# Investigate_a_Dataset

February 12, 2022

## 1 Project: Investigate No-show appointments

### 1.1 Table of Contents


## Introduction

This dataset collects information from 110k medical appointments in Brazil we will try here to ask some questions to find out a relationship or a correlation between the data we have been provided and it's affection on patient show or no show for there appointment we have a dataset consisted of 01) PatientId 02) AppointmentID 03) Gender 04) ScheduledDay 05) AppointmentDay 06) Age 07) Neighbourhood 08) Scholarship 09) Hipertension 10) Diabetes 11) Alcoholism 12) Handcap 13) SMS_received 14) No-show

#### 1.1.1 Question(s) for Analysis

## 2 which element have the most impact in attending ?

## 3 Does the gender of the patient affect on attending ?

## 4 And Exploring a relationship between attendance and neighbourhood

## 5 Does the chronic disaese affect the attendance ?

## 6 Does the receiving a SMS effect on the attendance ?

```
In [1]: import pandas as pd
        import numpy as np
        import matplotlib.pyplot as plt
        import seaborn as snb
        %matplotlib inline
        from sklearn.preprocessing import LabelEncoder
```

```
In [ ]: # Upgrade pandas to use dataframe.explode() function.
        !pip install --upgrade pandas==0.25.0
```

## Data Wrangling

```
In [2]: df= pd.read_csv("noshowappointments-kagglev2-may-2016.csv")
        df.head()
```

Out[2]:

| | PatientId | AppointmentID | Gender | ScheduledDay | AppointmentDay | Age | Neighbourhood | Scholarship | Hipertension | Diabetes | Alcoholism | Handcap | SMS_received | No-show |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 2.987250e+13 | 5642903 | F | 2016-04-29T18:38:08Z | 2016-04-29T00:00:00Z | 62 | JARDIM DA PENHA | 0 | 1 | 0 | 0 | 0 | 0 | No |
| 1 | 5.589978e+14 | 5642503 | M | 2016-04-29T16:08:27Z | 2016-04-29T00:00:00Z | 56 | JARDIM DA PENHA | 0 | 0 | 0 | 0 | 0 | 0 | No |
| 2 | 4.262962e+12 | 5642549 | F | 2016-04-29T16:19:04Z | 2016-04-29T00:00:00Z | 62 | MATA DA PRAIA | 0 | 0 | 0 | 0 | 0 | 0 | No |
| 3 | 8.679512e+11 | 5642828 | F | 2016-04-29T17:29:31Z | 2016-04-29T00:00:00Z | 8 | PONTAL DE CAMBURI | 0 | 0 | 0 | 0 | 0 | 0 | No |
| 4 | 8.841186e+12 | 5642494 | F | 2016-04-29T16:07:23Z | 2016-04-29T00:00:00Z | 56 | JARDIM DA PENHA | 0 | 1 | 1 | 0 | 0 | 0 | No |

```
In [7]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 110527 entries, 0 to 110526
Data columns (total 14 columns):
PatientId         110527 non-null float64
AppointmentID     110527 non-null int64
Gender            110527 non-null object
ScheduledDay      110527 non-null object
AppointmentDay    110527 non-null object
Age               110527 non-null int64
Neighbourhood     110527 non-null object
Scholarship       110527 non-null int64
Hipertension      110527 non-null int64
Diabetes          110527 non-null int64
Alcoholism        110527 non-null int64
Handcap           110527 non-null int64
SMS_received      110527 non-null int64
No-show           110527 non-null object
dtypes: float64(1), int64(8), object(5)
```

```
memory usage: 11.8+ MB
```

```
In [8]: df.dtypes
```

```
Out[8]: PatientId         float64
        AppointmentID       int64
        Gender             object
        ScheduledDay       object
        AppointmentDay     object
        Age                 int64
        Neighbourhood      object
        Scholarship         int64
        Hipertension        int64
        Diabetes            int64
        Alcoholism          int64
        Handcap             int64
        SMS_received        int64
        No-show            object
        dtype: object
```

after inspecting for missing values and the types of our data i find out that there is no missing values

