In [1]:
```
import pandas as pd
import pylab as pl
import numpy as np
import scipy.optimize as opt
import statsmodels.api as sm
from sklearn import preprocessing
'exec(% matplotlib inline)'
import matplotlib.pyplot as plt
import matplotlib.mlab as mlab
import seaborn as sns
```

In [5]:
```
# Loading the Dataset

disease_df = pd.read_csv("Downloads/framingham.csv")
disease_df.drop(['education'], inplace = True, axis = 1)
disease_df.rename(columns = {'male':'Sex_male'}, inplace = True)
```

In [7]:
```
# Handling missing values (NAN / NULL removing)

disease_df.dropna(axis = 0, inplace = True)
print(disease_df.head(), disease_df.shape)
print(disease_df.TenYearCHD.value_counts())
```

```
   Sex_male  age  currentSmoker  cigsPerDay  BPMeds  prevalentStroke  \
0         1   39              0         0.0     0.0                0
1         0   46              0         0.0     0.0                0
2         1   48              1        20.0     0.0                0
3         0   61              1        30.0     0.0                0
4         0   46              1        23.0     0.0                0

   prevalentHyp  diabetes  totChol  sysBP  diaBP    BMI  heartRate  glucose  \
0             0         0    195.0  106.0   70.0  26.97       80.0     77.0
1             0         0    250.0  121.0   81.0  28.73       95.0     76.0
2             0         0    245.0  127.5   80.0  25.34       75.0     70.0
3             1         0    225.0  150.0   95.0  28.58       65.0    103.0
4             0         0    285.0  130.0   84.0  23.10       85.0     85.0

   TenYearCHD
0           0
1           0
2           0
3           1
4           0   (3751, 15)
TenYearCHD
0    3179
1     572
Name: count, dtype: int64
```

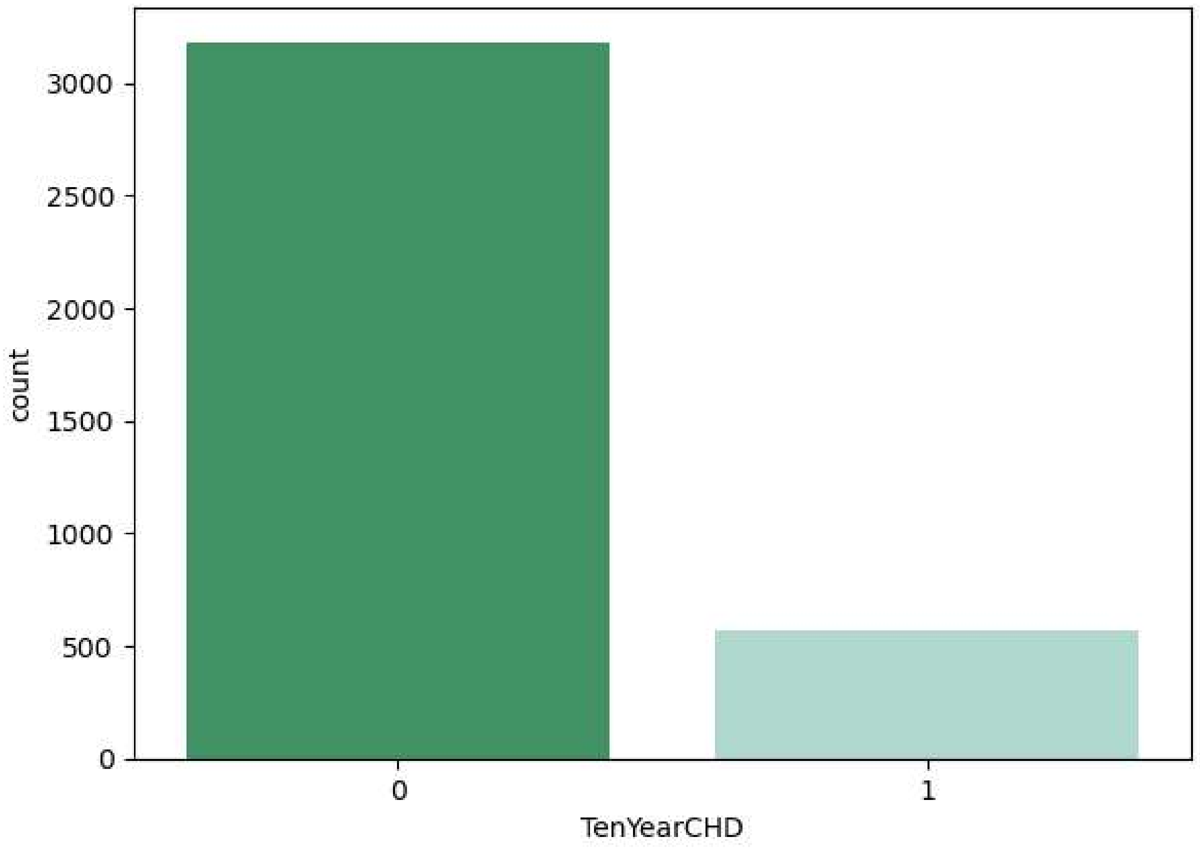
In [21]:
```
# Splitting the Dataset into Test and Train Sets

X = np.asarray(disease_df[['age', 'Sex_male', 'cigsPerDay', 'totChol', 'sysBP', 'gl
y = np.asarray(disease_df['TenYearCHD'])

# normalization of the dataset
```

```
X = preprocessing.StandardScaler().fit(X).transform(X)

# Train-and-Test -Split

from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X,y,test_size = 0.3, random_sta

print('Train set:', X_train.shape, y_train.shape)
print('Test set:', X_test.shape, y_test.shape)
```

```
Train set: (2625, 6) (2625,)
Test set: (1126, 6) (1126,)
```

