Project: Investigate a Dataset (no show appointment dataset)

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Introduction

Selected dataset: No-show appointments

Dataset Description: This dataset collects information from 100k medical appointments in Brazil and is focused on the question of whether or not patients show up for their appointment. A number of characteristics about the patient are included in each row.

'ScheduledDay' tells us on what day the patient set up their appointment.

'Neighborhood' indicates the location of the hospital.

'Scholarship' indicates whether or not the patient is enrolled in Brasilian welfare program Bolsa Família.

'No_show' it says 'No' if the patient showed up to their appointment, and 'Yes' if they did not show up.

questions asked?

the dataset could be used o answerr many questions as:

- is having a scholarship a factor?
- is having a certain disease a factor?
- which gender is more likely to show up ?
- is age a factor to no show?
- which Scheduled Day is more likely not to show?
- is receiving a sms a factoris receiving a sms a factor?
- is nigbourhood a factor not to show?
- is being handcapped a factor not to show?

we could aslo relate factors like

- which nighbourhood has more handcaped people ?
- or which gender has more Alcoholism?
- or where do most of people with diabetes live ?

I have chosen 4 questions to answer?

1-is age a factor to no show?

2-which Scheduled Day is more likely not to show?

3-is receiving a sms a factoris receiving a sms a factor?

3- is nigbourhood a factor not to show?

Data Wrangling

the data was clean no NAN values or duplicates, but it had logically wrong values for the age as it have patients with age =-1 so they were removed

what I have done to invsegate those question first I have seperated the data to 2 dataframes for the no show and show values then I've made a comprision using charts below

conclusion

results

- Age: age is factor , young people seems to show up less there's a 4 year differce in th mean of the 2 groups and the highest ration of no shower between 30 and 10
- Day: doesn't seem to be a factor
- Reciving a sms: receiving a sms seems to have a negative effect on the showing ratio but doesn't have to be corelated
- Nigbourhood: some nighbourhood have more showing up ratios more than the others as "jardim camburi "

Limitations

- Most of the data is catagorial which doesn't allow for advanced statisitical calculations
- not much of details eg. for recieving sms, we don't konw when did are they sent, if they are targeting non showers
- thus we can't correlate most of our data