## 7 Assessing and Building Intuition

```
In [9]: df.shape
```

```
Out[9]: (110527, 14)
```

this returns a tuple of the dimensions of the dataframe

```
In [12]: df.describe().round(2)
```

```
Out[12]:           PatientId  AppointmentID        Age  Scholarship  Hipertension  \
         count  1.105270e+05      110527.00  110527.00     110527.0      110527.0
         mean   1.474963e+14     5675305.12      37.09          0.1           0.2
         std    2.560949e+14       71295.75      23.11          0.3           0.4
         min    3.921784e+04     5030230.00      -1.00          0.0           0.0
         25%    4.172614e+12     5640285.50      18.00          0.0           0.0
         50%    3.173184e+13     5680573.00      37.00          0.0           0.0
         75%    9.439172e+13     5725523.50      55.00          0.0           0.0
         max    9.999816e+14     5790484.00     115.00          1.0           1.0

                 Diabetes  Alcoholism    Handcap  SMS_received
         count  110527.00   110527.00  110527.00     110527.00
         mean        0.07        0.03       0.02          0.32
         std         0.26        0.17       0.16          0.47
```

```
min          0.00          0.00          0.00          0.00
25%          0.00          0.00          0.00          0.00
50%          0.00          0.00          0.00          0.00
75%          0.00          0.00          0.00          1.00
max          1.00          1.00          4.00          1.00
```

this returns descriptive statistics for each column of data the avrage age of the patient is 37 about 50 % of the patient age is from (55 to 18) there is a wrong value in the min age that could not be (negative)

```
In [12]: df[df.Age==-1].shape[0]
```

```
Out[12]: 1
```

```
In [14]: df=df[df.Age>=0]
```

remove the only patient that have a negative Age

```
In [4]: df["PatientId"].nunique()
```

```
Out[4]: 62299
```

this returns the number of unique values in patient ID Column

### 7.0.1 Data Cleaning

```
In [5]: df.rename(columns={"Hipertension":"Hypertension"},inplace= True)
        df.rename(columns={"Handcap":"Handicap"},inplace= True)
        df.rename(columns={"No-show":"No_show"},inplace= True)
        df.head()
```

```
Out[5]:       PatientId  AppointmentID Gender          ScheduledDay  \
        0  2.987250e+13        5642903      F  2016-04-29T18:38:08Z
        1  5.589978e+14        5642503      M  2016-04-29T16:08:27Z
        2  4.262962e+12        5642549      F  2016-04-29T16:19:04Z
        3  8.679512e+11        5642828      F  2016-04-29T17:29:31Z
        4  8.841186e+12        5642494      F  2016-04-29T16:07:23Z

                AppointmentDay  Age      Neighbourhood  Scholarship  Hypertension  \
        0  2016-04-29T00:00:00Z   62    JARDIM DA PENHA            0             1
        1  2016-04-29T00:00:00Z   56    JARDIM DA PENHA            0             0
        2  2016-04-29T00:00:00Z   62      MATA DA PRAIA            0             0
        3  2016-04-29T00:00:00Z    8  PONTAL DE CAMBURI            0             0
        4  2016-04-29T00:00:00Z   56    JARDIM DA PENHA            0             1

           Diabetes  Alcoholism  Handicap  SMS_received No_show
        0         0           0         0             0      No
        1         0           0         0             0      No
        2         0           0         0             0      No
        3         0           0         0             0      No
        4         1           0         0             0      No
```

here i correct the writing of some words in the column heading like hypertension & handicap

```
In [26]: df.drop_duplicates(["PatientId"],inplace= True)
         df.shape

Out[26]: (62299, 14)
```