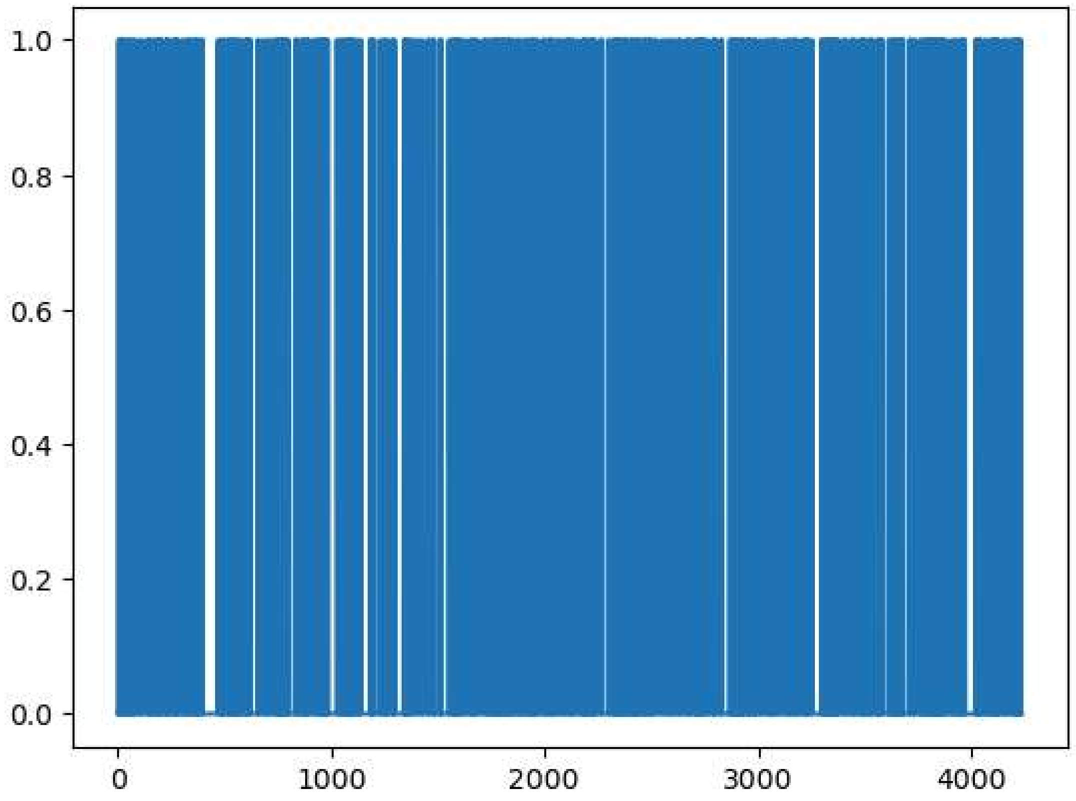
In [23]:
```
# Exploratary Data Analysis #

# counting no. of patients affected with CHD
plt.figure(figsize=(7,5))
sns.countplot(x="TenYearCHD", data=disease_df, palette="BuGn_r")
plt.show()
```

```
C:\Users\Computer\AppData\Local\Temp\ipykernel_5456\3424366598.py:5: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.1
4.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

  sns.countplot(x="TenYearCHD", data=disease_df, palette="BuGn_r")
```



