



Global Demography Concepts and Population Pyramids

Objectives:

- Define demography
- Describe major sources of population data
- List the important factors that determine population growth and calculate measures of these factor
- 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
- Doctors notes 442
- Doctor notes
- Golden notes
- Important
- Extra





Demography

What is demography?

It is the scientific 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



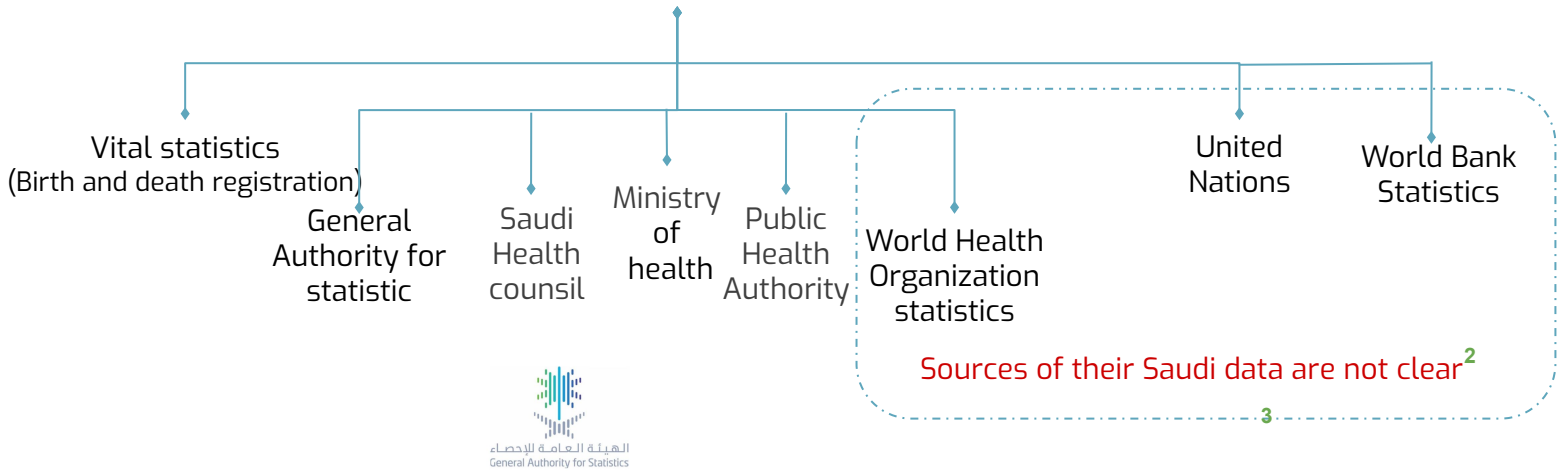
Why demography is important?

- The health of people in a community depends on the dynamic interaction between size of the population and the space they occupy
- to plan health and public health interventions

Sources of demographic data in KSA

Sources

- 1) Proper planning for country
- 2) To sustain healthy individual in certain community
- 3) To plan health intervention
- 4) To prevent population explosion



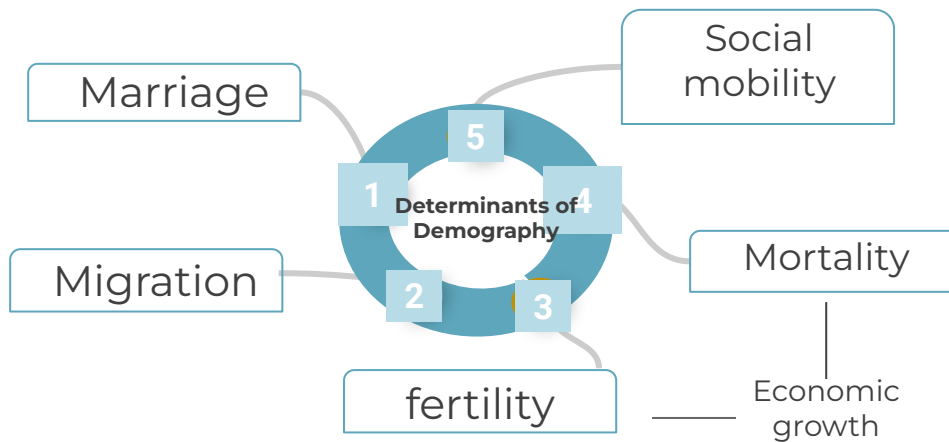
Available Demographic Indicators from GAS

(the organization responsible for updating demographic info in the kingdom)

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 births
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 (What determines demographic distribution of a population and population size?)



An MCQ :
What are the determinants of demography ? It will not come to the exam as this straightforward question but I want you to keep in your mind that fertility is the first and most important determinant and mortality

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

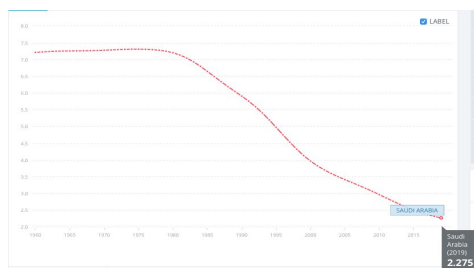
Fertility

It is the actual bearing of children, determined by:

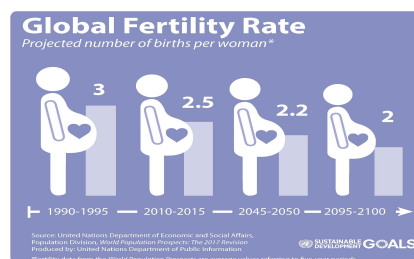
- ▶ 1. Age of marriage
- ▶ 2. Duration of married life
- ▶ 3. Spacing of children
- ▶ 4. Education ²
- ▶ 5. Economic status ³
- ▶ 6. Religion
- ▶ 7. Nutrition
- ▶ 8. Family planning
- ▶ 9. Other factors (physiological, biological, cultural, social)

Measures for fertility:

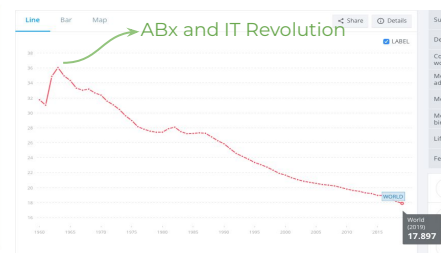
- ▶ 1. Crude birth rate
- ▶ 2. General fertility rate
- ▶ 3. General marital fertility rate
- ▶ 4. Age specific fertility rate
- ▶ 5. Total fertility rate



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



Global "total fertility rates"
(projection)



Crude Birth Rate Trend (World
Bank)

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."



Crude birth rate:

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

Inaccurate and not specific as there is no specific age or if the female is married or not



General fertility rate: More accurate

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

$$\text{GFR} = \frac{\text{N of live births in a year in a specific locality}}{\text{Mid - year female population aged 15-49 In that same year and locality}} \times 1000 \longrightarrow \text{GFR} = \frac{90,254}{2,374,912} \times 1000 = 38$$

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



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.



Age -specific fertility rate:

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

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



Total fertility rate: (rate per woman)

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"

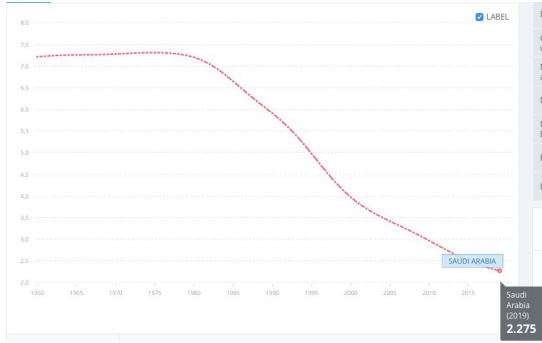
$$\frac{\text{Sum of the age specific fertility rates}}{1000} \text{ (rate per woman)}$$

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

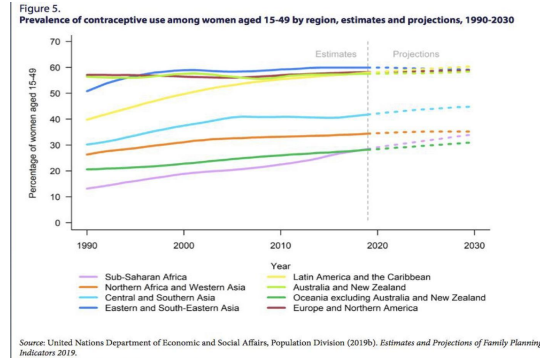
1. The most reported fertility measure worldwide.
2. Birth rate is lower than death rate → people will increase firstly but then they start to decrease.
3. What cause the birth rate to decrease in this chart? ABx, IT and sexual revolution which means the women gained more control over their bodies and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

Global "Total Fertility Rates" (projection)

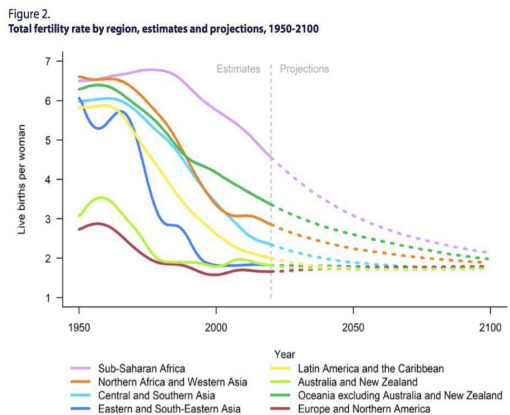
- In the past 30 years (1990 to 2020) the total fertility rate around the world has declined from 3.2 to 2.5 live births per woman.
- The global level of fertility is expected to reach 2.2 live births per woman in 2050 and 1.9 in 2100
- This is problematic because demographers believe that a fertility rate below 2.1 would lead to population growth of zero on the long run



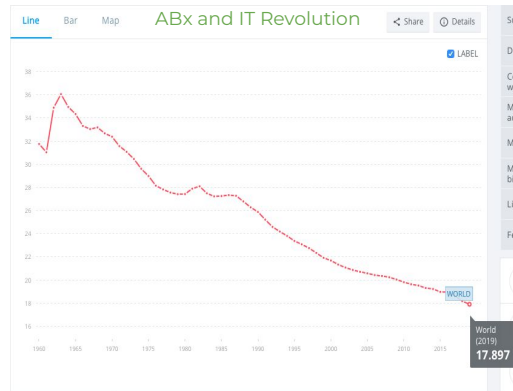
Trend of "total fertility rate" in KSA 2



Part of it can be explained by their trends in family planning and contraception use