dealing with the duplicated patient ID in the dataset

```
In [6]: df.drop(["AppointmentID", "ScheduledDay", "AppointmentDay"], axis = 1, inplace = True)
        df.head()

Out[6]:       PatientId Gender  Age      Neighbourhood  Scholarship  Hypertension  \
        0  2.987250e+13      F   62    JARDIM DA PENHA            0             1
        1  5.589978e+14      M   56    JARDIM DA PENHA            0             0
        2  4.262962e+12      F   62      MATA DA PRAIA            0             0
        3  8.679512e+11      F    8  PONTAL DE CAMBURI            0             0
        4  8.841186e+12      F   56    JARDIM DA PENHA            0             1

           Diabetes  Alcoholism  Handicap  SMS_received No_show
        0         0           0         0             0      No
        1         0           0         0             0      No
        2         0           0         0             0      No
        3         0           0         0             0      No
        4         1           0         0             0      No
```

accordinig to the questions that i am trying to answer there is no need for "AppointmentID" , "ScheduledDay","AppointmentDay" so i droped them

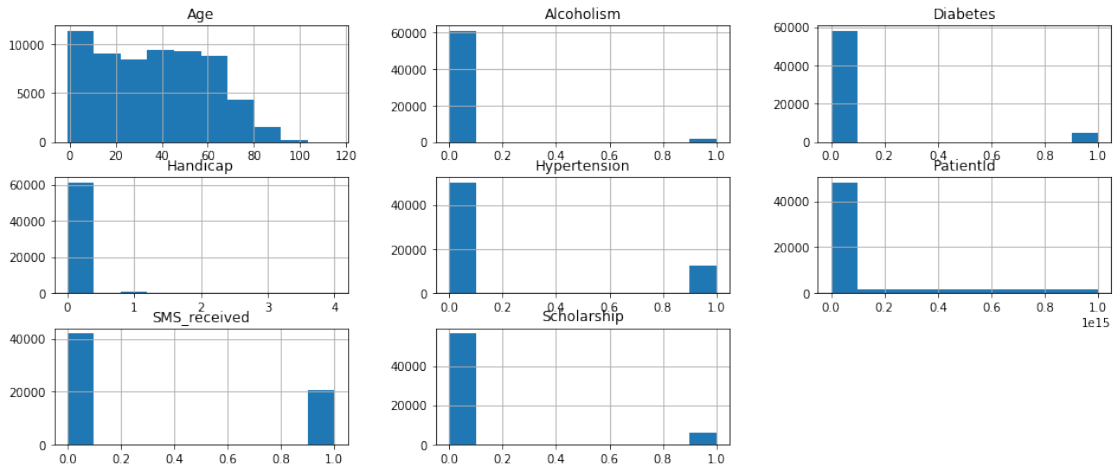
```
In [7]: show=df.No_show=="No"
        noshow=df.No_show=="Yes"
        df[show].count()

Out[7]: PatientId        88208
        Gender           88208
        Age              88208
        Neighbourhood    88208
        Scholarship      88208
        Hypertension     88208
        Diabetes         88208
        Alcoholism       88208
        Handicap         88208
        SMS_received     88208
        No_show          88208
        dtype: int64

In [20]: df[noshow].count()
```

```
Out[20]: PatientId        12193
         Gender           12193
         Age              12193
         Neighbourhood    12193
         Scholarship      12193
         Hypertension     12193
         Diabetes         12193
         Alcoholism       12193
         Handicap         12193
         SMS_received     12193
         No_show          12193
         dtype: int64
```

number of patient who attended is 50106 and who did not attend is 12193
## Exploratory Data Analysis

