```
 /* IMPORTING DATA  */

PROC IMPORT DATAFILE="/home/u63680151/NITHIN_EDA/osteoporosis.csv" OUT=Imported DBMS=CSV replace;
RUN;

/* SORTING AND REMOVING DUPLICATES BASED ON VARIABLE "ID" */

PROC SORT DATA=Imported NODUPKEY OUT=EDA;
BY ID;
RUN;
PROC PRINT DATA=EDA;
TITLE " OSTEOPOROSIS DATA ";
RUN;



data EDA;
set EDA (rename=('Hormonal Changes'n=Hormone
'Family History'n=Heridatary
'Race/Ethnicity'n=Race
'Body Weight'n=Weight
'Calcium Intake'n=Calcium
'Vitamin D Intake'n=VitaminD
'Physical Activity'n=Exercise
'Alcohol Consumption'n=Alcohol
'Medical Conditions'n=Condition
'Prior Fractures'n=Fractures));
run;




/* GENERATING FREQUENCY REPORTS */



/* GENDER */

ods graphics on;
proc freq data=EDA;
tables Osteoporosis*Gender/ nocum nocol norow plots=freqplot(tWOWAY=CLUSTER ORIENT=VERTICAL);
footnote '  1 - Suffering From Osteoporosis
    0 - Not Suffering From Osteoporosis ';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables Osteoporosis*Gender/list nocum nocol norow plots=freqplot(tWOWAY=CLUSTER ORIENT=VERTICAL);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;


* total female = 849
 total male = 900
 ==================
 820 peoples are not suffering from Osteoporosis
 Female = 400 percentage =48.78
 Male = 420 percentage =51.22
 929 peoples are suffering from Osteoporosis
 Female = 449 percentage =48.33
 Male = 480 percentage =51.67
As a result, (3.33%) of males had higher rates of osteoporosis than females.
=============================================================================================================;



/* Hormonal change */

*Does patients suffering from hormonal changes cause osteoporosis? ;
PROC FREQ DATA=EDA;
TABLES GENDER*OSTEOPOROSIS*HORMONE / nocum norow nocol PLOTS=FREQPLOT (TWOWAY=CLUSTER ORIENT=VERTICAL);
RUN;
PROC FREQ DATA=EDA;
TABLES GENDER*OSTEOPOROSIS*HORMONE / list nocum norow nocol PLOTS=FREQPLOT (TWOWAY=CLUSTER ORIENT=VERTICAL);
```

```
RUN;


*FROM THE ABOVE FREQUENCY REPORT
Total individuals suffering from hormonal changes: 873
Breakdown by gender:
 Females: 435
 Postmenopausal + osteoporosis: 225 (25.77%)
 Postmenopausal, no osteoporosis: 210
 Males: 438
 Postmenopausal + osteoporosis: 244 (27.94%)
 Postmenopausal, no osteoporosis: 194
 Conclusion:
 Hormonal change and osteoporosis: 469 individuals (53.72%)
 Hormonal change but no osteoporosis: 404 individuals (46.27%)
 Similar percentages between females with both conditions and those with osteoporosis only.
 Increase in male patients with hormonal change and osteoporosis compared to those without
 hormonal change but with osteoporosis: 1.01%
 Overall, males have a 1.01% higher risk, with a 2.17% greater risk for osteoporosis when
 hormonal changes are present.
==========================================================================================================;


/* Ancestry */
ods graphics on;
proc freq data=EDA;
tables Osteoporosis*Heridatary/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables Osteoporosis*Heridatary/LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;




*FROM THE ABOVE FREQUENCY REPORT
 Out of 1749 patients 929 have OSTEOPOROSIS 53.12% of total patients data.
 1. OSTEOPOROSIS with Ancestry == 453 ==> 453/929*100 => 48.76%
 So (48.76%) of total patients with Ancestry have osteoporosis
 2. OSTEOPOROSIS without Ancestry == 476 476/929*100 => 51.23%
 So (51.23%) of total patients without Ancestry have osteoporosis
 CONCLUSION :
 Ancestry (FAMILY HISTORY ) DOES NOT HAVE MORE IMPACT ON OSTEOPOROSIS
==========================================================================================================;



/* Race */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Race/ nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Race/LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;



/* FROM THE ABOVE FREQUENCY REPORT
 Total patients with osteoporosis: 929 (53.12% of total patients)
 Breakdown by gender:
 Female patients with osteoporosis: 449 (52.89% of total females)
 Male patients with osteoporosis: 480 (53.33% of total males)
 Ethnicity breakdown:
```

```
 African American: 157 (18.49%)
 Asian: 142 (16.73%)
 Caucasian: 150 (17.67%)
 Conclusion:
 Overall, osteoporosis affects 53.33% of male patients and 52.89% of female patients.
 African Americans have a higher prevalence of osteoporosis compared to Asians and Caucasians.