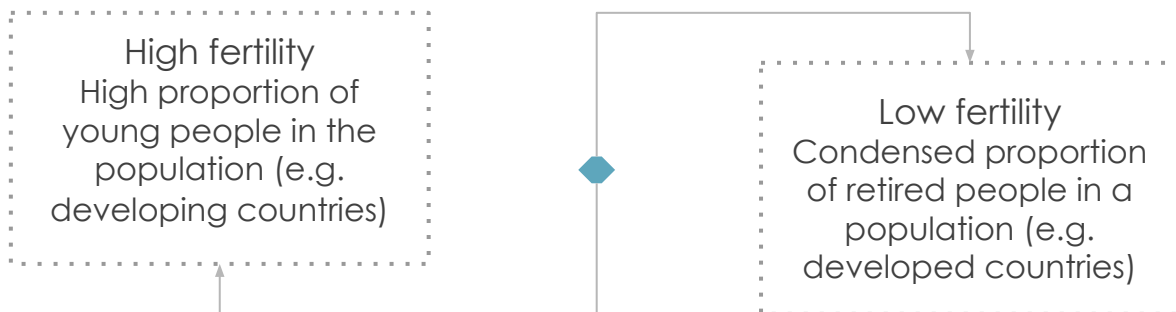


Global "total fertility rates" (projection) worldwide



Crude Birth Rate Trend (World Bank) 3

Impact of fertility on age distribution

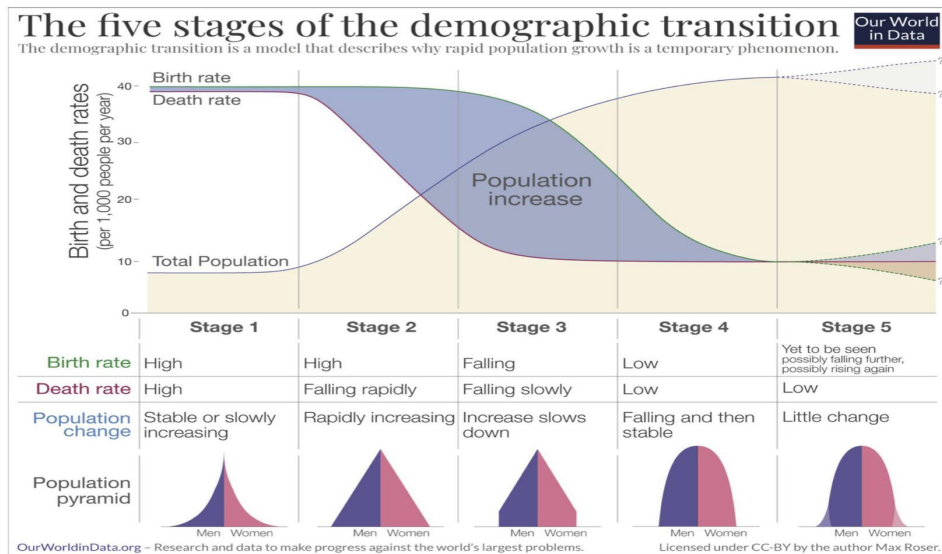


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Stages of demographic transition

- The model that explains why countries go through a period of rapid population growth is called the 'demographic transition.
- It is shown in the schematic figure.

- This explains the relationship between 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.



1

(High stationary)

1. High birth rate
2. High death rate.

Population growth is not that much increased

2

(early expanding)

1. Birth rates remain the same
 2. Death rates begin to decline
- E.g. many of the countries in **developing world**

Population growth starts to increase.

3

(late expanding)

1. Death rates further decline
 2. Birth rates begin to fall
- Birth rates > death rates** → **population growth**

Although the birth rate is falling, it still higher than the death rate. So there will be a population growth.

4

(low stationary)

1. Low birth rate
 2. Low death rate
 3. Population becomes stationary: Zero population growth
- e.g. **birth rates = death rates** → **population equilibrium**
- Many developed countries

Birth rate & death rate are kind of equal to each other such that population is not really growing from year to year.

5

(declining)

1. Birth rate very low
 2. Death rates very low
 3. Birth rates < death rates
 4. population decline
- e.g. **Germany and Hungary**

Limitation of demographic transition 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

An important determinant that it may affects the population



- According to UN reports , 281 million people live outside the country where they were born in 2022
- Of these 34 million (12%) are refugees or asylum seekers

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)

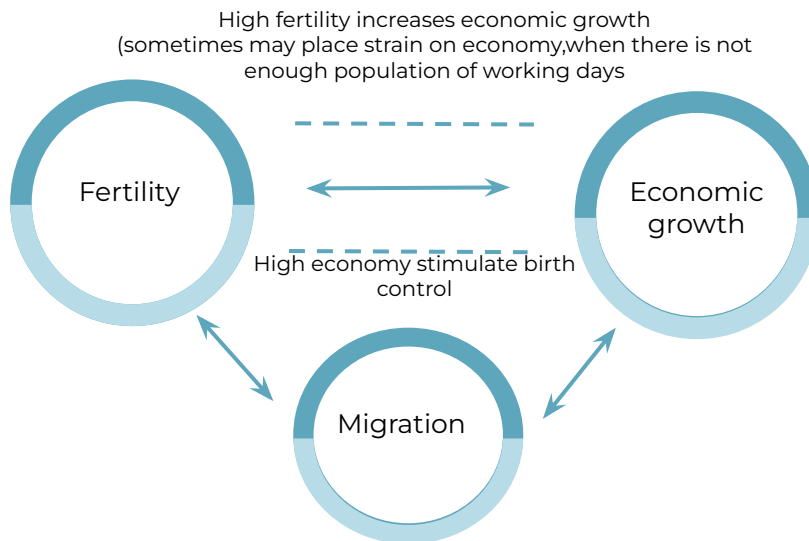
3

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



Migration will affect both of fertility and economic growth
Whenever infertily increase the economic growth will increase too
Both are control the birth

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 Same name and expression

- 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

Just for knowledge we will not ask you about it

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

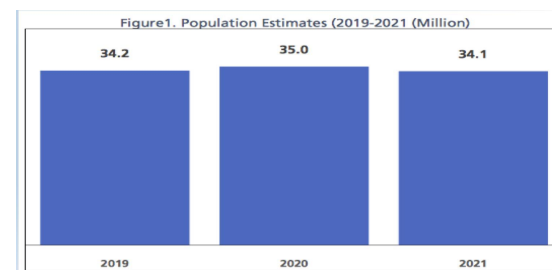
How does that impact healthcare needs ?

Population growth : population growth is determined by births and deaths

How do we measure population growth? Annual population growth rate (expressed in percentage)

Annual population growth rate:

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



Change in population Size in past 3 years in the Kingdom

Utility of Population Pyramid

- ▶ 1. Illustrates the **age-sex structure** of the population
- ▶ 2. It gives information about birth rate, death rate, life expectancy, male-female migration, working and dependent population
- ▶ 3. Indicates stage of demographic transition
- ▶ 4. demonstrate **population growth pattern** that helps in population projection
- ▶ 5. Help in demographic and economic **planning**- what kinds of services and facilities will be needed in future.

Components of population pyramids

• Base:

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

• Apex:

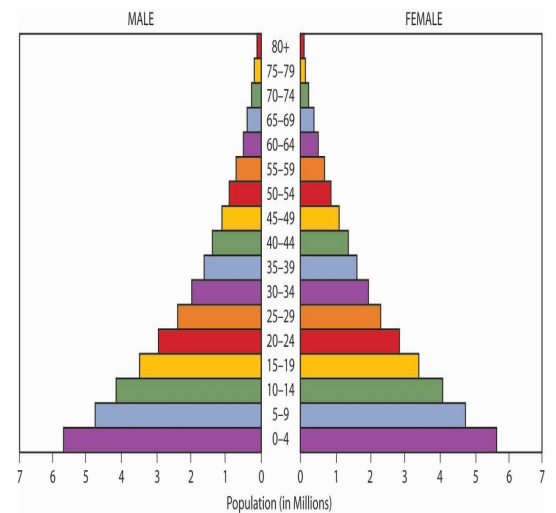
old population (retired population)wide? narrow?

• Height:

life span

• Side:

change in population size due to death or migration



Important demarcating points

Less than 15

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

60+ years

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

Apex= People living to old age

Median age

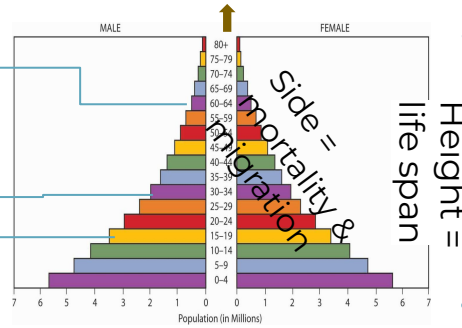


- Age that divide the population into two halves
- Small in population with high births
- Large in population with low births

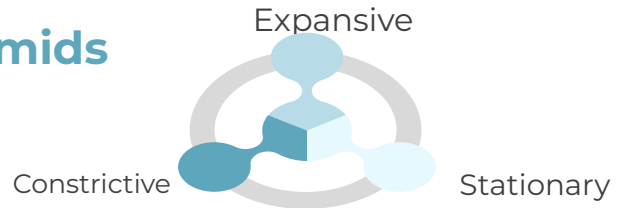
People ≥ 60 years= Old dependency

Median age

People < 15 years= Young dependency



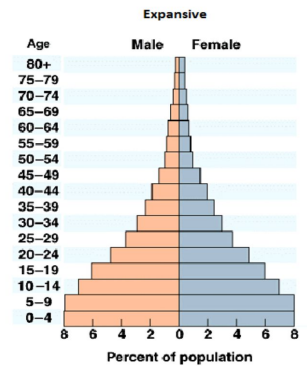
Types of population pyramids



1- Expansive population pyramid

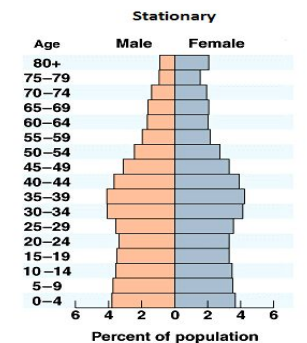
Expansive or expanding pyramid usually presents itself in the form of triangular shape with concave edges

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



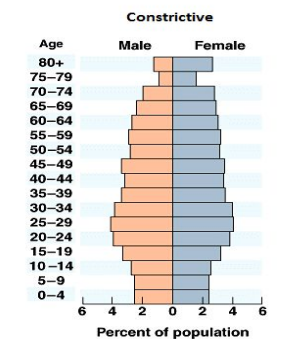
2-Stationary population pyramid

- 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 groups



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
متنصف العام ٢٠٢٠
mid year 2020

فئة العمر Age group	Total Population جملة السكان		
	MALE ذكور	FEMALE نساء	Total جملة
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)

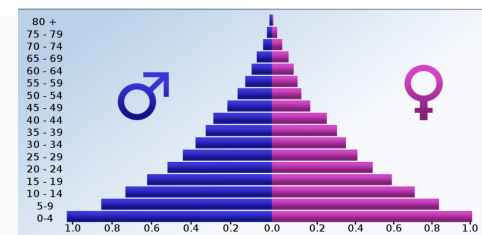
The proportion of persons above 65 years of age and children below 15 years of age are considered to be dependant on the economically productive age group (15-64 years)

-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 Pyramids

Population pyramid is a graph for group distribution, vertical line represents the age group, while horizontal one represents the percentage of each group.



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

Population density

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

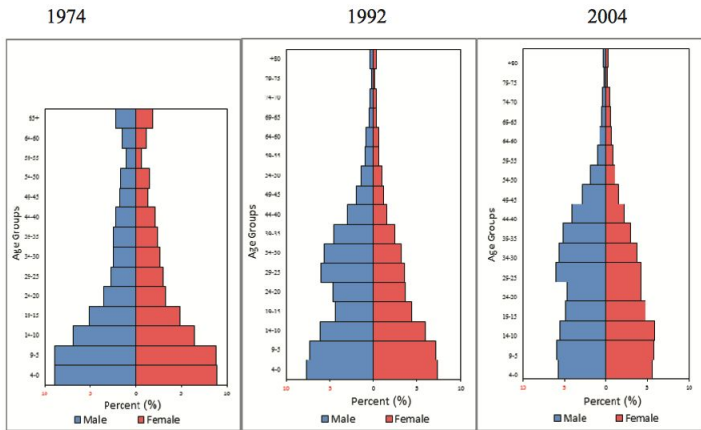


Figure 1. Age pyramid of total population.

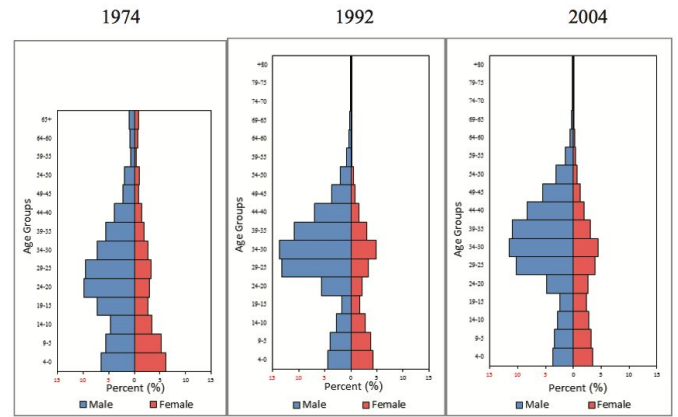
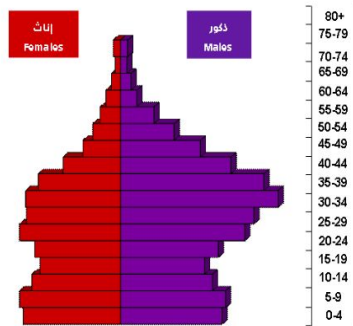


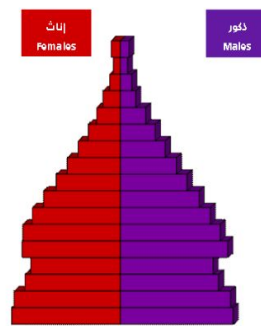
Figure 3. Age pyramid of expatriate population .

KSA population pyramid (2016)

الهيم السكاني لإجمالي السكان
Kingdom's Total Population Pyramid

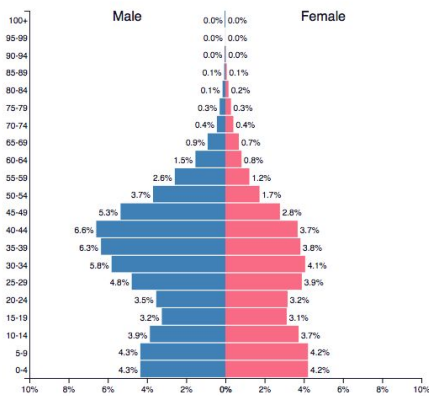


الهيم السكاني للسكان السعوديين
Saudi Population Pyramid

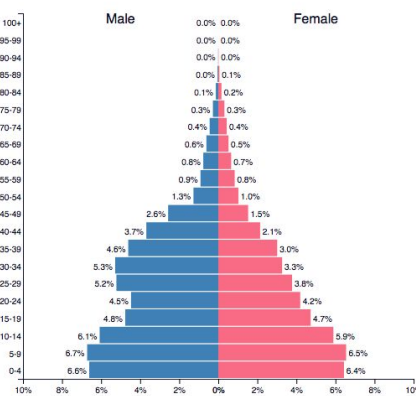


KSA Population Pyramid 20 years 1

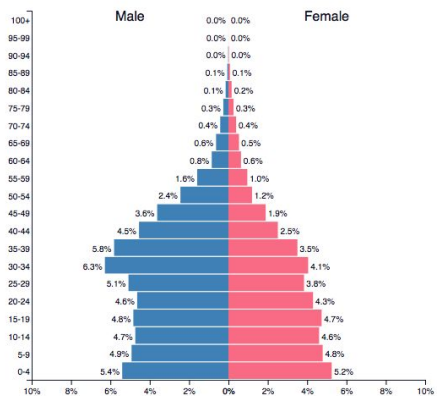
2000



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)

Thanks to all leaders and members from team 439 and team 441 ❤️

"وما نيلُ المطالبِ بالتمنيِّ ،، ولكن تُؤخذ الدنيا غلابا"



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Hoor aloraini
Mohammed Alzeer
Shahad Albukhari
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Meznah alshammari
deema alqahtani
Fatima halawi
raghad alkhodair
Amani Alotaibi
Nouf Aldhalaan
Reema AlJabarin
Reema Alhussien

Sarah Alzahrani
Raid almadi
Rayan alahmari
Mayssar Alshobaki
Kadi aldossari
nora bin hammad
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