### 7.0.2 which element have the most impact in attending ?

```
In [21]: df.hist(figsize=(16,6.5));
```



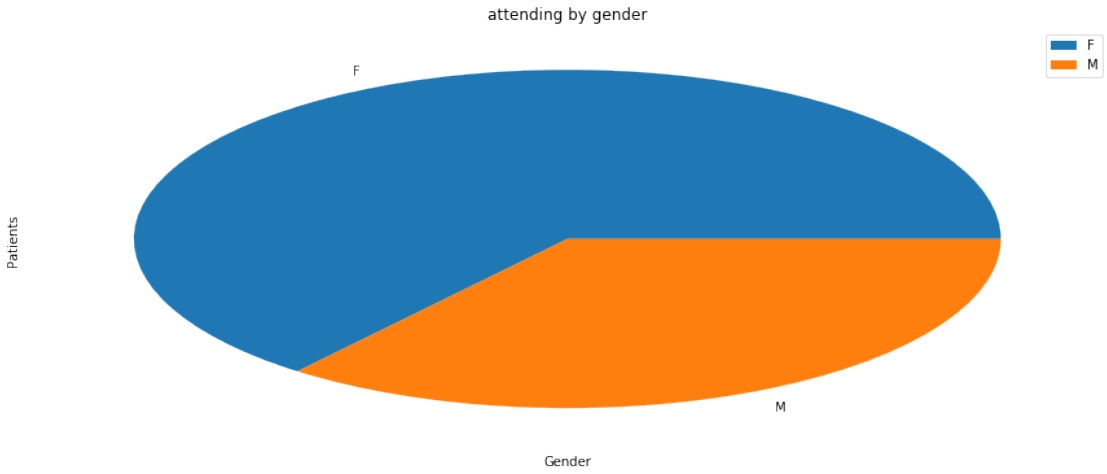

```
In [28]: df[noshow].groupby(["Hypertension","Diabetes"]).mean()["Age"],df[show].groupby(["Hypert
```

```
Out[28]: (Hypertension  Diabetes
          0             0           28.366490
                        1           49.280702
          1             0           58.423077
                        1           62.701188
          Name: Age, dtype: float64, Hypertension  Diabetes
          0             0           30.857729
                        1           54.259819
          1             0           60.389957
                        1           63.886106
          Name: Age, dtype: float64)
```

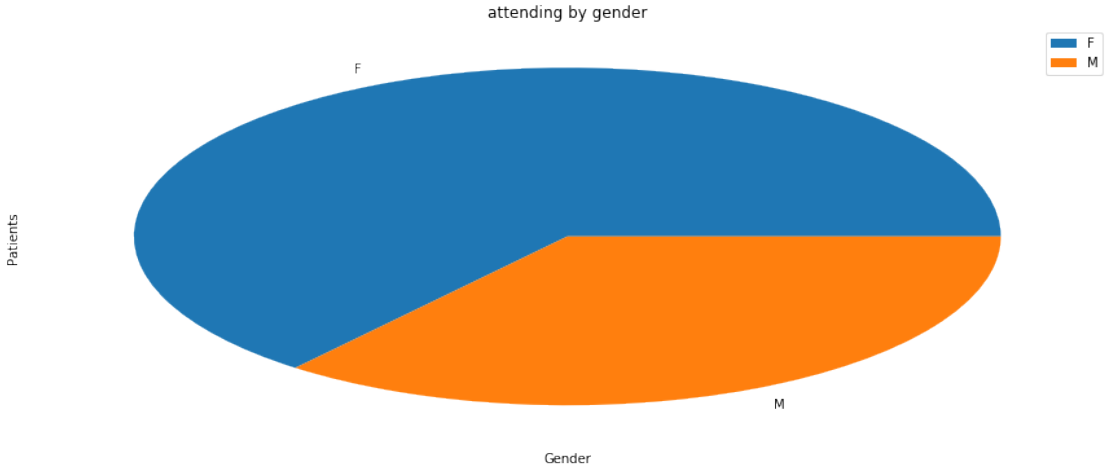
the correlation between chronic diseases like hypertension , daibates and age but there is no strog correlation between that

## 8 Does the gender of the patient affect on attending ?

```
In [29]: def attendance(df,col_name,attended,absent):
             plt.figure(figsize=[15,6])
             df[col_name][show].value_counts(normalize=True).plot(kind="pie",label="show")
             plt.legend();
             plt.title("attending by gender")
             plt.xlabel("Gender")
             plt.ylabel("Patients");
         attendance(df,"Gender",show,noshow)
```



