In [299]:
```
import pandas as pd
import altair as alt
import pandas_bokeh
pandas_bokeh.output_notebook()

from IPython.display import Image
from IPython.core.display import HTML
import cufflinks as cf
import plotly.graph_objs as go
import plotly
from plotly.offline import download_plotlyjs, init_notebook_mode, plot, iplot
cf.go_offline()
```

(https://bokeh.org)
BokehJS 2.1.0 successfully loaded.

Exploratory data analysis of survey data on use of Sarafu as a community inclusion currency in Mukuru

Purpose of data collection was to understand initial reactions to using Sarafu (i.e. are people happy, do they understand what it is - this will help us with our mobilisation messages for eg), what made people sign up/register, how has this contributed to them maintaining livelihoods and meeting basic needs during COVID and what are their expectations going forward.

In [2]:
```
# Reading data
df_cic = pd.read_excel('Community Inclusion Currencies M&E Rapid Survey Final.xlsx')
```

In [3]:
```
# number of people surveyed
a = df_cic['Are you willing to participate'].count()
b = df_cic['Are you willing to participate'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

The survey excercise enagged with **{{a}}** individuals out of whom, ***97.3%*** agreed to participate in the survey

In [4]:
```
# filter out those not willing to participate
df_cic = df_cic[df_cic['Are you willing to participate']
 != 'No']
```

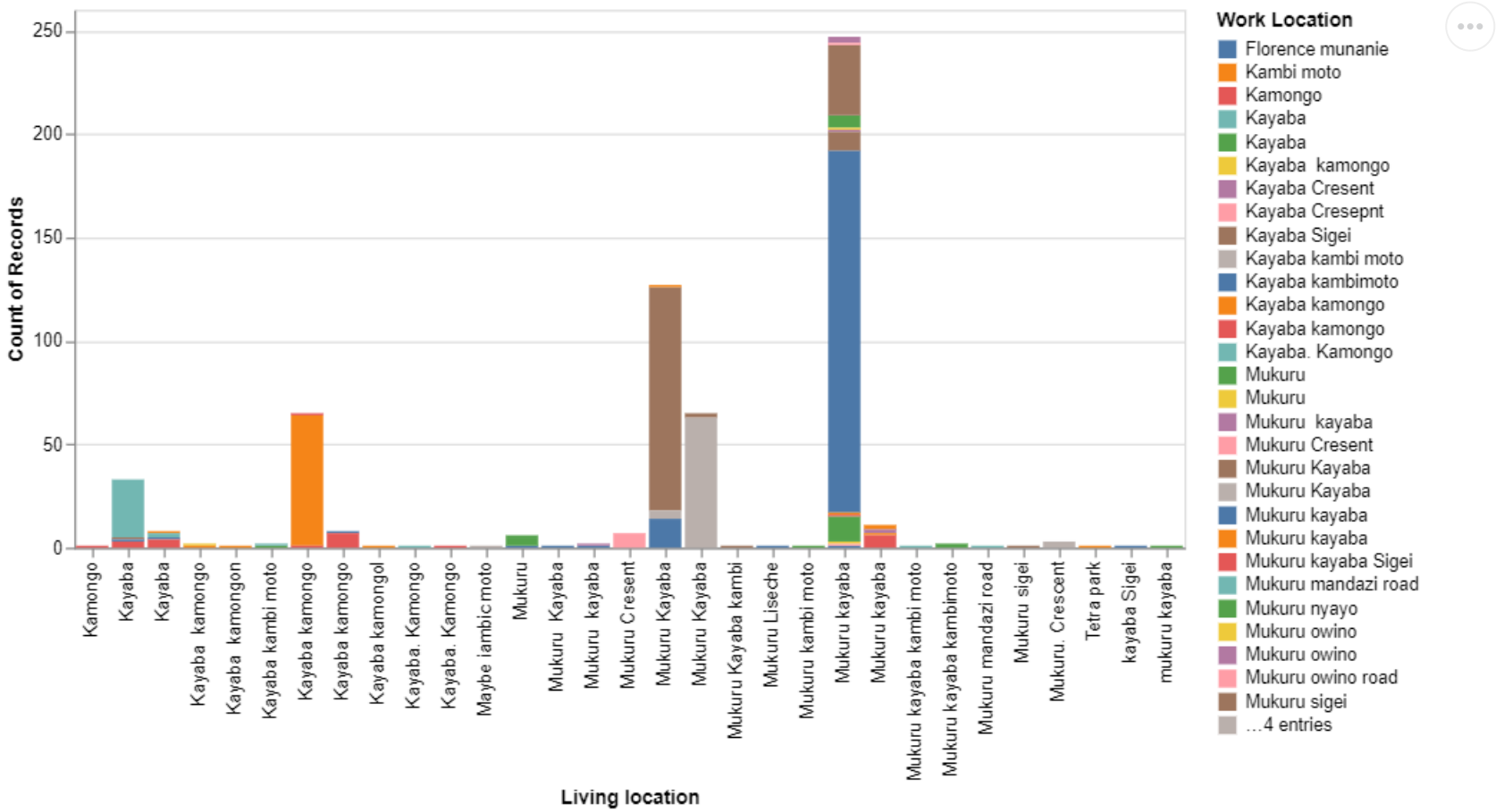
In [302]:
```
from pypandoc.pandoc_download import download_pandoc
```

Demographics of individuals participating

Living and working areas

In [6]:
```
alt.Chart(df_cic).mark_bar().encode(
    x='Living location ',
    y = 'count()',
      color='Work Location',
      tooltip = ("Work Location", 'count()')
).interactive()
```

Out[6]:



Roy and Humphrey, please help in cleaning this data, I am not familiar with the area.....

Below are lists of unique elements we can collapse into one for better analysis of the subject

In [7]:
```
living = df_cic['Living location '].tolist()
working = df_cic["Work Location"].tolist()
```

In [8]:
```
living = list(set(living))
working = list(set(working))
```

In [ ]:

In [ ]:

In [11]:
```
# change column name age
df_cic.rename(columns = {'4. Age of the respondent ':'Age'}, inplace = True)
# age data
age_list = df_cic['Age'].unique().tolist()
```

In [12]:
```
age_list
```

Out[12]:
```
['26-36 Years', '37-47 Years', '18-25 Years', '48-59 Years', 'Above 60 Years']
```

Age and gender specific analysis

The survey captured information from respondents in the **{{age_list}}** age brackets and also by **gender**

In [13]:
```
c = df_cic[['Age', 'Gender']].groupby('Age')['Gender'].value_counts(normalize = True).mul(100).round(1).astype(str) +
'%'
c_a = df_cic[['Age', 'Gender']].groupby('Age')['Gender'].value_counts()
c_a
```

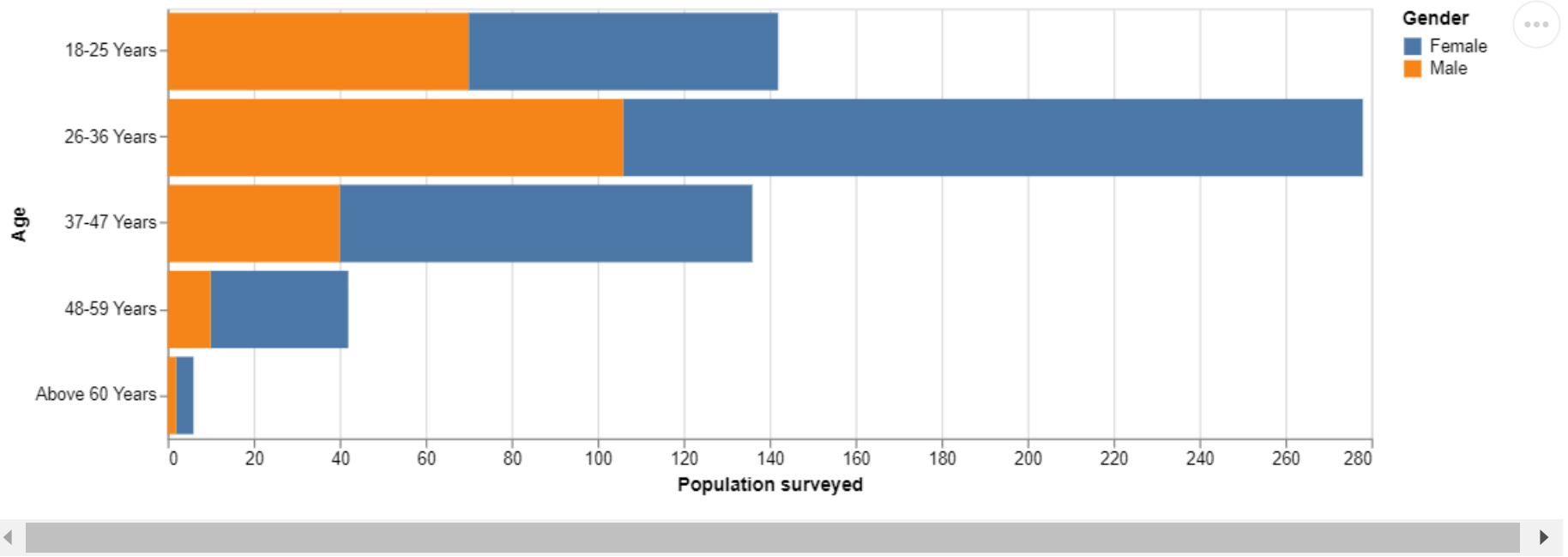
Out[13]:
```
Age             Gender
18-25 Years     Female     72
                Male       70
26-36 Years     Female    172
                Male      106
37-47 Years     Female     96
                Male       40
48-59 Years     Female     32
                Male       10
Above 60 Years  Female      4
                Male        2
Name: Gender, dtype: int64
```

In [14]:
```
# visualising the age vs gender data
d = alt.Chart(df_cic).mark_bar().encode(
    x=alt.X('count()', title = 'Population surveyed'),
    y =('Age'),
    color = 'Gender',
    tooltip = ('count()')
        ).interactive().properties(height = 250, width = 700)
```

More women than men in all age groups use Sarafu. The most **even** age split being between ***18-25 (51% vs 49 %)*** while the **largest** difference is in the ***48 - 59 age group (76 vs 24 %)***.{{d}}

In [15]:
```
# visualising the age vs gender data
d
```

Out[15]:



Number of people in household by age

In [16]:
```
print("Mean number of people in HH by", df_cic[['Age', 'Number of the people in your Household']].groupby('Age')['Number of the people in your Household'].mean().round(1))
```