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
```

Data Wrangling

General Properties

In [2]:
```
# genral look to understand data
df=pd.read_csv('noshowappointments-kagglev2-may-2016.csv')
df.head(6)
```

Out[2]:

	PatientId	AppointmentID	Gender	ScheduledDay	AppointmentDay	Age	Neighbourhood	Scholarship
0	2.987250e+13	5642903	F	2016-04-29T18:38:08Z	2016-04-29T00:00:00Z	62	JARDIM DA PENHA	0
1	5.589978e+14	5642503	M	2016-04-29T16:08:27Z	2016-04-29T00:00:00Z	56	JARDIM DA PENHA	0
2	4.262962e+12	5642549	F	2016-04-29T16:19:04Z	2016-04-29T00:00:00Z	62	MATA DA PRAIA	0
3	8.679512e+11	5642828	F	2016-04-29T17:29:31Z	2016-04-29T00:00:00Z	8	PONTAL DE CAMBURI	0
4	8.841186e+12	5642494	F	2016-04-29T16:07:23Z	2016-04-29T00:00:00Z	56	JARDIM DA PENHA	0
5	9.598513e+13	5626772	F	2016-04-27T08:36:51Z	2016-04-29T00:00:00Z	76	REPÚBLICA	0

In [3]:
```
df.describe()
```

Out[3]:

	PatientId	AppointmentID	Age	Scholarship	Hipertension	Diabetes	Alcoholi
count	1.105270e+05	1.105270e+05	110527.000000	110527.000000	110527.000000	110527.000000	110527.0000
mean	1.474963e+14	5.675305e+06	37.088874	0.098266	0.197246	0.071865	0.0304
std	2.560949e+14	7.129575e+04	23.110205	0.297675	0.397921	0.258265	0.1716
min	3.921784e+04	5.030230e+06	-1.000000	0.000000	0.000000	0.000000	0.0000
25%	4.172614e+12	5.640286e+06	18.000000	0.000000	0.000000	0.000000	0.0000
50%	3.173184e+13	5.680573e+06	37.000000	0.000000	0.000000	0.000000	0.0000
75%	9.439172e+13	5.725524e+06	55.000000	0.000000	0.000000	0.000000	0.0000
max	9.999816e+14	5.790484e+06	115.000000	1.000000	1.000000	1.000000	1.0000

Data Cleaning

In [4]:
```
#checing if there's Nan values
df.isnull().sum()
```

Out[4]:
```
PatientId         0
AppointmentID     0
Gender            0
ScheduledDay      0
AppointmentDay    0
Age               0
Neighbourhood     0
Scholarship       0
Hipertension      0
Diabetes          0
Alcoholism        0
Handcap           0
SMS_received      0
No-show           0
dtype: int64
```

In [5]:
```
#checking if there's duplicates
df.duplicated(subset=['AppointmentID']).sum()
```

Out[5]: 0

In [6]:
```
#removing outliers
df=df[df['Age']>0]
df.describe()
```

Out[6]:

	PatientId	AppointmentID	Age	Scholarship	Hipertension	Diabetes	Alcoholi
count	1.069870e+05	1.069870e+05	106987.000000	106987.000000	106987.000000	106987.000000	106987.0000
mean	1.472814e+14	5.675434e+06	38.316085	0.101031	0.203772	0.074243	0.0314
std	2.558267e+14	7.133274e+04	22.466214	0.301371	0.402804	0.262167	0.1744
min	3.921784e+04	5.030230e+06	1.000000	0.000000	0.000000	0.000000	0.0000