=================================================================================================;



/* Calcium */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Calcium/ nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Calcium/ list nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

*FROM THE ABOVE FREQUENCY REPORT
 Total patients: 1749, with 929 (53.12%) having osteoporosis.
 Female:
 Osteoporosis with adequate calcium: 217 (23.35%)
 Osteoporosis with low calcium: 232 (24.97%)
 Conclusion: Low calcium intake has a 1.63% greater impact on osteoporosis in females compared
 to those with adequate calcium.
 Male:
 Osteoporosis with adequate calcium: 240 (25.83%)
 Osteoporosis with low calcium: 240 (25.83%)
 Conclusion: Calcium intake doesn't affect osteoporosis in males, unlike females,
 where low calcium intake correlates with higher osteoporosis incidence compared to adequate intake.
*================================================================================================;



/* VitaminD */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*VitaminD/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*VitaminD/ LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;


*FROM THE ABOVE FREQUENCY REPORT
 total patients: 1749, with 929 (53.12%) having osteoporosis.
 Female:
 Osteoporosis with sufficient Vitamin D: 217 (23.35%)
 Osteoporosis with insufficient Vitamin D: 232 (24.97%)
 Conclusion: Insufficient Vitamin D intake correlates with a higher likelihood of
 osteoporosis in females compared to those with sufficient intake.
 Male:
 Osteoporosis with sufficient Vitamin D: 240 (25.83%)
 Osteoporosis with insufficient Vitamin D: 240 (25.83%)
 Conclusion: Vitamin D intake doesn't affect osteoporosis in males.
=================================================================================================;


/* Exercise */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Exercise/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
```

```
run;
ods graphics off;
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Exercise/list nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;

*Male:
 Total male patients: 900
 Male patients with osteoporosis: 480 (53.33%)
 Male patients with active (exercise): 451 (50.11%)
 Male patients with active (exercise) and osteoporosis: 227 (25.22%)
 Male patients with sedentary (exercise): 449 (48.89%)
 Male patients with sedentary (exercise) and osteoporosis: 253 (28.11%)
 Conclusion: Male patients with sedentary exercise have a 2.89% higher risk of
 osteoporosis compared to those with active exercise.
Female:
 Total female patients: 849
 Female patients with osteoporosis: 449 (52.89%)
 Female patients with active (exercise): 447 (52.65%)
 Female patients with active (exercise) and osteoporosis: 250 (29.45%)
 Female patients with sedentary (exercise): 402 (47.35%)
 Female patients with sedentary (exercise) and osteoporosis: 199 (23.44%)
 Conclusion: Female patients with active exercise have a 6.01% higher risk of
 osteoporosis compared to those with sedentary exercise.
==========================================================================================================;



/* Smoking */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Smoking/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Smoking/LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;


/*FROM THE ABOVE FREQUENCY REPORT
 Male:
 Total male patients: 900
 Male patients with osteoporosis: 480 (53.33%)
 Male patients who smoke: 436 (48.44%)
 Male smokers with osteoporosis: 224 (24.88%)
 Male patients who don't smoke: 464 (51.55%)
 Non-smoking male patients with osteoporosis: 256 (28.44%)
 Conclusion: Male patients with osteoporosis who don't smoke are 3.56% more than those who do smoke.
 Female:
 Total female patients: 849
 Female patients with osteoporosis: 449 (52.89%)
 Female patients who smoke: 453 (53.35%)
 Female smokers with osteoporosis: 234 (27.56%)
 Female patients who don't smoke: 396 (46.64%)
 Non-smoking female patients with osteoporosis: 215 (25.32%)
 Conclusion: Female patients with osteoporosis who smoke are 2.24% more than those who don't smoke.
 Overall Conclusion:
 Smoking doesn't affect male patients regarding osteoporosis, whereas female patients who smoke
 have a higher risk of developing osteoporosis compared to non-smokers.
 */
*==========================================================================================================;



/* Alcohol */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Alcohol/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;
```

```
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Alcohol/ LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;


/*FROM THE ABOVE FREQUENCY REPORT
Male:
 Total male patients: 900
 Male patients with osteoporosis: 480 (53.33%)
 Male patients who drink alcohol: 446 (49.55%)
 Male drinkers with osteoporosis: 237 (26.33%)
 Male patients who don't drink alcohol: 454 (50.44%)
 Non-drinking male patients with osteoporosis: 243 (27%)
 Conclusion: Male osteoporosis patients who don't drink alcohol have a 0.67% higher risk compared
 to those who do.
Female:
 Total female patients: 849
 Female patients with osteoporosis: 449 (52.89%)
 Female patients who drink alcohol: 431 (50.76%)
 Female drinkers with osteoporosis: 229 (26.97%)
 Female patients who don't drink alcohol: 418 (49.23%)
 Non-drinking female patients with osteoporosis: 220 (25.91%)
 Conclusion: Female osteoporosis patients who drink alcohol have a 1.06% higher risk compared to
 non-drinkers.
