



ITC 6000

Database Management Systems

“Module 4 – HIV Assignment”

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OBJECTIVE

The Human Immunodeficiency Virus, also known as HIV, is a retrovirus that affects the human immune system, decreasing its ability to fight infections and diseases. It was discovered in the early 1980s and has since become a worldwide health hazard. HIV is primarily transmitted by contact with an infected person's bodily fluids, such as blood, sperm, vaginal fluids, rectal fluids, and breast milk. Unprotected sexual contact, sharing needles for drug use, and transmission from mother to child during childbirth or breastfeeding are all common mechanisms of transmission.

HIV infection advances in stages, beginning with acute infection, which is commonly accompanied by flu-like symptoms, and ending with chronic infection, which may not show any symptoms. If left untreated, it can progress to AIDS (acquired immunodeficiency syndrome), a severe stage in which the immune system fails.

Blood tests are used to detect the virus or its antibodies. While there is no cure for HIV, it can be effectively controlled with antiretroviral therapy (ART), a combination of drugs that decrease viral replication while also preserving immune function and lowering the risk of transmission. Safe sex practices, clean needle use, and pre-exposure prophylaxis (Prep) for high-risk persons are all prevention approaches. HIV education, de-stigmatization, and global efforts have resulted in success in combating this virus, increasing the quality of life for those living with HIV, and minimizing its transmission.

The **Region** we have chosen is **Middle East & North Africa**.

SOURCE

Table 1 - <https://www.unaids.org/en/resources/fact-sheet>
https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=UNICEF_MENA.HVA_PMTCT_MTCT.T.&startPeriod=2007&endPeriod=2016

Table 2 - <https://databank.worldbank.org/source/world-development-indicators#>

KEY PERFORMANCE INDICATORS

I.) HIV Prevalance Rate

```
update hiv_stat_mapping
set hiv_prevalence_rate = (
    select (hiv_stat_mapping.estimated_number_ofpeople_living_withhiv /
region_stats.population)*1000000
    from region_stats
    where hiv_stat_mapping.hiv_stat_id = region_stats.hiv_stat_id
);
```

Explanation - This SQL code updates the HIV_Prevalence_Rate column in the HIV_Stat_Mapping table by calculating a new value based on the number of people living with HIV from the HIV_Stat_Mapping table and the population data from the REGION_STATS table. The result is scaled to represent HIV prevalence per one million people.

II.) HIV Mortality Rate

```
update hiv_stat_mapping
set hiv_related_mortality_rate = (
    select (estimated_number_of_death_due_to_hiv /
estimated_number_ofpeople_living_withhiv) * 100
    from hiv_stat_mapping as subquery
    where subquery.hiv_stat_id = hiv_stat_mapping.hiv_stat_id
);
```

Explanation - this SQL code updates the HIV_Related_Mortality_Rate column in the HIV_Stat_Mapping table by calculating the mortality rate for each row based on the number of deaths due to HIV and the number of people living with HIV, both of which are stored in the same table. The result is a mortality rate expressed as a percentage.

1	UPDATE HIV_Stat_Mapping
2	SET HIV_Prevalence_Rate = (
3	SELECT (HIV_Stat_Mapping.Estimated_Number_OfPeople_Living_WithHIV / REGION_STATS.Population)*1000000
4	FROM REGION_STATS
5	WHERE HIV_Stat_Mapping.HIV_Stat_Id = REGION_STATS.HIV_Stat_Id
6);
7	
8	UPDATE HIV_Stat_Mapping
9	SET HIV_Related_Mortality_Rate = (
10	SELECT (Estimated_Number_Of_Death_Due_To_HIV / Estimated_Number_OfPeople_Living_WithHIV) * 100
11	FROM HIV_Stat_Mapping AS subquery
12	WHERE subquery.HIV_Stat_Id = HIV_Stat_Mapping.HIV_Stat_Id
13);
14	
15	