25%	4.173523e+12	5.640490e+06	19.000000	0.000000	0.000000	0.000000	0.0000
50%	3.172463e+13	5.680744e+06	38.000000	0.000000	0.000000	0.000000	0.0000
75%	9.433600e+13	5.725634e+06	56.000000	0.000000	0.000000	0.000000	0.0000
max	9.999816e+14	5.790484e+06	115.000000	1.000000	1.000000	1.000000	1.0000

In [7]:
```
#seprating the data into 2 dataframes based on the no show value
df_yes=df[df['No-show']=='Yes']
df_no=df[df['No-show']=='No']
```

In [8]:
```
#creating a function for chart comprison  between the no show and show dataframes
def stacked_chart(column,n):
    df_yes[column].value_counts().plot(figsize=(n,n),kind='bar',alpha=0.5,color='blue
    df_no[column].value_counts().plot(figsize=(n,n),kind='bar',alpha=0.5,color='red',
    plt.legend()
    plt.title( column +'  comparison')
    plt.xlabel( column )
    plt.ylabel('patients')
    plt.show()
```

Exploratory Data Analysis

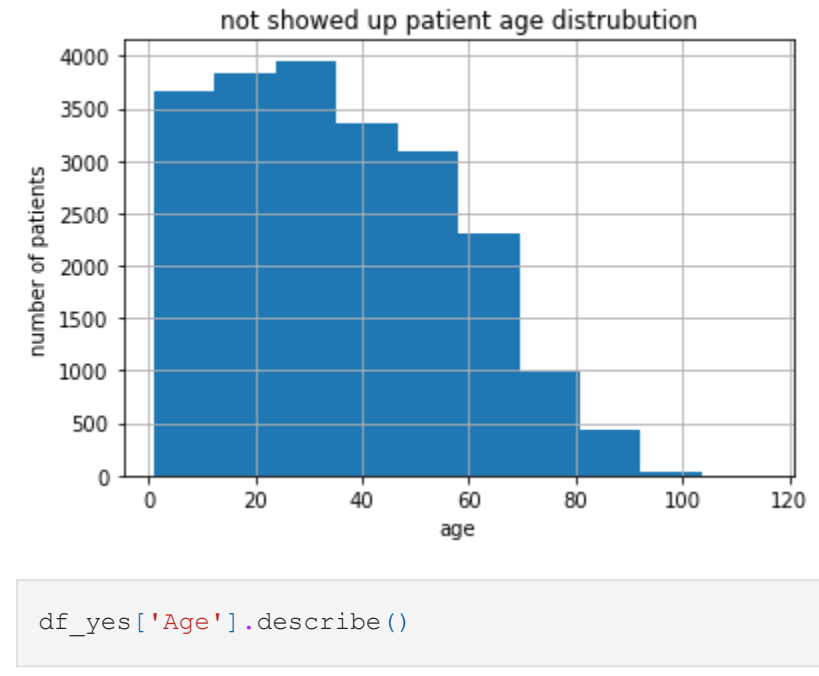
is age a factor to no show

In [9]:
```
#getting the mean of each group
df.groupby('No-show')['Age'].mean()
```

Out[9]:
```
No-show
No     39.075187
Yes    35.329151
Name: Age, dtype: float64
```

In [10]:
```
df_no['Age'].hist(alpha=0.5,color='blue',label ='showed')
df_yes['Age'].hist(alpha=0.5,color='yellow',label ='no show')
plt.title("age of patients age distrubution")
plt.xlabel('age')
plt.ylabel('number of patients')
plt.legend()
```

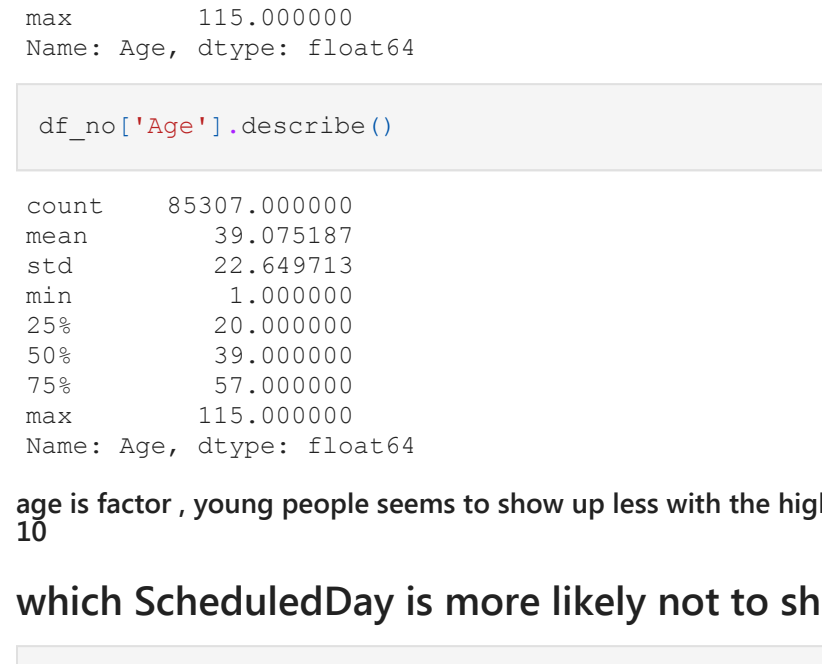
Out[10]: <matplotlib.legend.Legend at 0x9c1cd60>



age distrubtion between 2 groups seems to be different

In [11]:
```
df_yes['Age'].hist()
plt.title("not showed up patient age distrubution")
plt.xlabel('age')
plt.ylabel('number of patients')
```

Out[11]: Text(0, 0.5, 'number of patients')



In [12]:
```
df_yes['Age'].describe()
```

Out[12]:
```
count    21680.000000
mean        35.329151
std         21.470631
min          1.000000
25%         18.000000
50%         33.000000
75%         52.000000
max        115.000000
Name: Age, dtype: float64
```

In [13]:
```
df_no['Age'].describe()
```

Out[13]:
```
count    85307.000000
mean        39.075187
std         22.649713
min          1.000000
25%         20.000000
50%         39.000000
75%         57.000000
max        115.000000
Name: Age, dtype: float64
```

age is factor , young people seems to show up less with the highest ration of no shower between 30 and 10

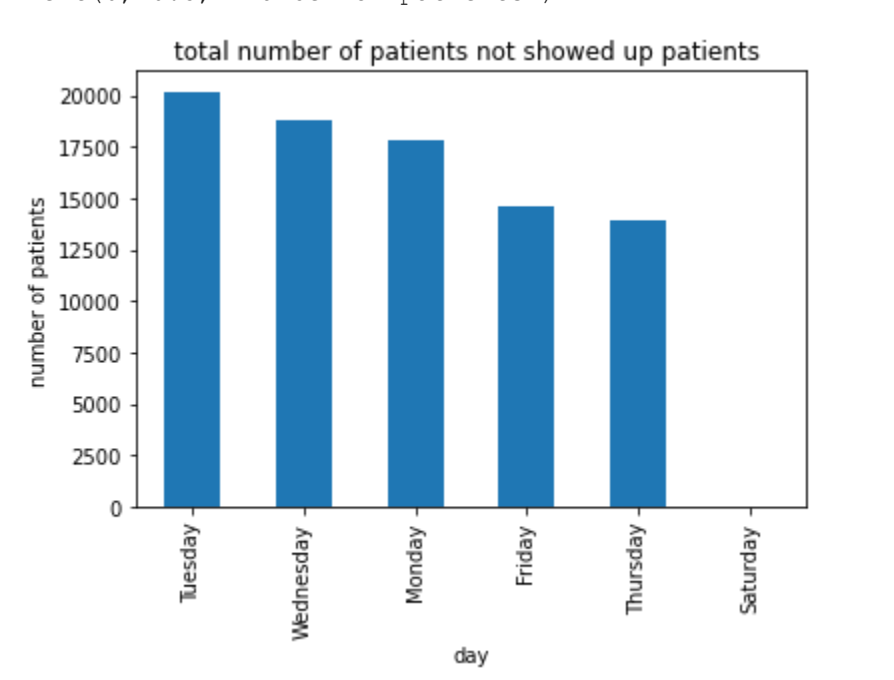
which ScheduledDay is more likely not to show

In [14]:
```
df_yes['ScheduledDay']=pd.to_datetime(df_yes['ScheduledDay'])
df_no['ScheduledDay']=pd.to_datetime(df_no['ScheduledDay'])