Overall Conclusion:
 Drinking alcohol doesn't affect male patients regarding osteoporosis, whereas female patients
 who drink alcohol have a higher risk of developing osteoporosis compared to non-drinkers.
 */
*=============================================================================================================;


/* Condition */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Condition/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;

ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Condition/LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;

/*FROM THE ABOVE FREQUENCY REPORT
IN MALE
 =======
 Total male patients ==> 900
Total male with Osteoporosis patients ==> 480 => 480/900*100 => (53.33%) of total male have Osteoporosis.
 Total male patients who Drink Alcohol ==> 446 ==> 446/900*100 => (49.55%)
 Total male patients who Drink Alcohol and have Osteoporosis ==> 237 ==> 237/900*100 => (26.33%)
 Total male patients who don't Drink Alcohol ==> 454 ==> 454/900*100 => (50.44%)
 Total male patients who don't Drink Alcohol and have Osteoporosis ==> 243 ==> 243/900*100 => (27%)
CONCLUSION :
---------->
Male osteoporosis patients who do not use alcohol have a 0.67% higher risk compared to those who do.
 FEMALE
 ======
 Total Female patients ==> 849
 Total Female with Osteoporosis patients ==> 449 => 480/849*100 => (52.89%) of total Female have Osteoporosis.
 Total Female patients who Drink Alcohol ==> 431 ==> 431/849*100 => (50.76%)
 Total Female patients who Drink Alcohol and have Osteoporosis ==> 229 ==> 229/849*100 => (26.97%)
 Total Female patients who don't Drink Alcohol ==> 418 ==> 418/849*100 => (49.23%)
 Total Female patients who don't Drink Alcohol and have Osteoporosis ==> 220 ==> 220/849*100 => (25.91%)
CONCLUSION :
---------->
Female osteoporosis patients who drink alcohol have a 1.06% higher risk
compared to those who do not consume alcohol.
CONCLUSION :
---------->
While drinking alcohol does not affect male patients, female patients who drink alcohol have a higher
risk of developing osteoporosis compared to those who do not drink alcohol.
 */
*=============================================================================================================;
```

```
/* Medications */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Medications/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Medications/LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;

/*FROM THE ABOVE FREQUENCY REPORT
Male:
 Total male patients: 900
 Male patients with osteoporosis: 480 (53.33%)
 Male patients who take medications: 449 (49.88%)
 Male patients on medications with osteoporosis: 238 (26.44%)
 Male patients who don't take medications: 451 (50.11%)
 Male patients not on medications with osteoporosis: 242 (26.88%)
 Conclusion: Male osteoporosis patients who don't take medications have a 0.44% higher
 risk compared to those who do.
Female:
 Total female patients: 849
 Female patients with osteoporosis: 449 (52.89%)
 Female patients who take medications: 431 (50.76%)
 Female patients on medications with osteoporosis: 241 (28.36%)
9/10/24, 5:50 PM Code: project code.sas
about:blank 5/6
 Female patients who don't take medications: 418 (49.23%)
 Female patients not on medications with osteoporosis: 208 (24.49%)
 Conclusion: Female osteoporosis patients who take medications have a 3.87% higher
 risk compared to those who don't.
Overall Conclusion:
 Taking medications doesn't affect male patients regarding osteoporosis, whereas female
 patients who take medications have a higher risk of developing osteoporosis compared to those who don't.
 */
*=============================================================================================================;


/* Fractures */
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Fractures/nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
footnote ' ( 1 - Suffering From Osteoporosis )
 ( 0 - Not Suffering From Osteoporosis )';
run;
ods graphics off;
ods graphics on;
proc freq data=EDA;
tables gender*Osteoporosis*Fractures/ LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
run;
ods graphics off;

*Male:
 Total male patients: 900
 Male patients with osteoporosis: 480 (53.33%)
 Male patients with fractures: 443 (49.22%)
 Male patients with fractures and osteoporosis: 241 (26.78%)
 Male patients without fractures and osteoporosis: 239 (26.56%)
 Conclusion: Male patients with fractures are slightly (0.22%) greater than those without fractures.
Female:
Total female patients: 849;



/*  AGE  */

proc format;
  value agecat
    1 - 35 = '1-35'
    36 - 59 = '36-65'
    60 - 100 = '66+';
run;

ods graphics on;
proc freq data=EDA;
```

```
    format AGE agecat.;  /* Apply the age category format */
    tables gender*Osteoporosis*AGE / nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
  run;
  ods graphics off;

  ods graphics on;
  proc freq data=EDA;
  format AGE agecat.;  /* Apply the age category format */
  tables gender*Osteoporosis*AGE/ LIST nocum norow nocol plots=freqplot(twoway=cluster orient=vertical);
  run;
  ods graphics off;
```