```
Mean number of people in HH by Age
18-25 Years       3.7
26-36 Years       4.2
37-47 Years       5.3
48-59 Years       5.5
Above 60 Years    5.3
Name: Number of the people in your Household, dtype: float64
```

In [17]:
```
df_cic[['Number of the people in your Household']].mean().round(1)
```

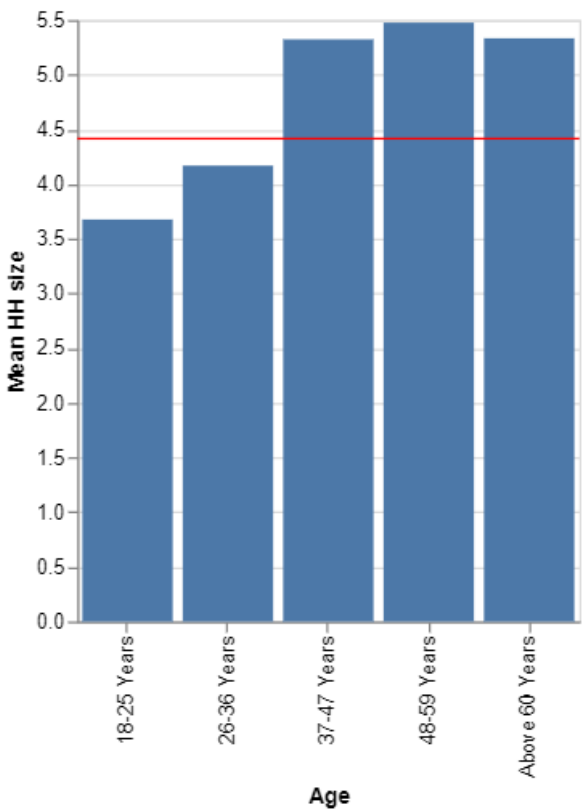
Out[17]:
```
Number of the people in your Household    4.4
dtype: float64
```

In [18]:
```
# visualising
hhs = alt.Chart(df_cic).mark_bar().encode(
    x=('Age'),
    y = ('mean(Number of the people in your Household)'),
    tooltip = ('mean(Number of the people in your Household)')
        ).interactive()

rule = alt.Chart(df_cic).mark_rule(color='red').encode(
    y=alt.Y('mean(Number of the people in your Household):Q', title = 'Mean HH size'),
    tooltip = ('mean(Number of the people in your Household)')
)

e = (hhs + rule).properties(width = 250)
```

In [19]:
```
print('HH distribution')
e
```

```
HH distribution
```

Out[19]:



The **mean HH** size is ***4.4*** in the surveyed group. By age group, the **largest** HH size is in the **48 - 59** age group ***(5.5)***, while the **smallest HH** size is in the **18 - 25** age band ***(3.7)***

Income analysis

First we slice income data by relevant columns in the dataframe

In [20]:
```
df_income = df_cic[[
 'Age',
 'Gender',
 'What are your sources of income?(All that apply)/Own business',
 'What are your sources of income?(All that apply)/stable job',
 'What are your sources of income?(All that apply)/informal labour',
 'What are your sources of income?(All that apply)/aid assistance',
 'What are your sources of income?(All that apply)/no income']]
# remane columns
df_income.rename(columns = {'4. Age of the respondent ':'Age', 'What are your sources of income?(All that apply)/Own b
usiness':'own business',
 'What are your sources of income?(All that apply)/stable job':'stable job',
 'What are your sources of income?(All that apply)/informal labour':'informal labour',
 'What are your sources of income?(All that apply)/aid assistance':'aid assistance',
 'What are your sources of income?(All that apply)/no income':'no income'}, inplace = True)
```

```
c:\users\admin\appdata\local\programs\python\python38-32\lib\site-packages\pandas\core\frame.py:4125: SettingWithCopy
Warning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning
-a-view-versus-a-copy
  return super().rename(
```

In [21]:
```
group_inc_age = df_income.groupby(['Age']).sum().reset_index()
group_inc_gender = df_income.groupby(['Gender']).sum().reset_index()
```

Summary description of income data

In [22]:
```
group_inc_age
```

Out[22]:

	Age	own business	stable job	informal labour	aid assistance	no income
0	18-25 Years	50.0	9.0	59.0	18.0	29.0
1	26-36 Years	113.0	28.0	106.0	27.0	44.0
2	37-47 Years	79.0	10.0	43.0	12.0	12.0
3	48-59 Years	23.0	1.0	14.0	9.0	5.0
4	Above 60 Years	2.0	0.0	3.0	2.0	0.0

In [23]:
```
group_inc_gender
```

Out[23]:

	Gender	own business	stable job	informal labour	aid assistance	no income
0	Female	172.0	27.0	133.0	42.0	63.0
1	Male	95.0	21.0	92.0	26.0	27.0

In [24]:
```
inc_age = group_inc_age.melt('Age', var_name='income', value_name='population')
inc_gen = group_inc_gender.melt('Gender', var_name='income', value_name='population')
```

In [25]:
```
inc_age_sum = df_income.melt(['Age', 'Gender'], var_name='income', value_name='population')
# Remove 0 value from population
inc_age_sum = inc_age_sum[inc_age_sum['population']
 != 0]
```

In [26]:
```
inc_age_sum[['Age', 'Gender', 'income']].groupby('Age')['income'].value_counts()
```

Out[26]:
```
Age            income
18-25 Years    informal labour     59
               own business        50
               no income           29
               aid assistance      18
               stable job           9
26-36 Years    own business       113
               informal labour    106
               no income           44
               stable job          28
               aid assistance      27
37-47 Years    own business        79
               informal labour     43
               aid assistance      12
               no income           12
               stable job          10
48-59 Years    own business        23
               informal labour     14
               aid assistance       9
               no income            5
               stable job           1
Above 60 Years informal labour      3
               aid assistance       2
               own business         2
Name: income, dtype: int64
```

In [27]:
```
inc_age_sum[['Age', 'Gender', 'income']].groupby('Age')['income'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[27]:

Age	income	
18-25 Years	informal labour	35.8%
	own business	30.3%
	no income	17.6%
	aid assistance	10.9%
	stable job	5.5%
26-36 Years	own business	35.5%
	informal labour	33.3%
	no income	13.8%
	stable job	8.8%
	aid assistance	8.5%
37-47 Years	own business	50.6%
	informal labour	27.6%
	aid assistance	7.7%
	no income	7.7%
	stable job	6.4%
48-59 Years	own business	44.2%
	informal labour	26.9%
	aid assistance	17.3%
	no income	9.6%
	stable job	1.9%
Above 60 Years	informal labour	42.9%
	aid assistance	28.6%
	own business	28.6%

Name: income, dtype: object

In the sample population, **none of those above 60 years had a stable income** additionally **informal labour accounts for a large source of income for those surveyed**. Largest soure of income by age group are in bold below

18-25 Years **informal labour 35.8%**

26-36 Years **own business 35.5%**

37-47 Years **own business 50.6%**

48-59 Years **own business 44.2%**

Above 60 Years **informal labour 42.9%**

In [28]:
```
inc_age_sum[['Age', 'Gender', 'income']].groupby('Gender')['income'].value_counts()
```