df_yes['day']=df_yes['ScheduledDay'].dt.day_name()
df_no['day']=df_no['ScheduledDay'].dt.day_name()
```

```
<ipython-input-14-972b05029cc9>:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/use
r_guide/indexing.html#returning-a-view-versus-a-copy
  df_yes['ScheduledDay']=pd.to_datetime(df_yes['ScheduledDay'])
<ipython-input-14-972b05029cc9>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/use
r_guide/indexing.html#returning-a-view-versus-a-copy
  df_no['ScheduledDay']=pd.to_datetime(df_no['ScheduledDay'])
<ipython-input-14-972b05029cc9>:4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/use
r_guide/indexing.html#returning-a-view-versus-a-copy
  df_yes['day']=df_yes['ScheduledDay'].dt.day_name()
<ipython-input-14-972b05029cc9>:5: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/use
r_guide/indexing.html#returning-a-view-versus-a-copy
  df_no['day']=df_no['ScheduledDay'].dt.day_name()
```

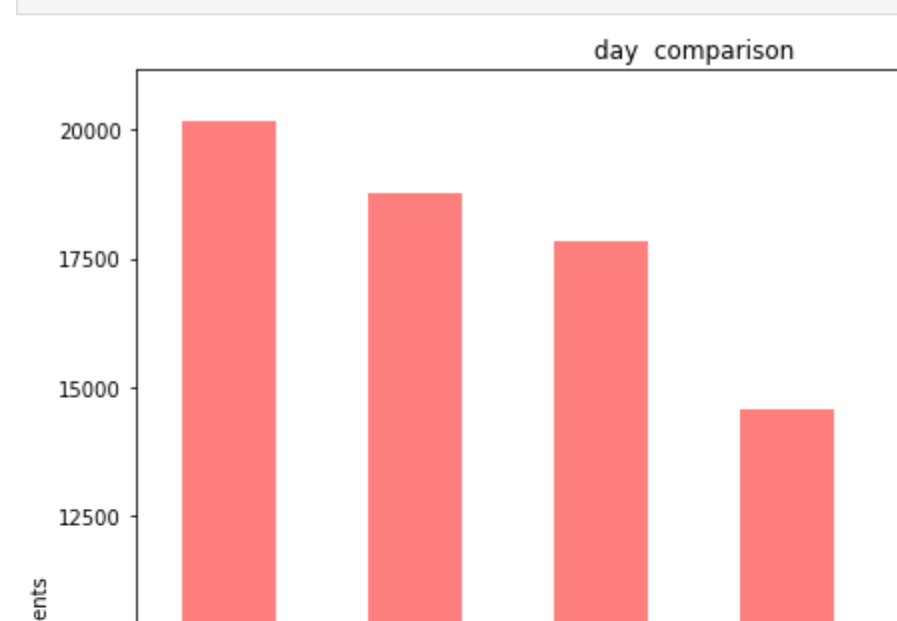
In [15]:
```
df_yes['day'].value_counts().plot(kind='bar')
plt.title("total number of patients not showed up patients ")
plt.xlabel('day')
plt.ylabel('number of patients')
```

Out[15]: Text(0, 0.5, 'number of patients')



