COVENANT UNIVERSITY

TUTORIAL KIT

PROGRAMME: DEMOGRAPHY AND SOCIAL STATISTICS

OMEGA SEMESTER

100 LEVEL

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DSS 121:

DSS 121 MARKING GUIDE

INSTRUCTION: ANSWER **QUESTION 1** AND ANY OTHER **TWO** QUESTIONS
TIME: 2 HOURS

Question 1: **(30 MARKS)**

I. Give **Two** (2) reasons why you consider demography to be a relevant social science discipline? **(4 marks)**
II. Name **Three** (3) main sources of demographic data **(3 marks)**
III. Name the components of population growth **(3 marks)**
IV. Name any **Four** (4) socioeconomic determinants of fertility **(2 marks)**
V. Define or explain the term, "Crude Rate of Natural Increase" . **(3 marks)**
VI. What do you understand by the term "Mortality Indicator"? **(2 marks)**
VII. Give **Three** (3) examples of "Fertility Indicator" **(3 marks)**
VIII. What does it mean to say that a population is a "Young Population"? **(3 marks)**
IX. Define the term, "Dependency Ratio" **(4 marks)**
X. How do you define "Life Expectancy at Birth"? **(3 marks)**

ANSWER

i.. Demography is a relevant social science discipline because it provides statistics for government actions and planning in any country of society.

ii. Demography is a relevant social science discipline because almost all government policies are population-based. This is made possible by demographers by furnishing the government with relevant statistics on population of a country or society from time to time through census or survey.

Note: Any reasonable reason should be marked.

II. i. Census ii. Sample Survey iii. Vital Registration

III. Fertility, Mortality and Migration

IV. Income, Occupation, Religion and Culture (Note: Any other socioeconomic factor is correct)

V. Crude Rate of natural increase (RNI) is defined as the difference between the crude birth rate (CBR) and crude death rate (CDR) of a population, usually expressed as a percentage. It is computed thus; $RNI = \frac{(CBR-CDR)}{1000} \times 100$ or simply CBR-CDR/10

VI. Mortality indicators are the parameters through which the incidence of death in a population is measured. Basic mortality indicators include crude death rate (CDR), Age Specific Death Date (ASDR), infant mortality rate, etc.

VII. Crude Birth Rate (CBR), Age Specific Fertility Rate (ASFR), Total Fertility Rate (TFR), General Fertility Rate (GFR), etc.

VIII. A population is termed 'young' if the a large proportion of the its people are under 15 years of age. Usually, the median age of such population is less than 20 years

IX. Dependency ratio can be defined as the population aged fewer than 15 or over 64 years divided by the population aged 15 to 64 years, multiplied by 100.

X. Life expectancy at birth is defined as the average number of years a new born baby is expected to live if he/she experiences the prevailing/current age specific mortality rates of that population throughout his life.

Question 2: (20 MARKS)

A Differentiate between the following terms:

I. Fertility and Fecundity (4 marks)
II. Crude Birth Rate and Age-Specific Fertility Rate (4 marks)
III. Child-Woman Ratio and General Fertility rate (4 marks)

ANSWER

i. Fertility and Fecundity

Fertility is the measure of reproductive performance of women as obtained from the statistics of the number of live births while fecundity is the physiological ability of a woman to bear children.

ii. Crude Birth Rate and Age-Specific Fertility Rate

Crude Birth Rate (CBR) is the number of births occurring in a given year (or specified period) per 1000 population. CBR is also simply referred to as "the birth rate". CBR is calculated thus; CBR = B/P * 1000. Age-Specific Fertility Rate on the other hand is the number of births to women of a specific age group per year divided by the total number of females in that age group only and multiplied by 1000. It is the ratio of births by age of mothers in each age interval. It captures the number of births per 1000 women of a specific age group. It is computed thus; ASFR= Bi x K

Wi

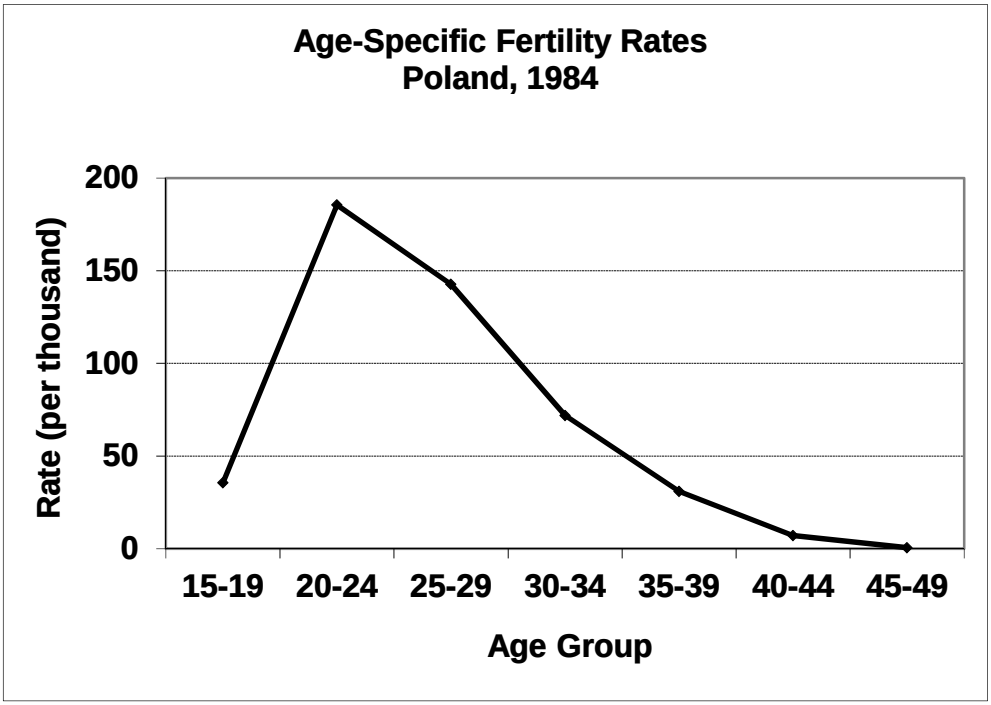
iii. Child-Woman Ratio and General Fertility Rate

Child-Woman Ratio is the number of children under age 5 years to the number of females aged 15–44. It is useful in populations where birth registration is not compulsory. It is limited in use due to the fact that it does not take into account mortality of infants. Where child mortality is

high, there can be significant underestimation of fertility. General fertility rate on the other hand is defined as the total live births per 1000 women of age group 15-44 or 15-49(for developing and developed nations respectively) of a given population within a year. GFR is computed thus: GFR=

$$\frac{B}{P_{w15\text{-}49}} \times 1000$$

B. The diagram below shows the Age Specific Fertility Rates in Poland in 1984. Describe the pattern of fertility in Poland as women go through their reproductive years. **(8 marks)**



ANSWER

THE PATTERN OF FERTILITY IN POLAND AS WOMEN GO THROUGH THEIR REPRODUCTIVE YEARS BASED ON THE DIAGRAM ABOVE

The following pattern of fertility can be deduced from Poland situation in 1984:

- Fertility was low but rising gently for 15-19 years age cohort. This is because perhaps most ladies are still in school during this time since that is the school-going age cohort. Besides, most ladies may still be single in this age group. This is very similar to what normally happens in most countries.
- Fertility rose sharply after age group 15-19 and peaked at age group 20-24. This means that most women in Poland give birth at age group 20-24.
- Fertility began to fall after it peaked in age group 20-24 and flattened out at age group 45-49. This is because most women stop giving birth from here since they have reached menopause.

Question 3 (20 MARKS)

(a). Define or Explain the following terms:

i. Total Fertility Rate (TFR) (3 marks)

ii. Gross Reproduction Rate (GRR) (3 marks)

ANSWER

i. **Total Fertility Rate(TFR):** TFR is defined as the number of children a woman will have if she lives throughout all the reproductive ages and follows the specific fertility rates of a given period(usually a year). It is the average number of children a woman will have if she experiences a given set of ASFRs throughout her lifetime. In other words, it is the average number of children a woman will have by the age of 50 if she is exposed to a given set of ASFR from age 15-49. It is computed thus; TFR = $\frac{+\text{ASFR X Magnitude of the age group}}{1000}$

ii. **Gross Reproduction Rate (GRR):** GRR is the defined as the number of girls which are expected to be born by a woman passing through her child bearing years. GRR is a sex-specific measure of fertility as it relates only to female births. GRR is the sum of ASFRs calculated for female births only. It is a measure of the average number of daughters produced by women during their reproductive lifetime. GRR is computed thus;

GRR = $\frac{\text{No of female births(Bf)}}{\text{Total No of Births(Pf)}}$ x TFR

(b). Use the Table below to estimate the Total Fertility Rate of that population. (9 marks)

Age Group	Total Births	Total No. of Women	ASFR
15-19	43807	1230396	35.60
20-24	257872	1390077	??= 185.5
25-29	236088	1653183	142.81
30-34	115566	1608925	??= 71.83
35-39	38450	1241967	30.96
40-44	6627	941963	7.04
Total			473.75

(c). Given that the sex ratio at birth in that population is 105:100 (M: F), estimate the Gross Reproduction Rate (GRR) of that population. (5 marks

ANSWER

NOTE: ASFRs for age groups 20-24 and 30-34 have been computed because the figures will form part of the calculation of TFR as required in 4b above.

b) The Total Fertility Rate (TFR)

$$TFR = 5 * \sum_{a=15}^{44} \frac{B_a}{W_a} * 1000 = 5 * \sum \text{ASFR}$$

$$\text{Or} \quad TFR = \frac{+ASFR \times \text{Age group}}{1000}$$

$$473.75 * 5/1000 = 2.37$$

$$= 2.4$$

A woman will give birth to an average of two children from the information provided in the table above if she experiences a given set of ASFRs throughout her lifetime

c) The Gross Reproduction Rate (GRR) given that the sex ratio is 105:100 (M: F)

$$GRR = \Sigma ASFR(a) * \frac{B^f(a)}{B^{m+f}(a)}$$

Where; B^f = Number of female births, B^{m+f} = All Births (male and females), $p_f = B^f / B^{m+f}$ (proportion of female births)

OR, GRR can also be computed thus;

$$GRR = \frac{\text{No of female births (Bf)}}{\text{Total No of Births (Both sexes)}} \times TFR$$

$$= P_f * TFR$$

NOTE: The question states that the sex ratio is 105:100 (M: F), that is for every 100 females born, 105 males are born.

- Pf = 100/(105+100) = 100/205 = 0.49
- P_f = 0.49 and TFR = 2.4

$$GRR = 0.49 \times 2.4 = 1.18$$

$$= 1.2$$

Question 4: (20 MARKS)

A. Define the following:

(i) Infant Mortality Rate (ii) Neonatal Mortality Rate (iii) Maternal Mortality Ratio (6 marks)

ANSWER

i. INFANT MORTALITY RATE: Infant Mortality Rate (IMR) can be defined as the number of infant deaths per 1000 live births. It can also be defined as the deaths of new born babies before they clock a year. It is computed thus; $D_0/B * 1000$ where D_0 is the number of infants, B is the number of live births and 1000 is constant since we are working with rate.

ii. NEONATAL MORTALITY RATE: Neonatal mortality rate is the number of deaths of newborns in the first month of life per 1000 births. Neonatal mortality rate is computed thus;

$$= \frac{D_0 \text{ - 3 Weeks or < 1 month}}{\text{Live Births}} \times 1000$$

iii. MATERNAL MORTALITY RATIO: Maternal mortality ratio is the number of deaths due to maternal causes per 100,000 live births. Maternal mortality ratio is computed thus: $D_{mc} / B * 100, 000$

B. (i) Calculate the conventional Infant Mortality Rate for US (1990), based on the following data:

(4 marks)

Year	Birth Cohort	Births	Deaths	Infant deaths
1989	1989	4,040,958	39,655	33,645
1990	1989	-----		5,861
1990	1990	4,158,212	38,351	32,490
1991	1990	-----		5,657
1991	1991	4,110,907	36,766	31,109

(ii). Using **Cohort Probability** adjustment method, calculate from the above data, the adjusted Infant Mortality Rate for US in 1990. **{Hint: $IMR_c = (D^1_y + D^{11}_{y+1}) / B_y$}** **(7 marks)**

(iii) Compare the result you obtained in (ii) above with the one on conventional infant mortality rate in (i) above.
(3 marks)

ANSWER

i. Conventional Infant Mortality Rate for US (1990):

$$IMR\ (1990) = (D^1_y + D_{y-1}) / B_y * 1000)$$

$$= \{32,490+5,861/4,158,212\} * 1000$$

$$= 9.2$$

ii. Infant Mortality for 1990 Using Cohort Probability adjustment method = $IMR_c = (D^1_y + D^{11}_{y+1}) / B_y * 1000)$

$$= \{32,490+5,657/4,158,212\} * 1000$$

$$=9.17$$

App. 9.2

iii. There is no difference between the results obtained for conventional IMR in (i) above and the adjusted IMR using cohort probability adjustment method in (ii). The two estimates produced almost the same result.

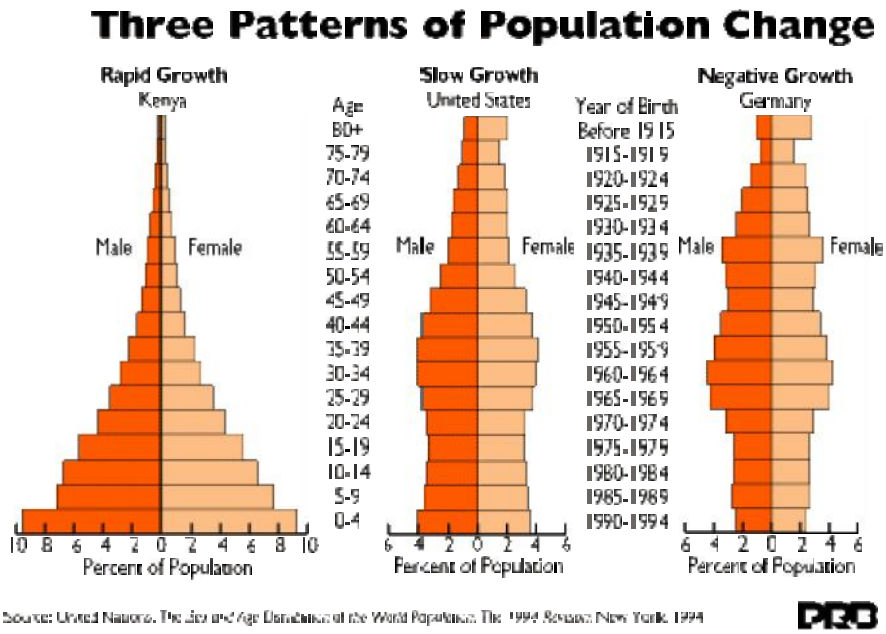
Question 5: **(20 MARKS)**

(i) In the diagram below, the population structures of three different countries are presented. What name do demographers call this type of diagrams? **(4 marks)**

(ii) Rank the countries according to how you perceive their levels of fertility to be (low-to-high)? **(6 marks)**

(iii) Which of the three countries appears to have the highest **child-dependency ratio** and which one appears to have the lowest? Explain how you know this? **(5 marks)**

(iv) Which of these countries appear to have the highest **life expectancy at birth** and which one has the lowest? Explain how you know this? **(5 marks)**



ANSWER

i. Demographers call this type of diagrams population pyramid

ii. Fertility from low-to-high is ranked thus: Germany-USA-Kenya

iii. Of the three countries, Kenya has the highest child-dependency ratio while Germany has the lowest. This is because the pyramid of Kenya is flat at the base meaning that there are more people between ages 0 and 15 years within their population more than other age group. Germany on the hand has a thin-base-pyramid meaning that the population of people less than 15 years of age is not predominant.

iv. Germany seems to have the highest life expectancy at birth while Kenya **GLARINGLY** has the lowest life expectancy at birth among the three countries in question. This is because a sizeable percentage of folks in Germany live beyond 70 years as it is evident in a thick top pyramid of Germany. Kenya on the other hand is so thin at the top that less than one percent of the population lives above 70 years.