	Number_Of_Death_Due_To_HIV	Estimated_Number_Of_Women_15+_WithHIV	MTC_Transmission_Rate	Percentage_Of_Pregment_Women_KnownHIV_Status	HIV_Prevalence_Rate	HIV_Related_Mortality_Rate
1		42 000	39.57	9.0	0.268306007736052	6800.0
2		44 000	37.49	10.0	0.289249820834059	6000.0
3		45 000	36.51	13.0	0.282534946381507	5818.18181818182
4		46 000	34.85	14.0	0.276383606043089	5727.27272727273
5		46 000	34.08	14.0	0.295533511169146	5333.33333333333
6		48 000	33.03	14.0	0.289772758102244	5416.66666666667

III.) Explanation - The query retrieves data from two tables, calculates the number of people living with HIV per unit of population, and groups the results by "Country," "Year," and "Population." The final result is sorted by "Country" and "Year." Please note that there is a "Country" column in the GROUP BY clause that is not selected in the columns, so it might be intended for aggregation purposes but is not included in the output.

29	
30	SELECT RS."Region_Name", HS."Year", HS.Estimated_Number_OfPeople_Living_WithHIV,
31	(RS.Population)/HS."Estimated_Number_OfPeople_Living_WithHIV" AS "People_Living_With_HIV",
32	RS."Population"
33	FROM "HIV_STAT_Mapping" HS
34	JOIN "REGION_STATS" RS ON HS."HIV_Stat_Id" = RS."HIV_Stat_Id"
35	GROUP BY "Country", HS."Year", RS."Population"
36	ORDER BY "Country", HS."Year";
37	

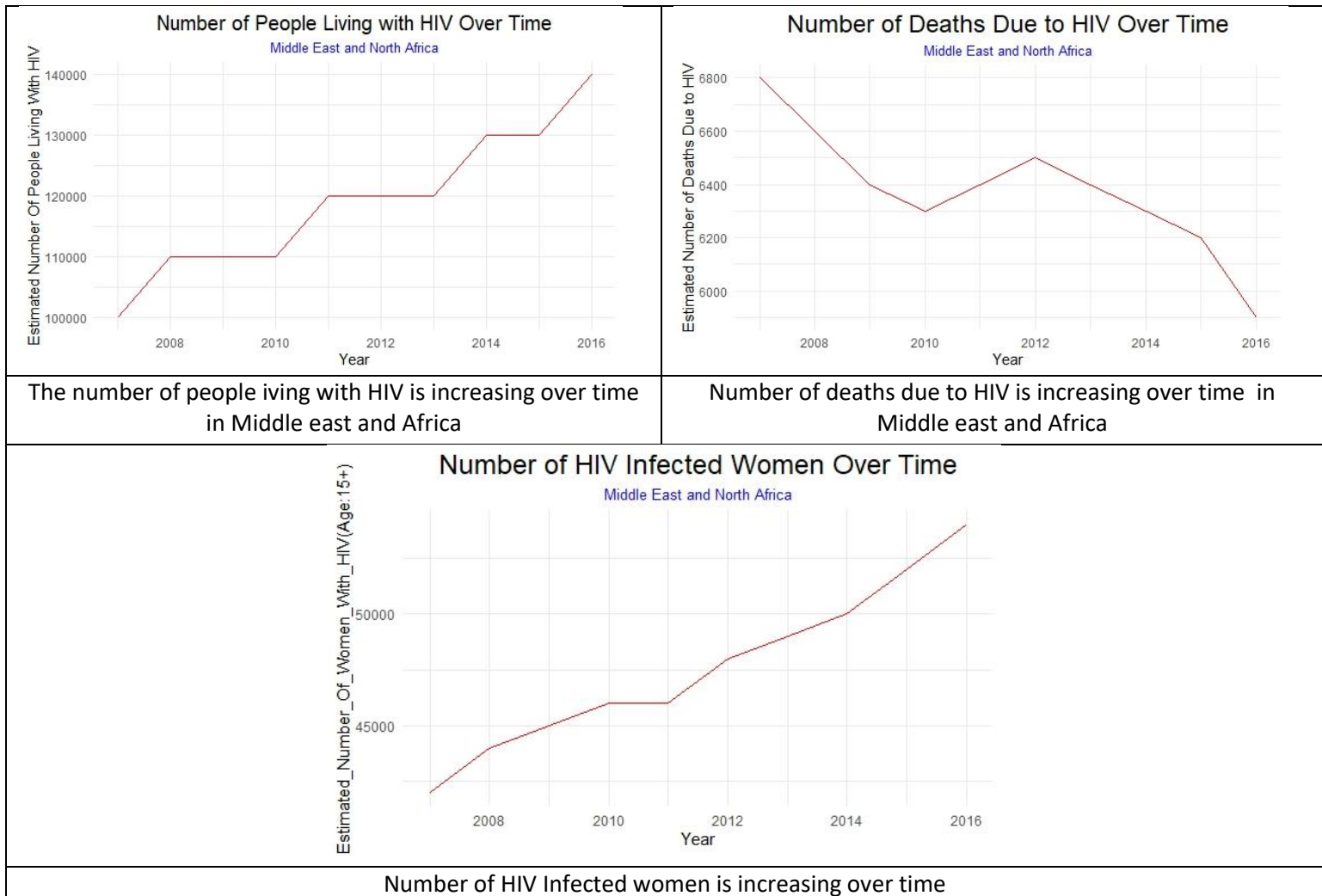
	Region_Name	Year	Estimated_Number_OfPeople_Living_WithHIV	People_Living_With_HIV	Population
1	Middle East & North Africa	2007	100 000	3713248.02	371324802.0
2	Middle East & North Africa	2008	110 000	3457219.08181818	380294099.0
3	Middle East & North Africa	2009	110 000	3539385.17272727	389332369.0
4	Middle East & North Africa	2010	110 000	3618159.60909091	397997557.0
5	Middle East & North Africa	2011	120 000	3383711.025	406045323.0
6	Middle East & North Africa	2012	120 000	3450980.025	414117603.0
7	Middle East & North Africa	2013	120 000	3523253.40833333	422790409.0

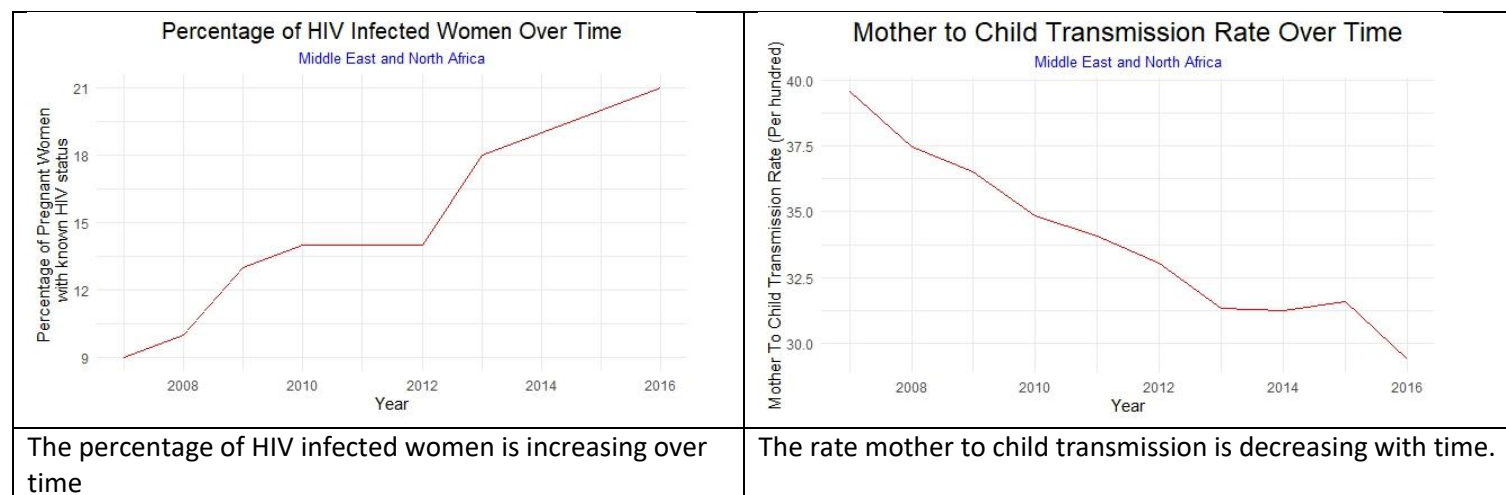

```
-- At line 30:
SELECT RS."Region_Name", HS."Year", HS.Estimated_Number_OfPeople_Living_WithHIV,
(RS.Population)/HS."Estimated_Number_OfPeople_Living_WithHIV" AS "People_Living_With_HIV",
RS."Population"
FROM "HIV_STAT_Mapping" HS
JOIN "REGION_STATS" RS ON HS."HIV_Stat_Id" = RS."HIV_Stat_Id"
GROUP BY "Country", HS."Year", RS."Population"
ORDER BY "Country", HS."Year";
-- Result: 10 rows returned in 11ms
```

DATA VISUALIZATION

Trend Graphs for HIV Dataset:

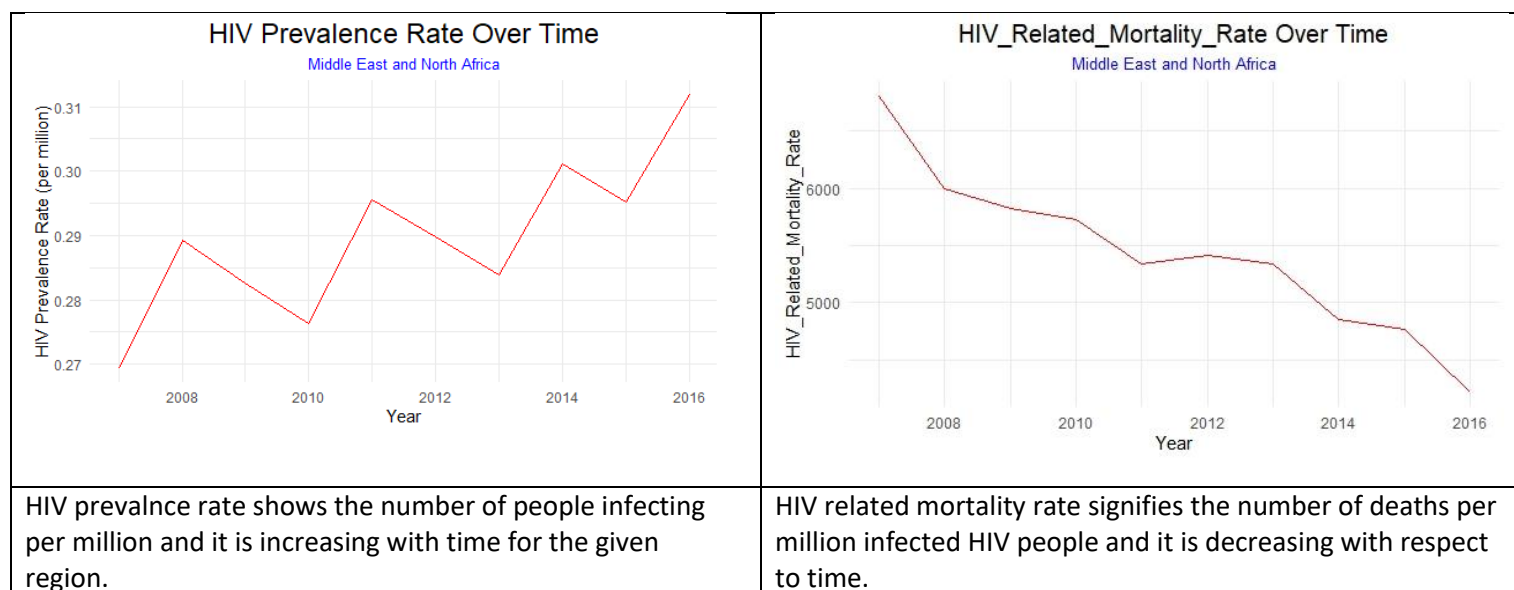
Trend graphs are visual representations of how a variable changes over time, helping identify patterns, trends, and anomalies. They are valuable for monitoring and decision-making in various fields and aid in communicating complex data trends to a broad audience.



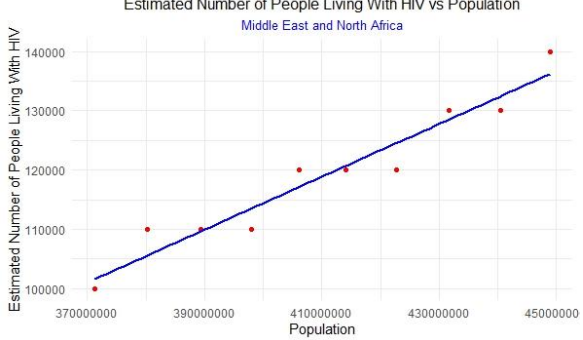
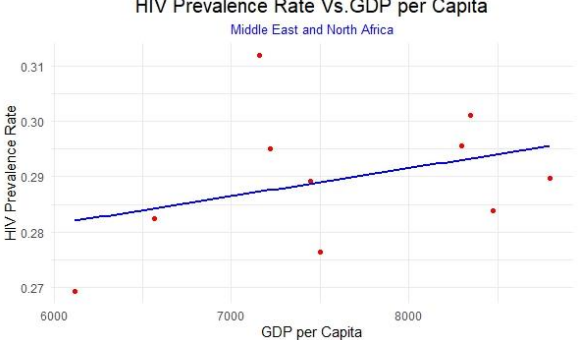
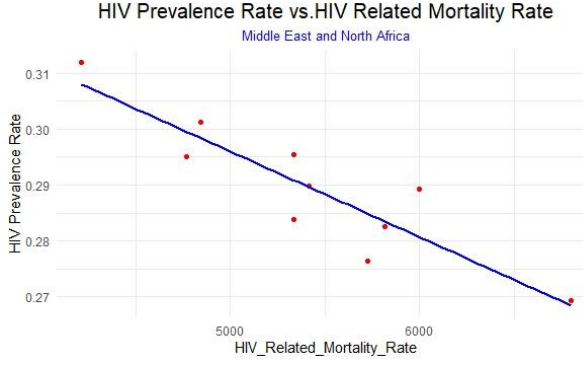
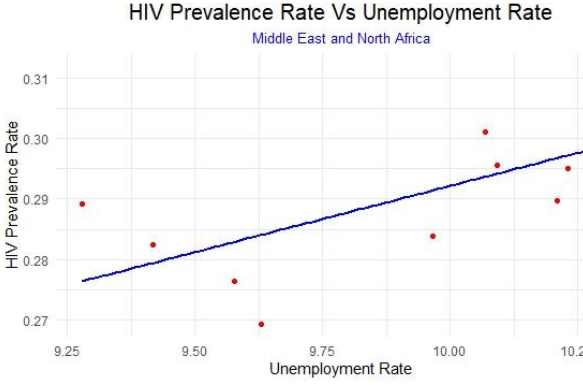


Trend Graphs for KPIs:

The graphs given below show how KPIs are performing over time in Middle East and North African region.



Scatter Plots: A scatter plot is a visual representation of two variables' relationship. Positive correlation is when both variables increase together, forming an upward pattern. Negative correlation is when one variable increases while the other decreases, creating a downward pattern on the plot.

	
<p>There is a positive correlation between estimated number of people with HIV and population that is the number of people livingwith HIV is increasing with increase in population.</p>	<p>HIV Prevalence Rate and GDP per capita are in weak positive correlation</p>
	
<p>HIV Prevalence Rate and GDP per capita are showing negative correlation that means the mortality rate is decreasing even though the prevalence rate is increasing.</p>	<p>HIV Prevalance rate is in positive corealtion with Unemplment rate that signifies that the HIV prevalence rate is increasing with increasing unemployment rate</p>

CONCLUSION

After analyzing the scatter plots, it is clear that a higher population density leads to a higher prevalence of HIV cases. Therefore, the government should take appropriate measures to control population growth. As observed from the graphs, there is a direct correlation between the unemployment rate and HIV prevalence rate. To curb the spread of HIV, the government should implement policies that promote employment opportunities.

Moreover, the prevalence rate of HIV has been increasing with time, while the mortality rate has been decreasing. This can be attributed to the advancements in medical technology and efficient treatment options. The progress in antiretroviral therapy (ART) has made it possible for people living with HIV to live longer and healthier lives. Therefore, it is crucial for the government to invest in research and development to improve the existing treatment options and make them more accessible to all.

In conclusion, the government should focus on population control measures, employment policies, and research to combat the spread of HIV and reduce the mortality rate associated with it.