In [16]:
```
df_no['day'].value_counts().plot(kind='bar')
plt.title("total number of patients not showed up patients ")
plt.xlabel('day')
plt.ylabel('number of patients')
```

Out[16]: Text(0, 0.5, 'number of patients')



days capcity doesn't seem to be different

In [17]:
```
stacked_chart('day',10)
```

In [18]:
```
df_yes['day'].value_counts()/df_no['day'].value_counts()
```

Out[18]:
```
Tuesday      0.253844
Wednesday    0.253340
Monday       0.247729
Friday       0.260392
Thursday     0.257627
Saturday     0.047619
Name: day, dtype: float64
```

Day doesn't seem to be a factor

is receiving a sms a factor

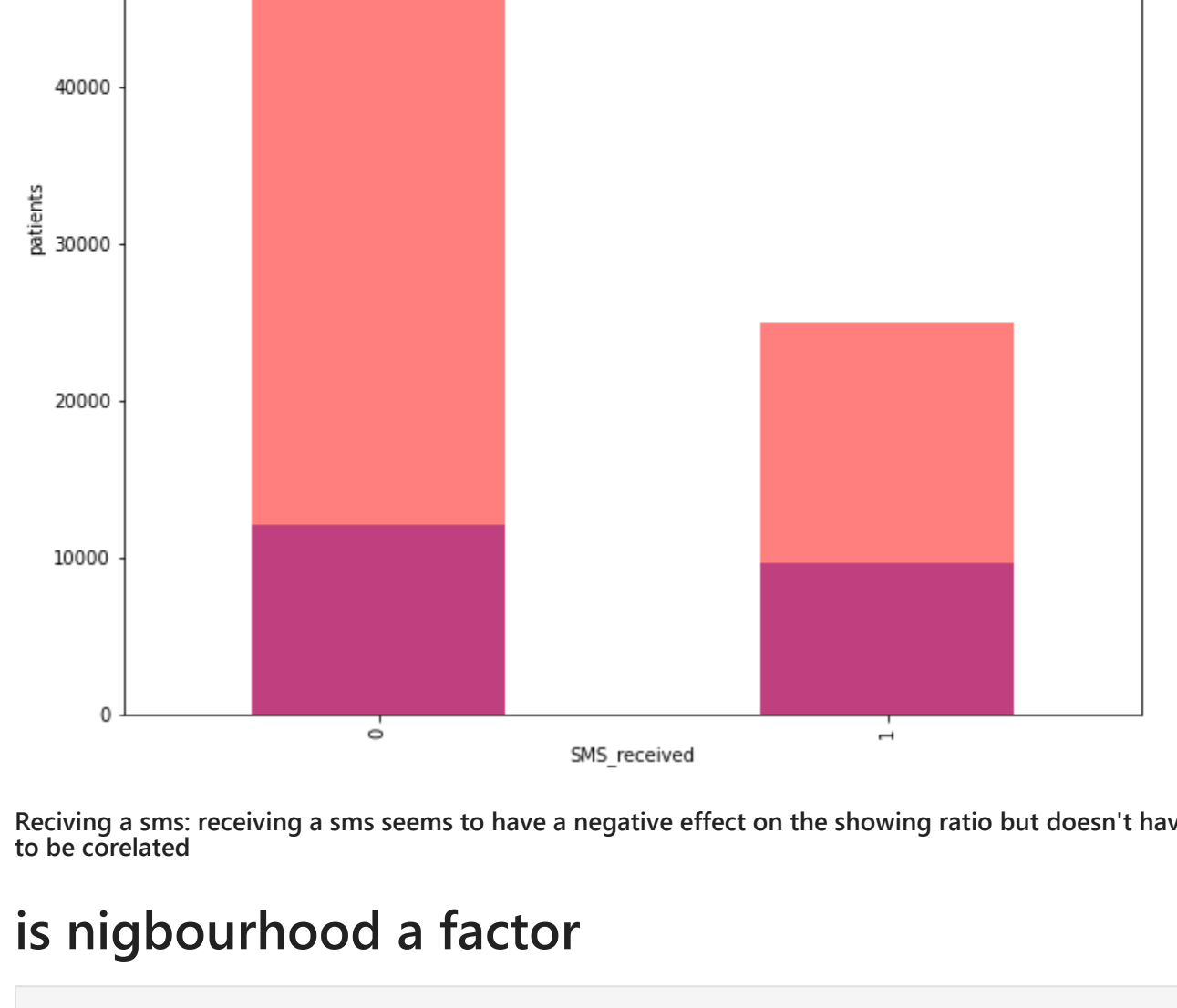
In [19]:
```
df[['SMS_received','No-show']].value_counts()
```

Out[19]:
```
SMS_received  No-show
0             No         60290
1             No         25017
0             Yes        12112
1             Yes         9568
dtype: int64
```

In [20]:
```
#getting the percentage of how much showed when a sms was sent vs didn't recive a sms
sms=df[['SMS_received','No-show']].value_counts().tolist()
no_sms_percentage=sms[2]/sms[0]
sms_sent_percentage=sms[3]/sms[1]
print(no_sms_percentage,sms_sent_percentage)
```