Out[28]:
```
Gender  income
Female  own business       172
        informal labour    133
        no income           63
        aid assistance      42
        stable job          27
Male    own business        95
        informal labour     92
        no income           27
        aid assistance      26
        stable job          21
Name: income, dtype: int64
```

In [29]:
```
inc_age_sum[['Age', 'Gender', 'income']].groupby('Gender')['income'].value_counts(normalize = True).mul(100).round(1).
astype(str) + '%'
```

Out[29]:
```
Gender  income
Female  own business       39.4%
        informal labour    30.4%
        no income          14.4%
        aid assistance      9.6%
        stable job          6.2%
Male    own business       36.4%
        informal labour    35.2%
        no income          10.3%
        aid assistance     10.0%
        stable job          8.0%
Name: income, dtype: object
```

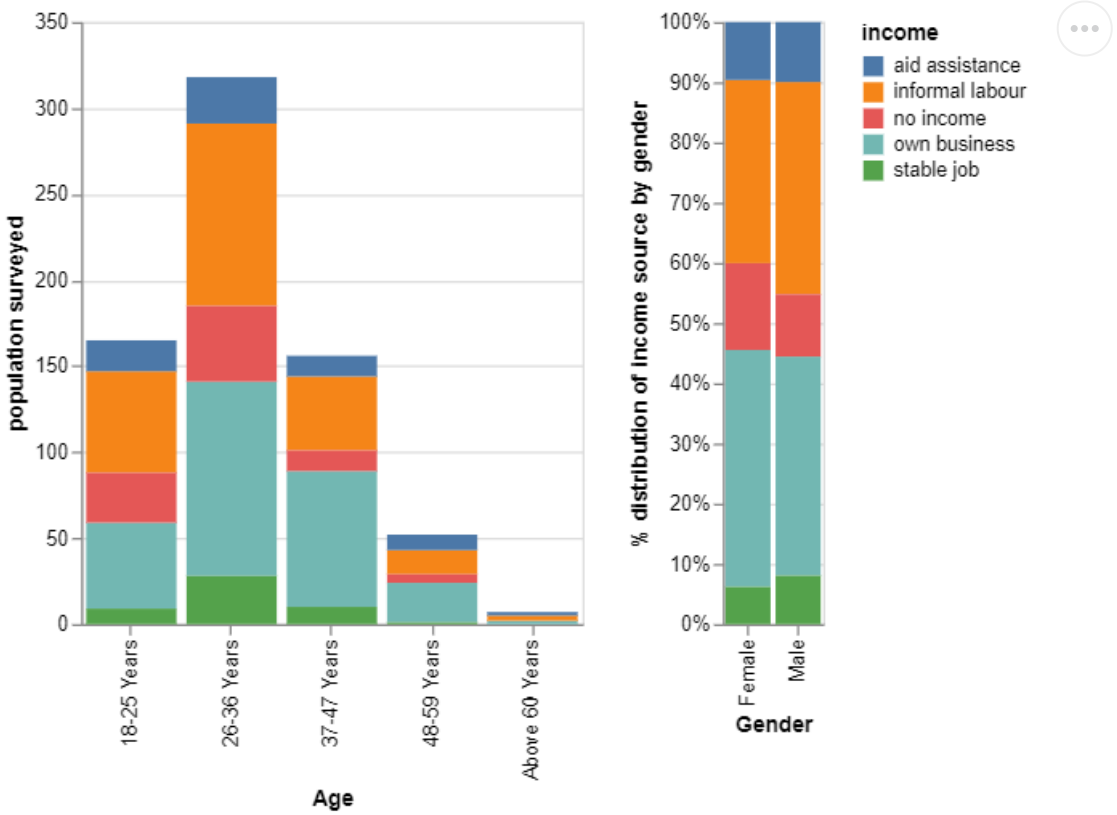
More women than men have their own businesses **39.4% vs 36.4%** while more men have stable jobs than women **8.0% vs 6.2%**. Both men and women are equaly reliant on aid assistance and more women have no income compared to men **14.4% vs 10.3%**.

In [30]:
```
# Visualising this data
inc_age_ch = alt.Chart(inc_age).mark_bar().encode(
    x=('Age'),
    y = alt.Y('population', title = 'population surveyed'),
    color = 'income',
    tooltip = ('income','population')
        ).interactive()
inc_gen_ch = alt.Chart(inc_gen).mark_bar().encode(
    x=alt.X('Gender'),
    y=alt.Y('sum(population)', title = '% distribution of income source by gender', stack="normalize", axis=alt.Axis(f
ormat='%')),
    color='income',
    tooltip=('income','population')
).interactive()
f = inc_age_ch.properties(width = 250)|inc_gen_ch.properties(width=50)
```

In [31]:
```
print("HH income vs age and gen")
f
```

```
HH income vs age and gen
```

Out[31]:



Description of those using Sarafu

Summary of number of people using Sarafu

In [32]:
```
saf_use = df_cic[['Gender', 'Age','Have you used Sarafu?']]
# remove population that hasn't used Sarafu
saf_use2 = saf_use[saf_use['Have you used Sarafu?']
 != 'No']
```

In [33]:
```
df_cic['Have you used Sarafu?'].value_counts()
```

Out[33]:
```
Yes    486
No     118
Name: Have you used Sarafu?, dtype: int64
```

In [34]:
```
df_cic['Have you used Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[34]:
```
Yes    80.5%
No     19.5%
Name: Have you used Sarafu?, dtype: object
```

Of those surveyed, **80.5%** have used Sarafu. Only ***118*** individuals surveyed have not used Sarafu compared to **486**.

In [35]:
```
#split by gender
df_cic[['Have you used Sarafu?', 'Gender']].groupby('Have you used Sarafu?')['Gender'].value_counts(normalize = True).
mul(100).round(1).astype(str) + '%'
```

Out[35]:
```
Have you used Sarafu?  Gender
No                     Female    61.0%
                       Male      39.0%
Yes                    Female    62.6%
                       Male      37.4%
Name: Gender, dtype: object
```

Of the **486** persons who have used Sarafu, more women use Sarafu than men **62.6% vs 37.4%**

By age group

In [36]:
```
df_cic[['Age', 'Have you used Sarafu?']].groupby('Age')['Have you used Sarafu?'].value_counts()
```

Out[36]:
```
Age            Have you used Sarafu?
18-25 Years    Yes                     122
               No                       20
26-36 Years    Yes                     218
               No                       60
37-47 Years    Yes                     107
               No                       29
48-59 Years    Yes                      33
               No                        9
Above 60 Years Yes                       6
Name: Have you used Sarafu?, dtype: int64
```

In [37]:
```
df_cic[['Age', 'Have you used Sarafu?']].groupby('Age')['Have you used Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[37]:
```
Age            Have you used Sarafu?
18-25 Years    Yes                     85.9%
               No                      14.1%
26-36 Years    Yes                     78.4%
               No                      21.6%
37-47 Years    Yes                     78.7%
               No                      21.3%
48-59 Years    Yes                     78.6%
               No                      21.4%
Above 60 Years Yes                    100.0%
Name: Have you used Sarafu?, dtype: object
```