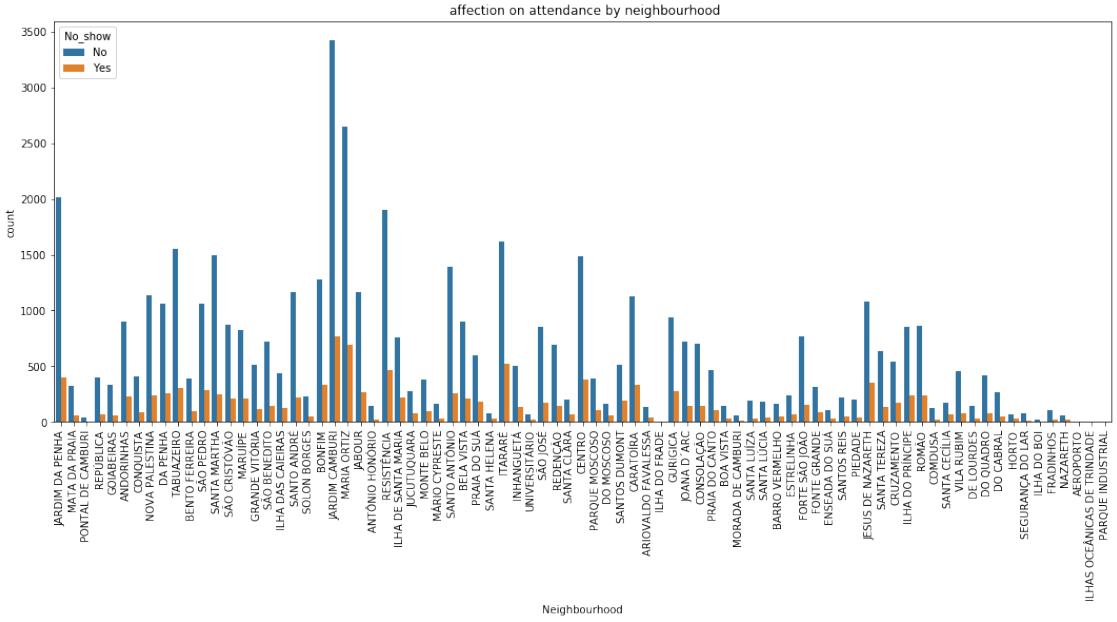

```
In [30]: def attendance(df,col_name,attended,absent):
             plt.figure(figsize=[15,6])
             df[col_name][noshow].value_counts(normalize=True).plot(kind="pie",label="noshow")
             plt.legend();
             plt.title("attending by gender")
             plt.xlabel("Gender")
             plt.ylabel("Patients");
         attendance(df,"Gender",show,noshow)
```




almost both of the show and noshow pie are similar so the gender does not affect on attending

## 9 And Exploring a relationship between attendance and neighbourhood

```
In [31]: plt.figure(figsize=(18,7))
         plt.xticks(rotation=90)
         Neighbourhood_effect = snb.countplot(x=df.Neighbourhood , hue=df.No_show)
         Neighbourhood_effect.set_title(" affection on attendance by neighbourhood")
         plt.show()
```

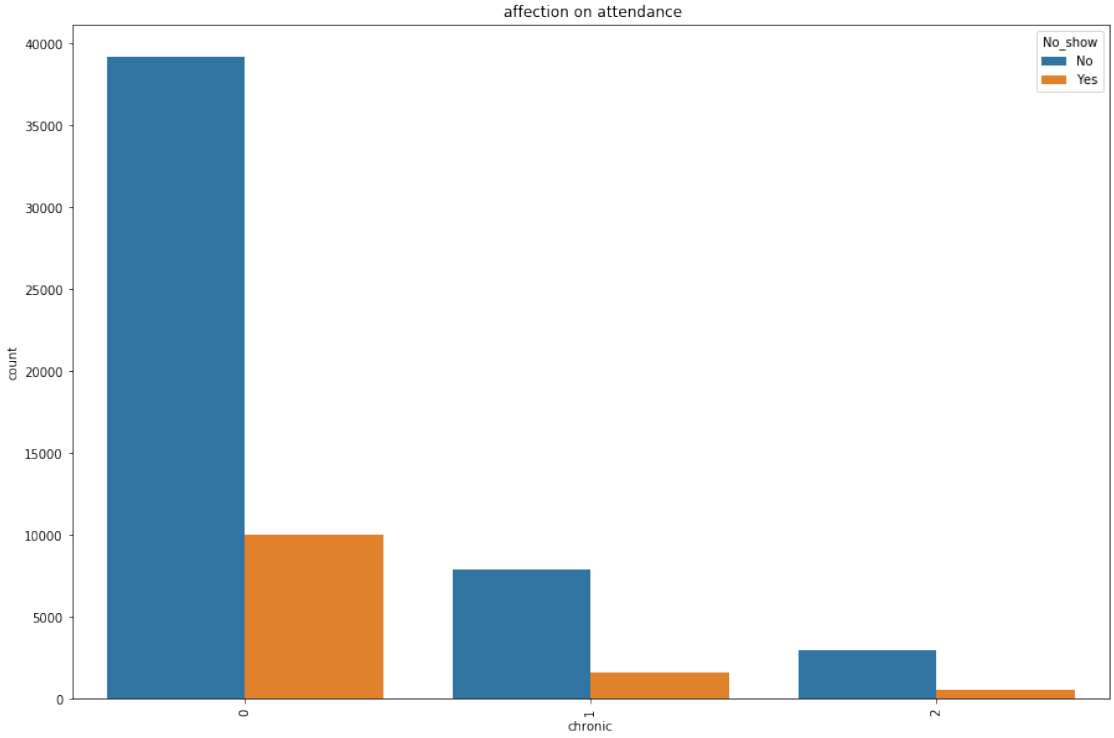


seems like only two places affected by neighbourhood ( Maria Ortiz & Jabour )

## 10 Does the chronic disaese affect the attendance ?

(2) here in the histogram is for peaple who suffer from Hypertension & Diabetes

```
In [32]: df["chronic"]=df["Hypertension"]+df["Diabetes"]
         plt.figure(figsize=(15,10))
         plt.xticks(rotation=90)
         chronic_effect = snb.countplot(x=df.chronic , hue=df.No_show)
         chronic_effect.set_title(" affection on attendance")
         plt.show()
```




```
In [33]: CD=df.chronic==2
         df[CD].count()
         #CD referes to chronic diseases
```

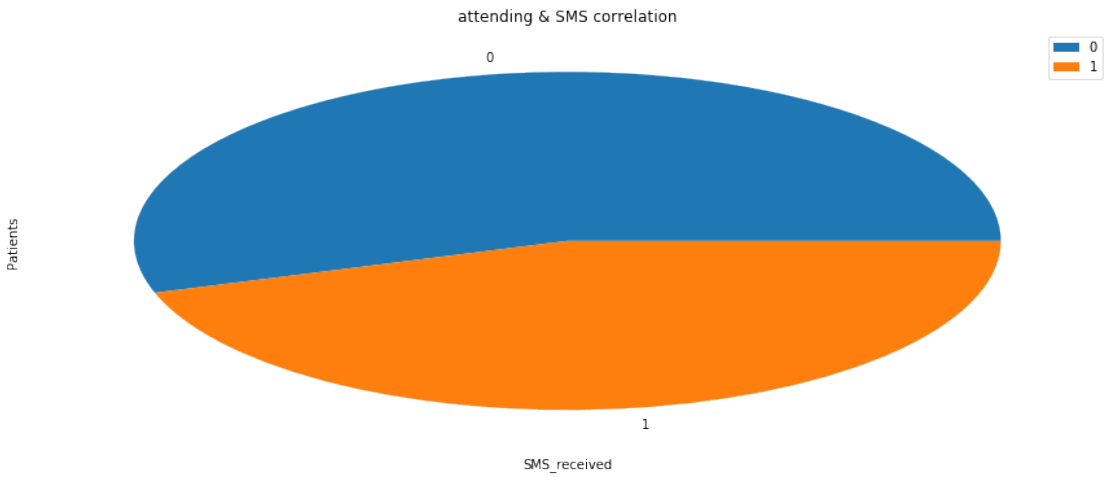
```
Out[33]: PatientId       3583
         Gender          3583
         Age             3583
         Neighbourhood   3583
         Scholarship     3583
         Hypertension    3583
```

```
Diabetes          3583
Alcoholism        3583
Handicap          3583
SMS_received      3583
No_show           3583
chronic           3583
dtype: int64
```

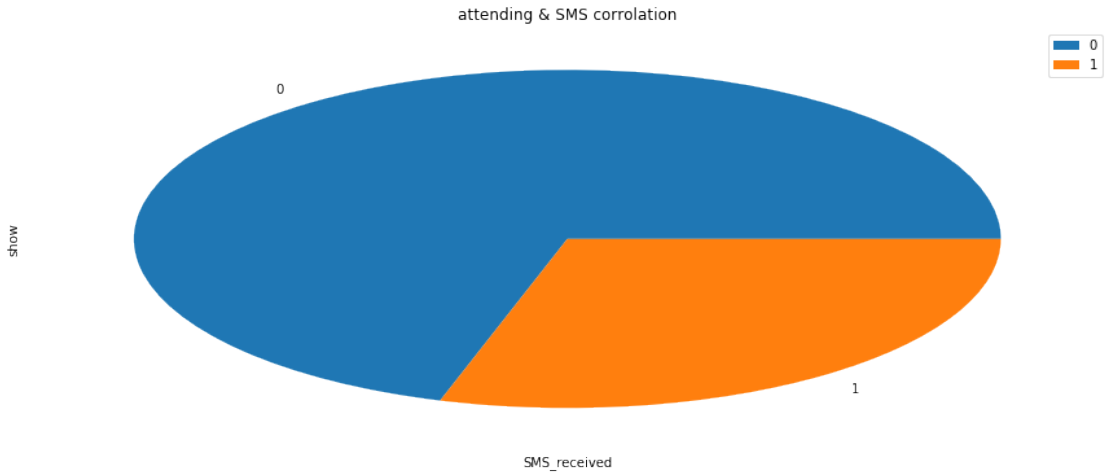
we have 3583 patient are suffer from the both chronic diseases but there is no huge affect in attending

## 11 Does the receiving a SMS effect on the attendance ?

```
In [34]: def attendance(df,col_name,attended,absent):
             plt.figure(figsize=[15,6])
             df[col_name][noshow].value_counts(normalize=True).plot(kind="pie",label="noshow")
             plt.legend();
             plt.title("attending & SMS correlation")
             plt.xlabel("SMS_received")
             plt.ylabel("Patients");
         attendance(df,"SMS_received",show,noshow)
```




```
In [36]: def attendance(df,col_name,attended,absent):
             plt.figure(figsize=[15,6])
             df[col_name][show].value_counts(normalize=True).plot(kind="pie",label="show")
             plt.legend();
             plt.title("attending & SMS corrolation")
             plt.xlabel("SMS_received")
             plt.ylabel("show");
         attendance(df,"SMS_received",show,noshow)
```




```
In [ ]: we can see that SMS recivied have a huge infelunce in attending of patient
        so i think that they need
```

## Conclusions we can see that SMS recivied have a huge infelunce in attending of patient so changing in sms recived can make a huge impact in patient attendice the correlation between chronic diseases like hypertension , daibates and age is not strog correlation , almost both of the show and noshow pie are similar so the gender does not affect on attending , seems like only two places strongly affected by neighbourhood ( Maria Ortiz & Jabour ) but generaly it is weak corrlation , we have 3583 patient are suffer from the both chronic diseases but there is no huge affect in attending , so i think that they need to establish an technical support department to make sure that many people recieved the massage or get a new contract with another telecom firm

### 11.1 The limitation

could not find a correlation between some given data like ("AppointmentID", "ScheduledDay", "AppointmentDay") and show or noshow of the patient . i think it is will be a good idea if we add a survey column with a scale 1 to 5 telling us how much patiant are satisfied of the service . it also will give us a good indicater if they will show or not and will give us also an indicator of which sectors that need some inerest in the future . ## Submitting your Project

```
In [38]: from subprocess import call
         call(['python', '-m', 'nbconvert', 'Investigate_a_Dataset.ipynb'])
```

```
Out[38]: 0
```

```
In [ ]:
```