```
0.20089567092386798 0.38245992724947037
```

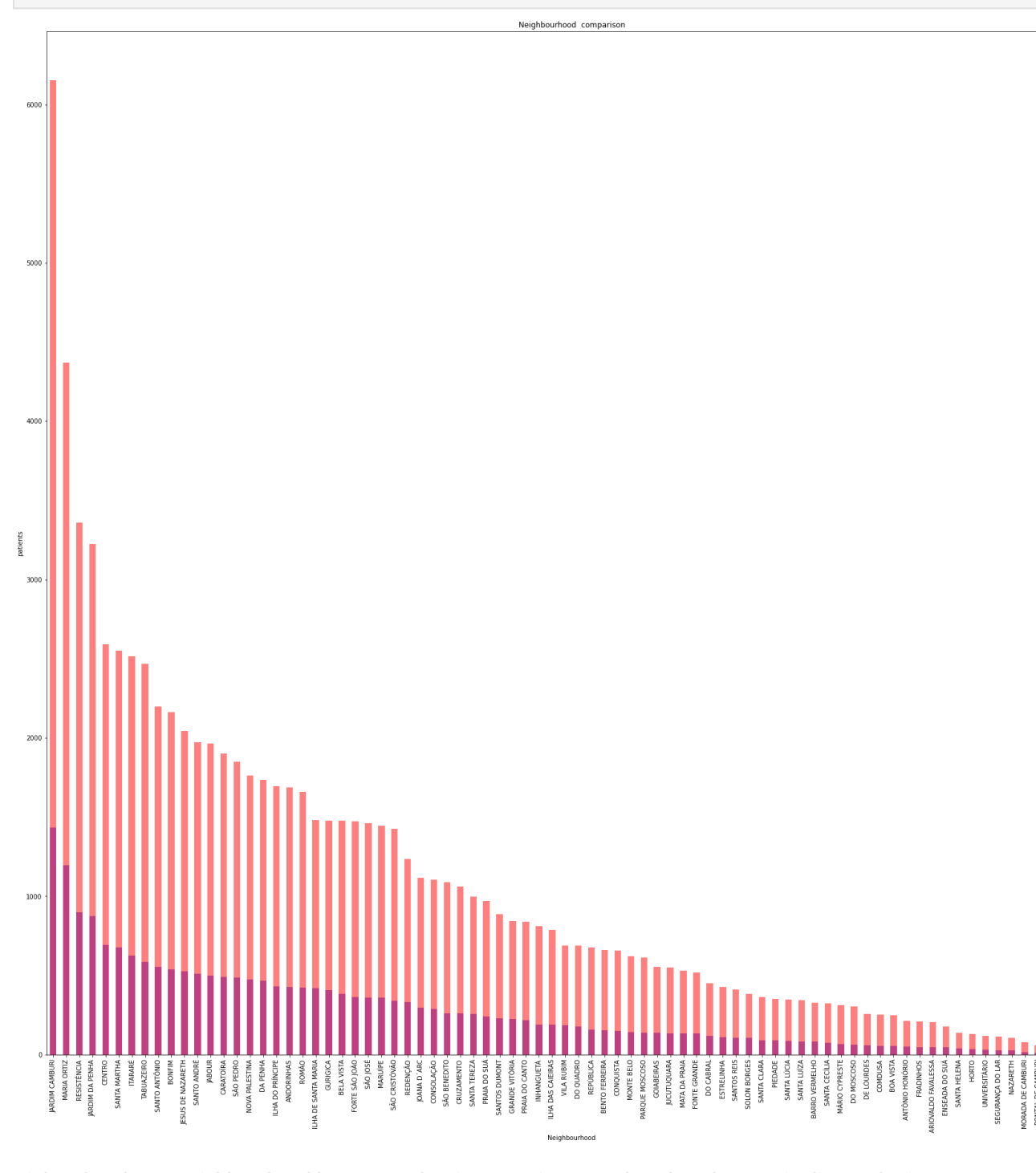
In [21]:
```
stacked_chart('SMS_received',10)
```



Reciving a sms: receiving a sms seems to have a negative effect on the showing ratio but doesn't have to be corelated

is nigbourhood a factor

In [22]:
```
stacked_chart('Neighbourhood',30)
```



Nigbourhood: some nighbourhood have more showing up ratios more than the others as "jardim camburi

In [ ]: