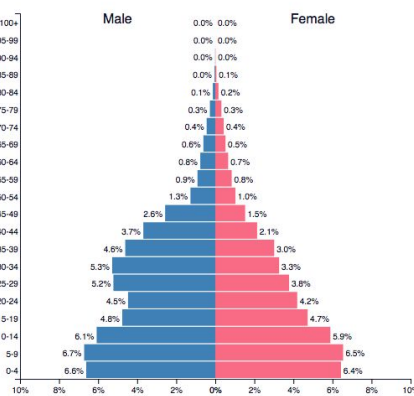


KSA Population Pyramid 20 years 1

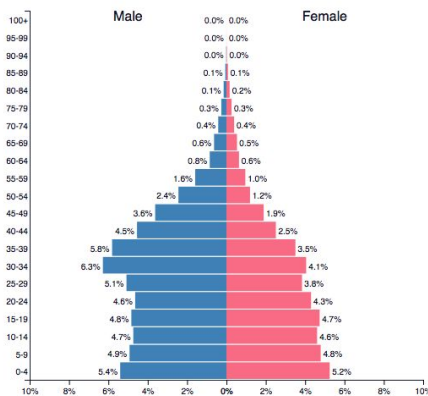
2000



2010



2020



1. KSA population pyramid has transformed from expansive pyramid in 2000 to stationary pyramid in 2020.

Practice Questions

Q1: health of people in a community depends on the interaction between:

A. migration & fertility

B. population size & the space

C. social mobility & mortality

D. None of them

Q2: which one of the following is measured by crude birth rate?

A. fertility

B. mortality

C. migration

D. social mobility

Q3: in which one of the following stages a population reaches to its equilibrium?

A. High Stationary

B. Early Expanding

C. Late Expanding

D. Low Stationary

Q4: which one of the following pyramids has a wide base?

A. stationary

B. expansive

C. constrictive

D. None of them

Q5: which one of the following countries considered the 3rd country world wide to accept migrants?

A. KSA

B. Russia

C. USA

D. UK

Q6: the migration helps in economic growth if the migrants were:

A. Healthy, younger

B. refugee

C. A&B

D. None of them

Answer key:

1 (B) , 2 (A) , 3 (D) , 4 (B) , 5 (A) , 6 (A)

Team leaders

Alaa Alsulmi

Abdulaziz Alghuligah

Khaled Alsubaie

Members

 Noura Aldahash

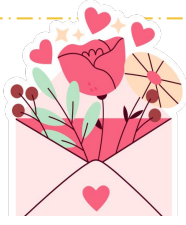
 Alaa Alsulmi

Organizer

 Alaa Alsulmi

Note taker

 Alaa Alsulmi



أعوذ بالله من الشيطان الرجيم

يَا بُنَيَّ إِنَّهَا إِنْ تَكُ مِثْقَالَ حَبَّةٍ
مِّنْ حَرْدَلٍ فَتَكُنْ فِي صَحْرَةٍ أَوْ
فِي السَّمَاوَاتِ أَوْ فِي الْأَرْضِ
يَأْتِ بِهَا اللَّهُ إِنَّ اللَّهَ
لَطِيفٌ خَبِيرٌ

لقمان: ١٦