In [31]:
```
laste = disease_df['TenYearCHD'].plot()
```

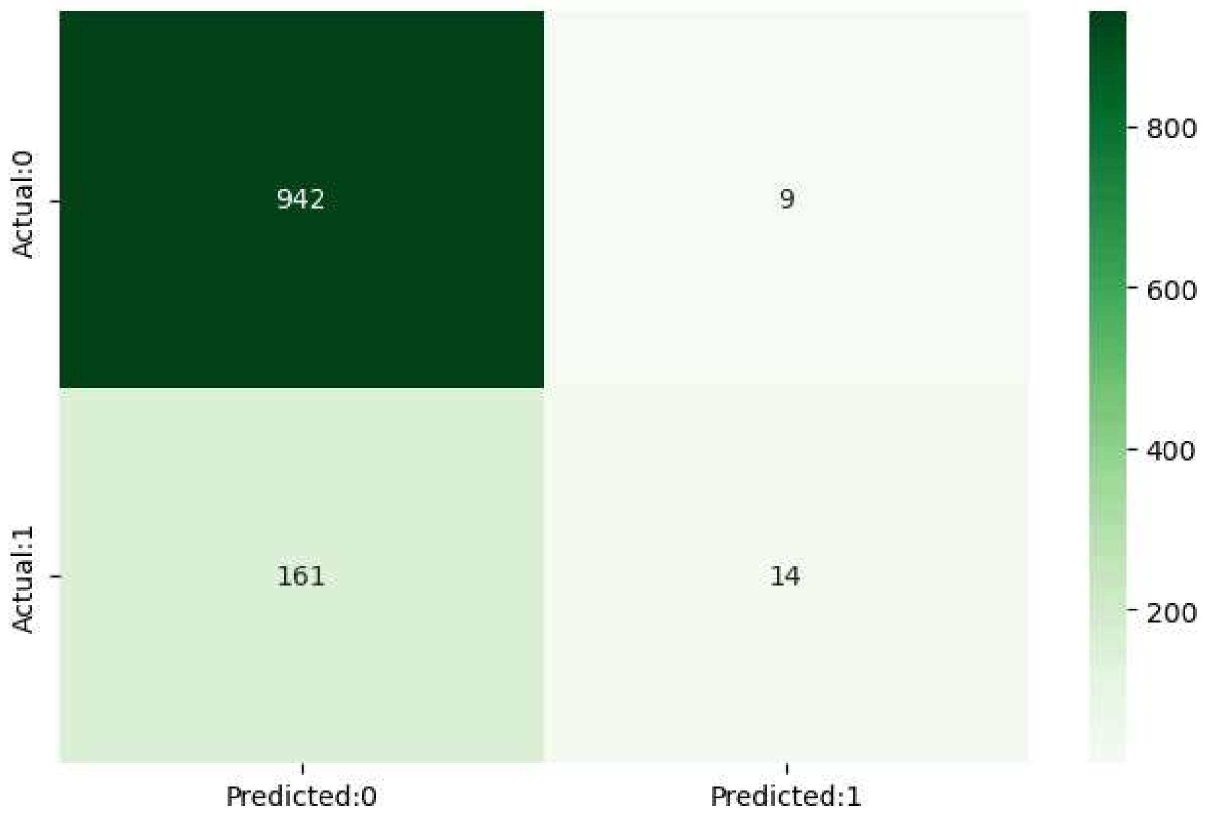
```
plt.show(laste)
```



In [33]:
```
# Fitting logistic regression model for heart disease prediction

from sklearn.linear_model import LogisticRegression
logreg = LogisticRegression()
logreg.fit(X_train, y_train)
y_pred = logreg.predict(X_test)

# Evaluation and accuracy

from sklearn.metrics import accuracy_score
print('Accuracy of the model is =', accuracy_score(y_test,y_pred))
```

```
Accuracy of the model is = 0.8490230905861457
```

In [37]:
```
# confusion matrix

from sklearn.metrics import confusion_matrix, classification_report

cm = confusion_matrix(y_test, y_pred)
conf_matrix = pd.DataFrame(data = cm, columns = ['Predicted:0','Predicted:1'],
                           index = ['Actual:0','Actual:1'])
plt.figure(figsize = (8, 5))
sns.heatmap(conf_matrix, annot = True, fmt = 'd', cmap = "Greens")

plt.show()

print('The details for confusion matrix is:')
print(classification_report(y_test, y_pred))
```



```
The details for confusion matrix is:
              precision    recall  f1-score   support

           0       0.85      0.99      0.92       951
           1       0.61      0.08      0.14       175

    accuracy                           0.85      1126
   macro avg       0.73      0.54      0.53      1126
weighted avg       0.82      0.85      0.80      1126
```

```
In [ ]:
```