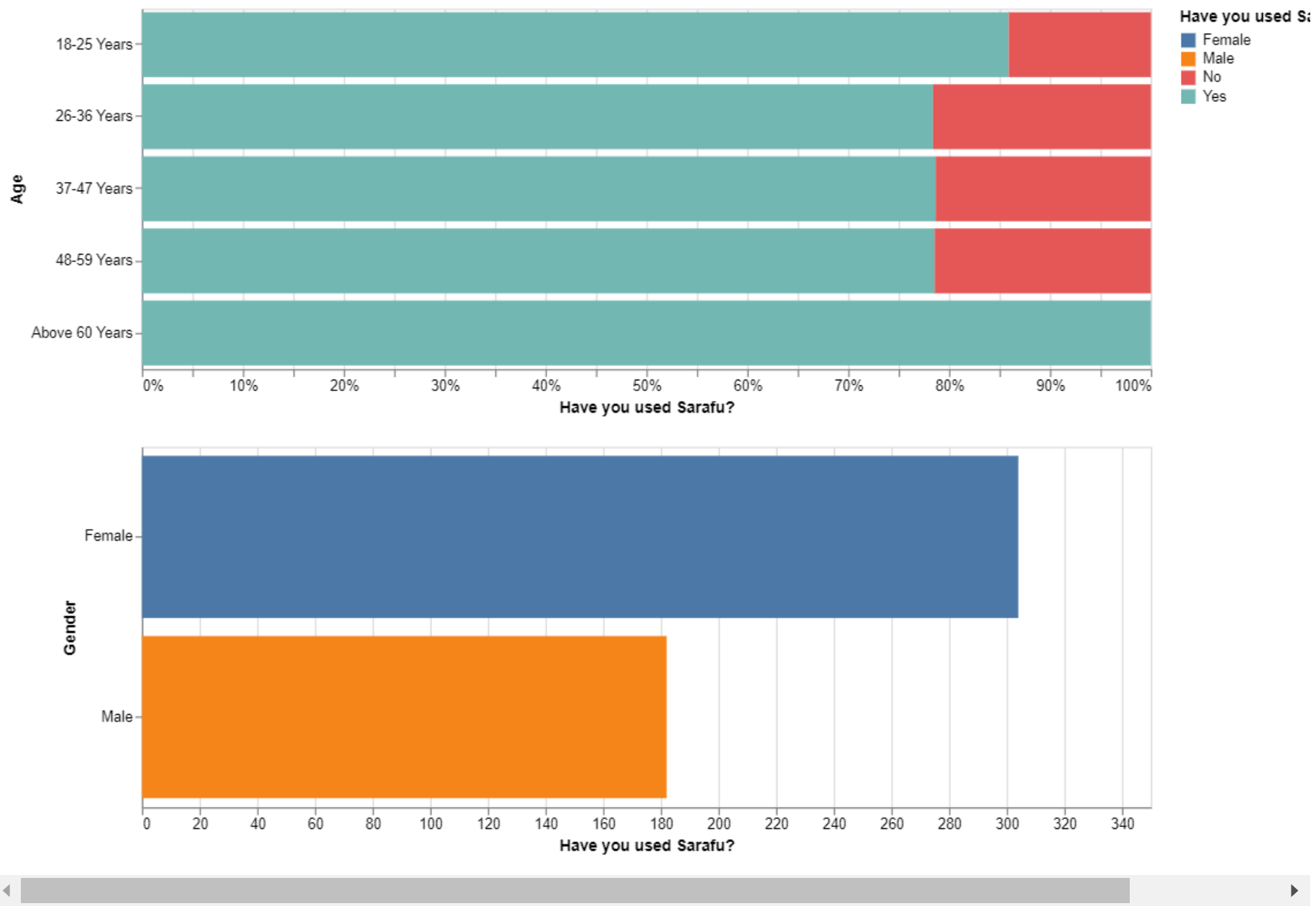
Sarafu is popular across all surveyed age bands, and **100%** of those **over 60** having used it while in the **18-25** age group, **(85%)** are users and **78%** usage in the rest.

In [38]:
```
# Visualising the data
use_s = alt.Chart(saf_use).mark_bar().encode(
    x=alt.X('count()', title = 'Have you used Sarafu?', stack="normalize", axis=alt.Axis(format='%')),
    y =alt.Y('Age'),
    color = 'Have you used Sarafu?',
    tooltip = ('count()')
        ).interactive().properties(height = 250, width = 700)
use_g = alt.Chart(saf_use2).mark_bar().encode(
    x=alt.X('count(Gender)', title = 'Have you used Sarafu?', ),
    y =('Gender'),
    color = 'Gender',
    tooltip = ('count()')
        ).interactive().properties(height = 250, width = 700)
g =  use_s&use_g
```

In [39]:
```
print('Sarafu users by age and gender')
g
```

Sarafu users by age and gender

Out[39]:



Main sources of income for those using Sarafu

In [40]:
```
users_inc = df_cic[[
 'Age',
 'Gender',
    'Have you used Sarafu?',
 'What are your sources of income?(All that apply)/Own business',
 'What are your sources of income?(All that apply)/stable job',
 'What are your sources of income?(All that apply)/informal labour',
 'What are your sources of income?(All that apply)/aid assistance',
 'What are your sources of income?(All that apply)/no income']]
# remane columns
users_inc.rename(columns = {'4. Age of the respondent ':'Age', 'What are your sources of income?(All that apply)/Own b
usiness':'own business',
 'What are your sources of income?(All that apply)/stable job':'stable job',
 'What are your sources of income?(All that apply)/informal labour':'informal labour',
 'What are your sources of income?(All that apply)/aid assistance':'aid assistance',
 'What are your sources of income?(All that apply)/no income':'no income'}, inplace = True)
```

```
c:\users\admin\appdata\local\programs\python\python38-32\lib\site-packages\pandas\core\frame.py:4125: SettingWithCopy
Warning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning
-a-view-versus-a-copy
  return super().rename(
```

In [41]:
```
users_inc = users_inc[users_inc['Have you used Sarafu?']
 != 'No']
# those not using
n_users_inc = users_inc[users_inc['Have you used Sarafu?']
 != 'Yes']
```

In [42]:
```
users_inc_a = users_inc.melt(['Age', 'Gender', 'Have you used Sarafu?'], var_name='income', value_name='population')
# remove 0
users_inc_a = users_inc_a[users_inc_a['population']
 != 0]
```

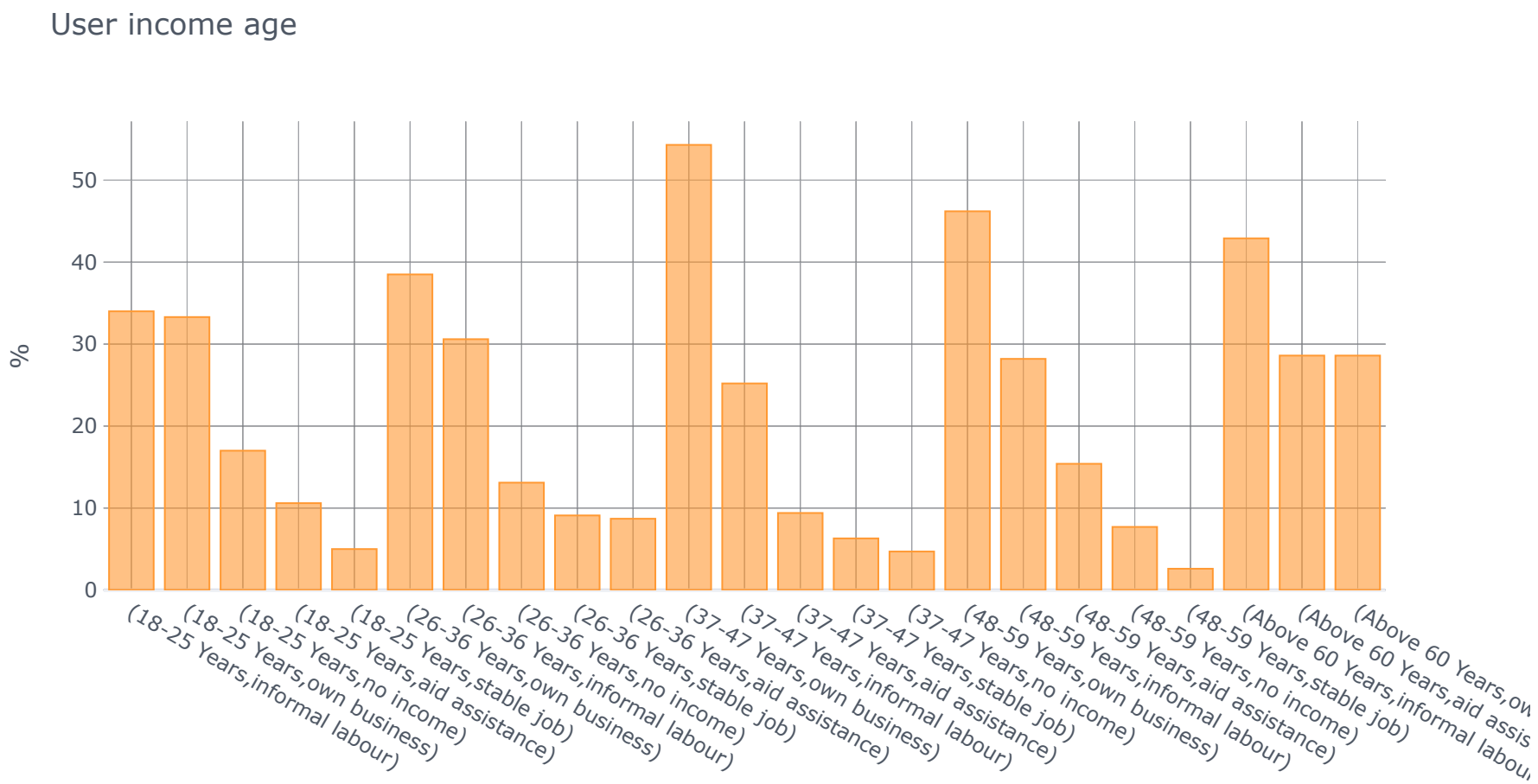
In [43]:
```
users_inc_a.groupby('Age')['income'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[43]:
```
Age            income
18-25 Years    informal labour    34.0%
               own business       33.3%
               no income          17.0%
               aid assistance     10.6%
               stable job          5.0%
26-36 Years    own business       38.5%
               informal labour    30.6%
               no income          13.1%
               stable job          9.1%
               aid assistance      8.7%
37-47 Years    own business       54.3%
               informal labour    25.2%
               aid assistance      9.4%
               stable job          6.3%
               no income           4.7%
48-59 Years    own business       46.2%
               informal labour    28.2%
               aid assistance     15.4%
               no income           7.7%
               stable job          2.6%
Above 60 Years informal labour    42.9%
               aid assistance     28.6%
               own business       28.6%
Name: income, dtype: object
```

In [44]:
```
users_inc_a.groupby('Age')['population'].value_counts()
```

Out[44]:
```
Age            population
18-25 Years    1.0           141
26-36 Years    1.0           252
37-47 Years    1.0           127
48-59 Years    1.0            39
Above 60 Years 1.0             7
Name: population, dtype: int64
```

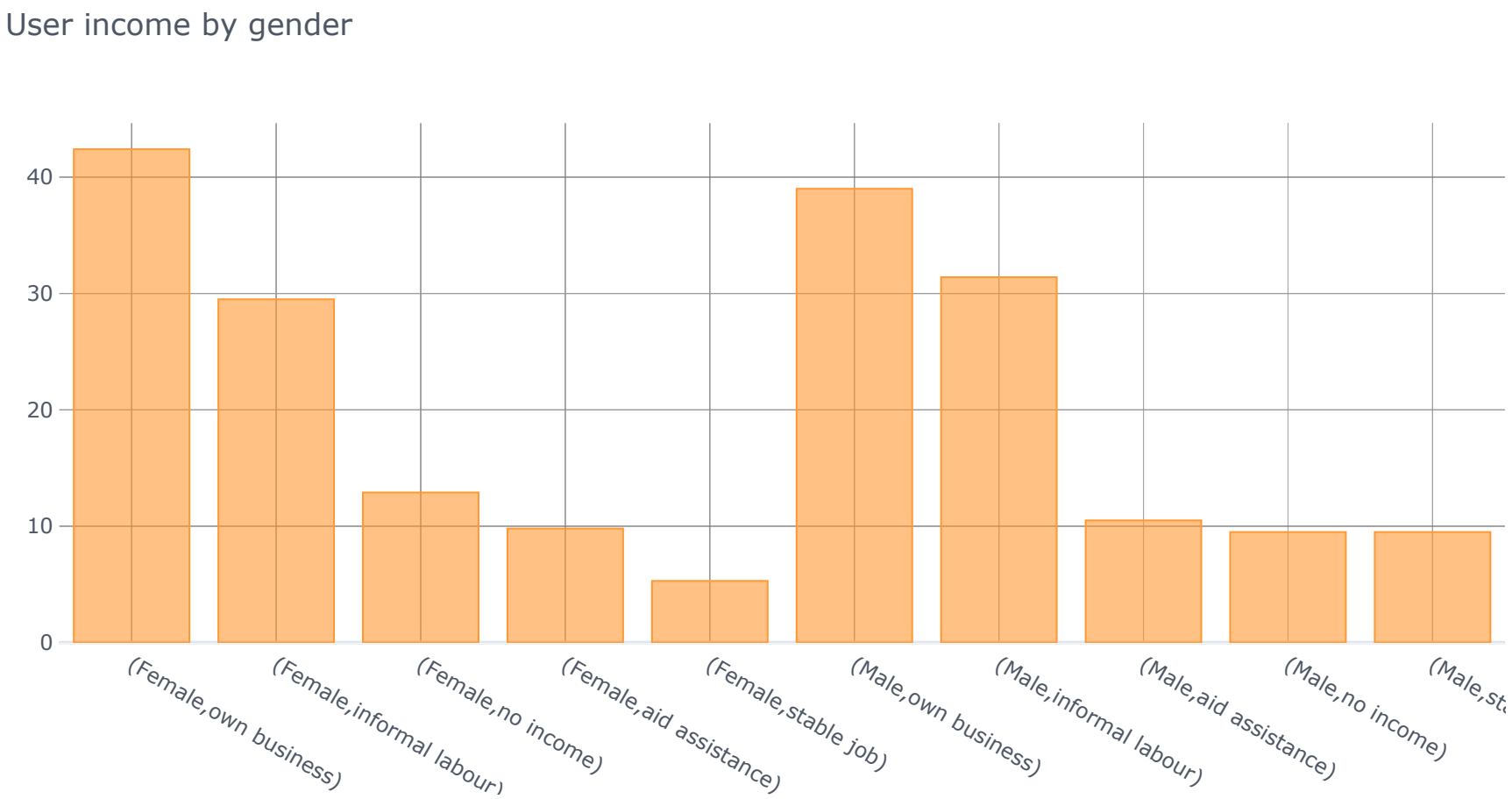
In [90]:
```
users_inc_a.groupby('Age')['income'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', tit
le='User income age')
```



In [46]:
```
users_inc_a.groupby('Gender')['income'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[46]:
```
Gender  income
Female  own business       42.4%
        informal labour    29.5%
        no income          12.9%
        aid assistance      9.8%
        stable job          5.3%
Male    own business       39.0%
        informal labour    31.4%
        aid assistance     10.5%
        no income           9.5%
        stable job          9.5%
Name: income, dtype: object
```

In [87]:
```
users_inc_a.groupby('Gender')['income'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',title='User
 income by gender')
```



Of those using Sarafu, those in the ***18-25*** age band rely in **informal income** as source of income ***(34%)*** and also have the largest share with **no income (17%)**, while majority in the ***26-36*** age band have their own source of income ***(38.5%)***. This is mirrored in the **37-47** age band where own sources of income is ***54%*** of the declared sources.

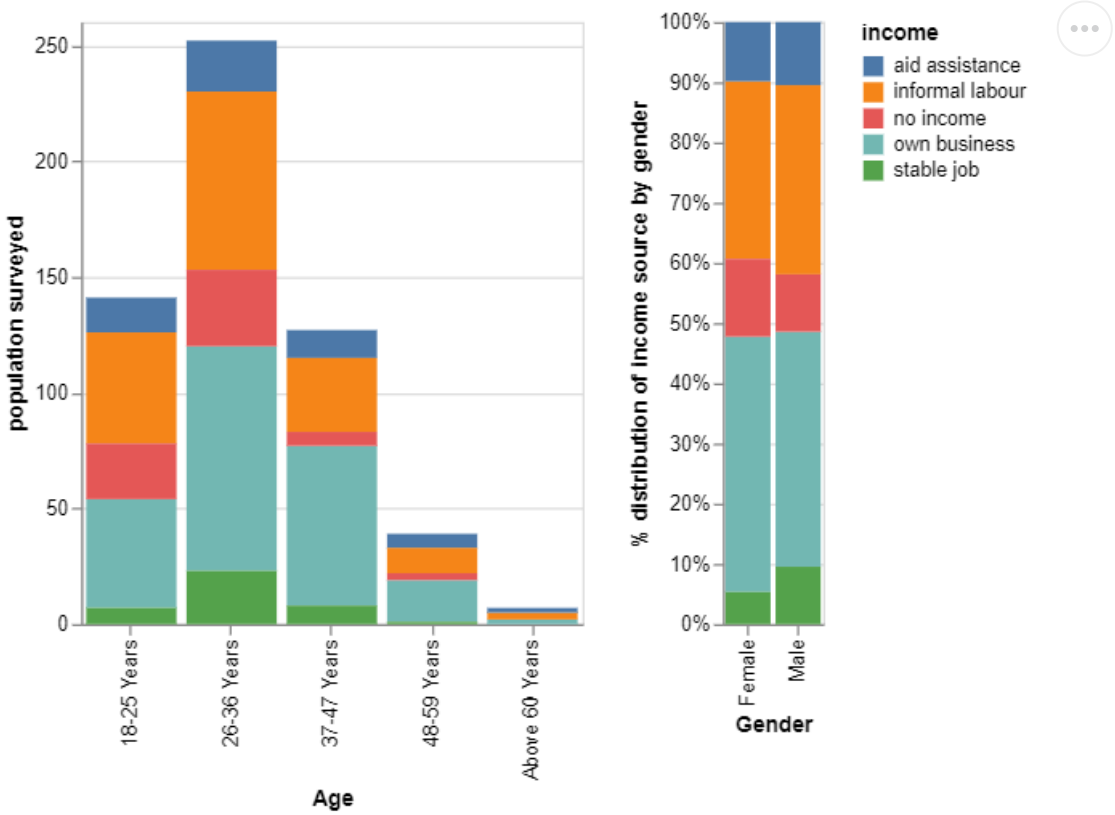
By gender, distribution of income sources is nearly even except women have much lower **stable income** than men ***(5.3% vs 9.5%)***.

In [48]:
```
# Additional visualisation there is an error in this code I'll clear later
u_inc_age = alt.Chart(users_inc_a).mark_bar().encode(
    x=('Age'),
    y = alt.Y('sum(population)', title = 'population surveyed'),
    color = 'income',
    tooltip = ('income', 'sum(population)')).interactive()

u_inc_gen = alt.Chart(users_inc_a).mark_bar().encode(
    x=alt.X('Gender'),
    y=alt.Y('sum(population)', title = '% distribution of income source by gender', stack="normalize", axis=alt.Axis(f
ormat='%')),
    color='income',
    tooltip=('income', 'sum(population)')
).interactive()
h = u_inc_age.properties(width = 250)|u_inc_gen.properties(width=50)
```

In [49]:
```
print('Users income source by age and gender')
h
```

```
Users income source by age and gender
```

Out[49]:



Analysis of how Sarafu is used

In [50]:
```
# slice user data
df_cic_users = df_cic[df_cic['Have you used Sarafu?']
 != 'No']
```

In [51]:
```
use = df_cic_users[['Age','Gender',
 'What do you use Sarafu for? (Mark all that Apply)/Cash out with chamas, ',
 'What do you use Sarafu for? (Mark all that Apply)/Pay debts',
 'What do you use Sarafu for? (Mark all that Apply)/Saving',
 'What do you use Sarafu for? (Mark all that Apply)/Purchase goods or services',
 'What do you use Sarafu for? (Mark all that Apply)/Acceptance for sales of goods or services']]
use.rename(columns = {'What do you use Sarafu for? (Mark all that Apply)/Cash out with chamas, ':'chamas',
 'What do you use Sarafu for? (Mark all that Apply)/Pay debts':'pay debt',
 'What do you use Sarafu for? (Mark all that Apply)/Saving':'savings',
 'What do you use Sarafu for? (Mark all that Apply)/Purchase goods or services':'purchse goods services',
 'What do you use Sarafu for? (Mark all that Apply)/Acceptance for sales of goods or services':'receive payment for go
ods'}, inplace = True)
```

```
c:\users\admin\appdata\local\programs\python\python38-32\lib\site-packages\pandas\core\frame.py:4125: SettingWithCopy
Warning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning
-a-view-versus-a-copy
  return super().rename(
```

In [52]:
```
purchase = df_cic_users[['Age','Gender',
'What goods or services did you purchase with Sarafu? (All that apply)/Food/Water',
 'What goods or services did you purchase with Sarafu? (All that apply)/Transport',
 'What goods or services did you purchase with Sarafu? (All that apply)/Environment',
 'What goods or services did you purchase with Sarafu? (All that apply)/Health',
 'What goods or services did you purchase with Sarafu? (All that apply)/Education',
 'What goods or services did you purchase with Sarafu? (All that apply)/Energy']]
purchase.rename(columns = {'What goods or services did you purchase with Sarafu? (All that apply)/Food/Water':'food or
water',
 'What goods or services did you purchase with Sarafu? (All that apply)/Transport':'transport',
 'What goods or services did you purchase with Sarafu? (All that apply)/Environment':'environment',
 'What goods or services did you purchase with Sarafu? (All that apply)/Health':'health',
 'What goods or services did you purchase with Sarafu? (All that apply)/Education':'education',
 'What goods or services did you purchase with Sarafu? (All that apply)/Energy':'energy'}, inplace = True)
```

In [53]:
```
purchase = purchase.melt(['Age', 'Gender'], var_name='purchases', value_name='population')
use = use.melt(['Age', 'Gender'], var_name='use', value_name='population')
# drop 0's
purchase= purchase[purchase['population']
 != 0]
use= use[use['population']
 != 0]
```

Purchases

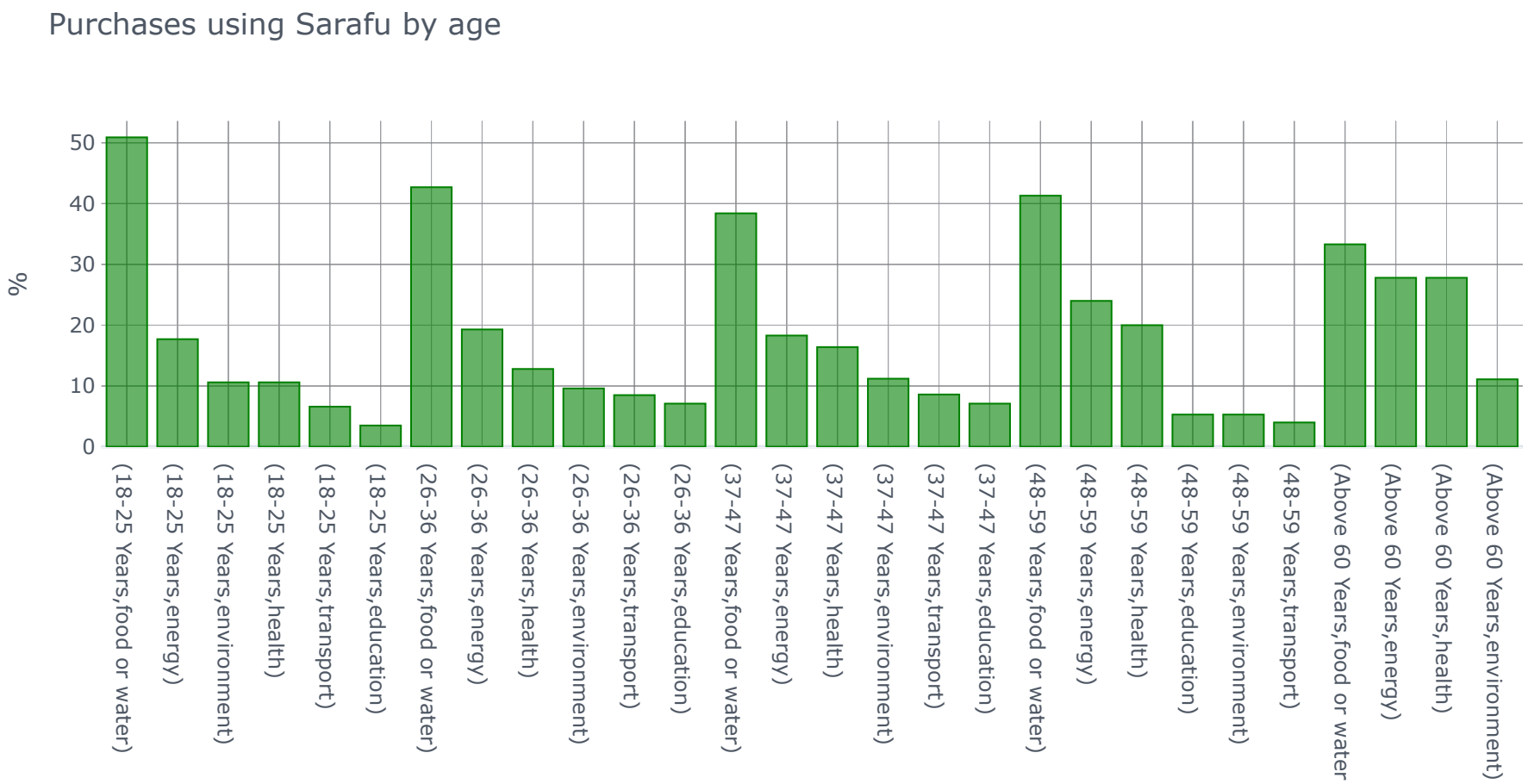
In [54]:
```
purchase.groupby('Age')['purchases'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[54]:

Age	purchases	
18-25 Years	food or water	50.9%
	energy	17.7%
	environment	10.6%
	health	10.6%
	transport	6.6%
	education	3.5%
26-36 Years	food or water	42.7%
	energy	19.3%
	health	12.8%
	environment	9.6%
	transport	8.5%
	education	7.1%
37-47 Years	food or water	38.4%
	energy	18.3%
	health	16.4%
	environment	11.2%
	transport	8.6%
	education	7.1%
48-59 Years	food or water	41.3%
	energy	24.0%
	health	20.0%
	education	5.3%
	environment	5.3%
	transport	4.0%
Above 60 Years	food or water	33.3%
	energy	27.8%
	health	27.8%
	environment	11.1%

Name: purchases, dtype: object

In [92]:
```
purchase.groupby('Age')['purchases'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', title='Purchases using Sarafu by age', color = 'green')
```

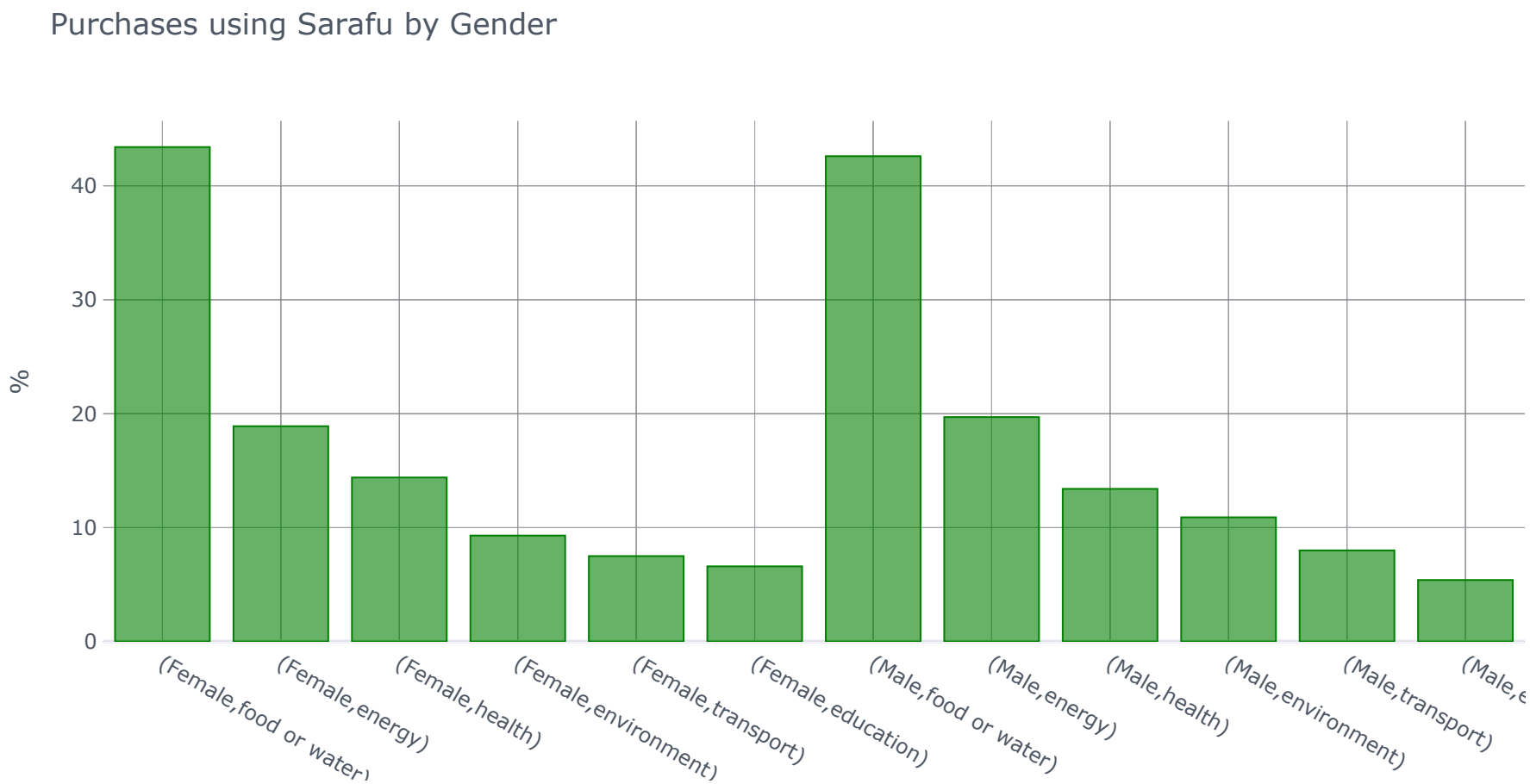


Across all age group of users, water and food were the most purchased items while the those **above 60 spent considerably on health than the rest of the age bands (27.8%)**.

In [56]:
```
purchase.groupby('Gender')['purchases'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[56]:
```
Gender  purchases
Female  food or water    43.4%
        energy           18.9%
        health           14.4%
        environment       9.3%
        transport         7.5%
        education         6.6%
Male    food or water    42.6%
        energy           19.7%
        health           13.4%
        environment      10.9%
        transport         8.0%
        education         5.4%
Name: purchases, dtype: object
```

In [93]:
```
purchase.groupby('Gender')['purchases'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%',
title='Purchases using Sarafu by Gender', color = 'green')
```



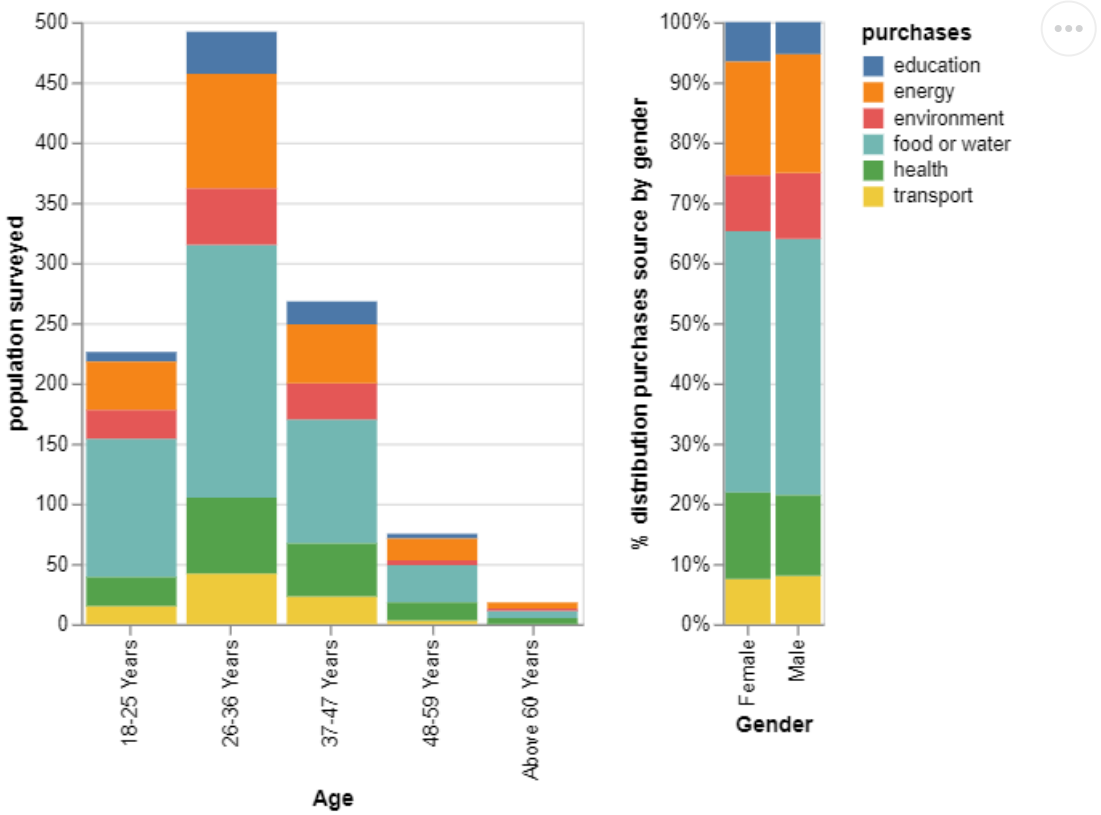
Split by ***gender***, spending patterns were **similar across board.**

In [58]:
```
pur_age = alt.Chart(purchase).mark_bar().encode(
    x=('Age'),
    y = alt.Y('sum(population)', title = 'population surveyed'),
    color = 'purchases',
    tooltip = ('purchases', 'sum(population)')
        ).interactive()
pur_gen = alt.Chart(purchase).mark_bar().encode(
    x=alt.X('Gender'),
    y=alt.Y('sum(population)', title = '% distribution purchases source by gender', stack="normalize", axis=alt.Axis(f
ormat='%')),
    color='purchases',
    tooltip=('purchases', 'sum(population)')
).interactive()
i = pur_age.interactive().properties(width = 250)|pur_gen.properties(width=50)
```

In [59]:
```
print('Purchases by age and gender of users')
i
```

```
Purchases by age and gender of users
```

Out[59]:

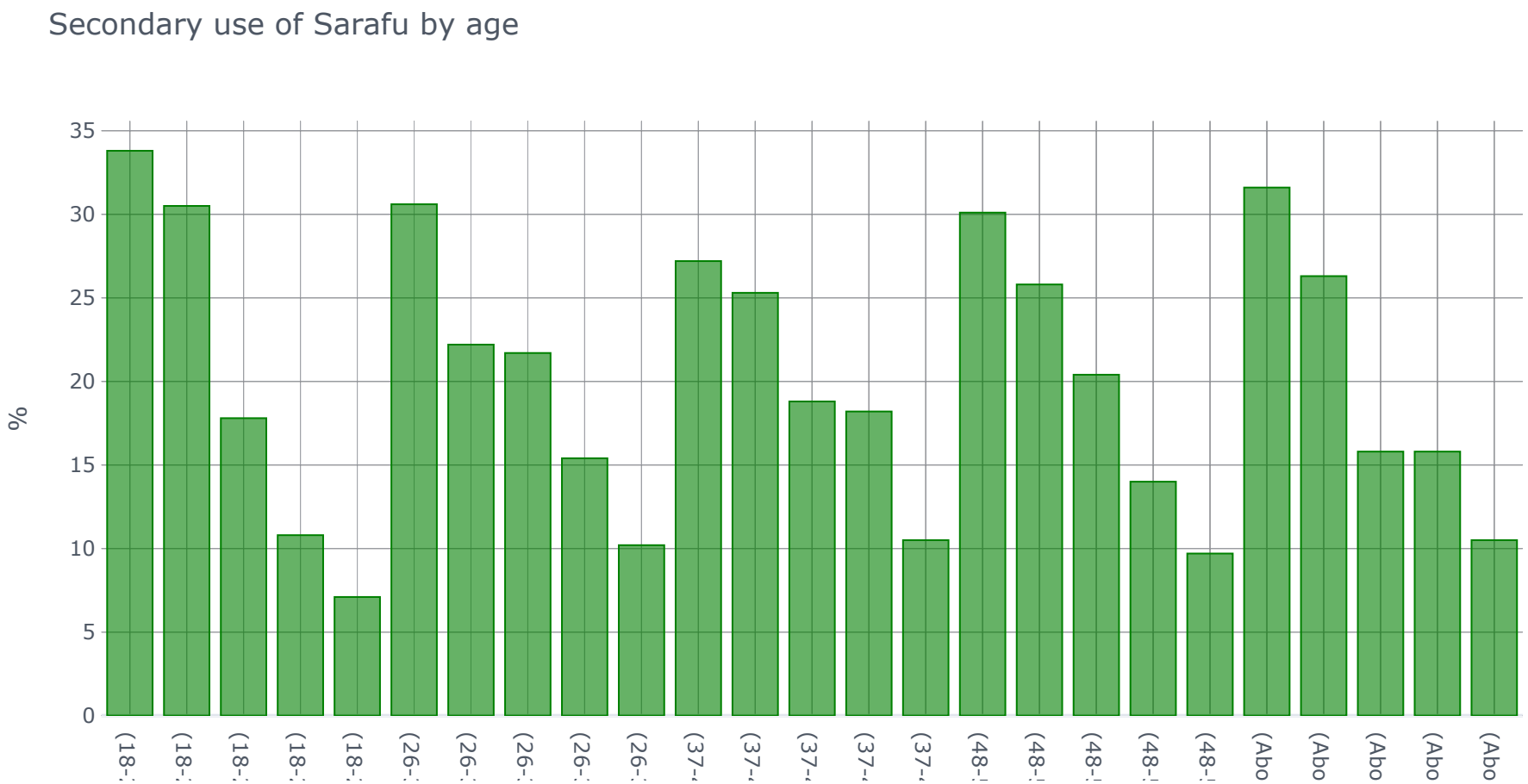


Uses

In [60]:
```
use.groupby('Age')['use'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[60]:
```
Age            use
18-25 Years    savings                     33.8%
               purchse goods services      30.5%
               chamas                      17.8%
               pay debt                    10.8%
               receive payment for goods    7.1%
26-36 Years    savings                     30.6%
               chamas                      22.2%
               purchse goods services      21.7%
               pay debt                    15.4%
               receive payment for goods   10.2%
37-47 Years    savings                     27.2%
               chamas                      25.3%
               purchse goods services      18.8%
               pay debt                    18.2%
               receive payment for goods   10.5%
48-59 Years    savings                     30.1%
               chamas                      25.8%
               pay debt                    20.4%
               purchse goods services      14.0%
               receive payment for goods    9.7%
Above 60 Years savings                     31.6%
               purchse goods services      26.3%
               pay debt                    15.8%
               receive payment for goods   15.8%
               chamas                      10.5%
Name: use, dtype: object
```

In [94]:
```
use.groupby('Age')['use'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', title='Secondary use of Sarafu by age', color = 'green')
```



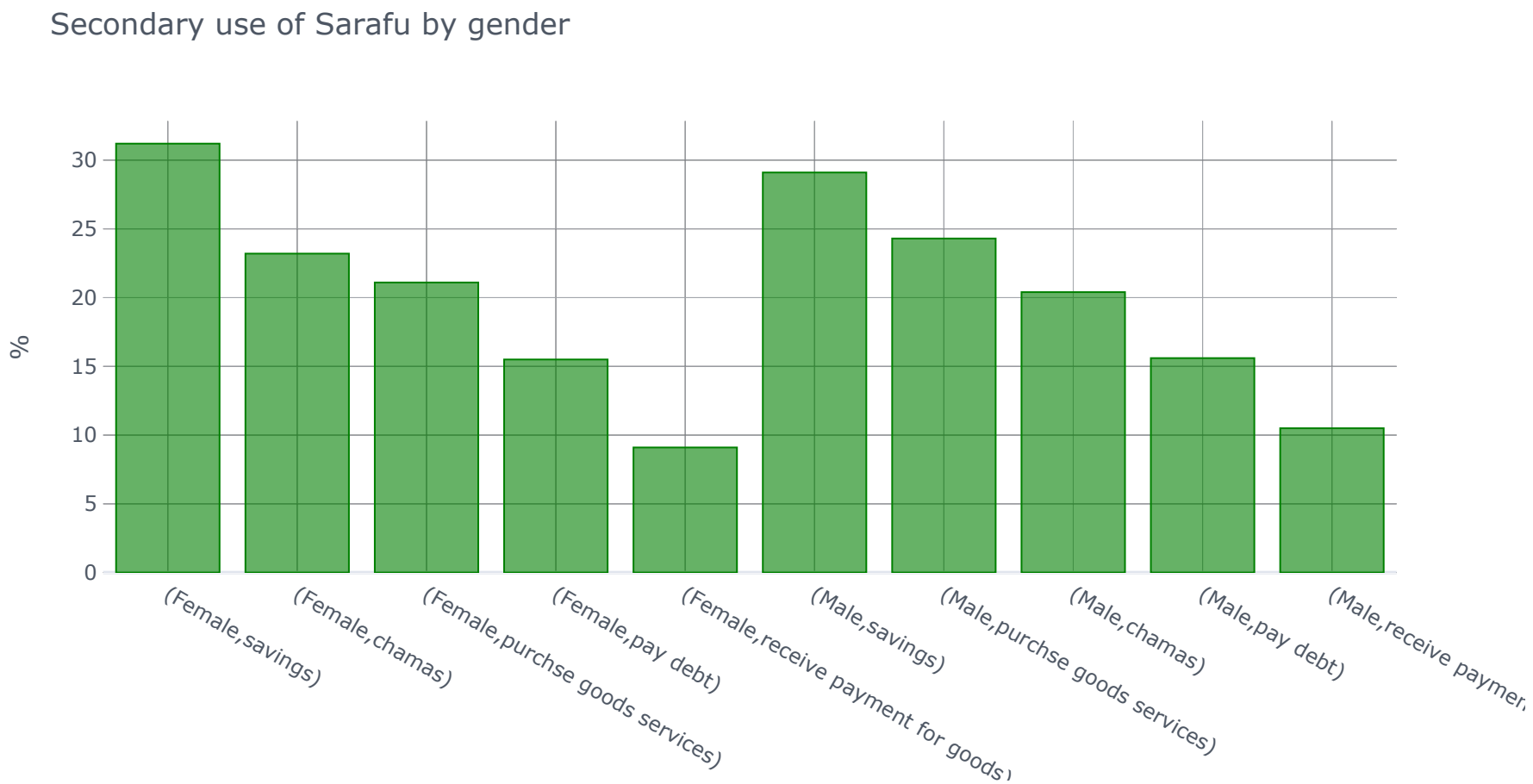
By age groups, **savings** is the highest recorded use ranging between ***27% - 33%*** across all age bands.

In [ ]:
```

```

In [62]:
```
use.groupby('Gender')['use'].value_counts(normalize = True).mul(100).round(1).astype(str) + ('%')
```

Out[62]:
```
Gender  use
Female  savings                     31.2%
        chamas                      23.2%
        purchse goods services      21.1%
        pay debt                    15.5%
        receive payment for goods    9.1%
Male    savings                     29.1%
        purchse goods services      24.3%
        chamas                      20.4%
        pay debt                    15.6%
        receive payment for goods   10.5%
Name: use, dtype: object
```

In [95]:
```
use.groupby('Gender')['use'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', title='Secondary use of Sarafu by gender', color = 'green')
```



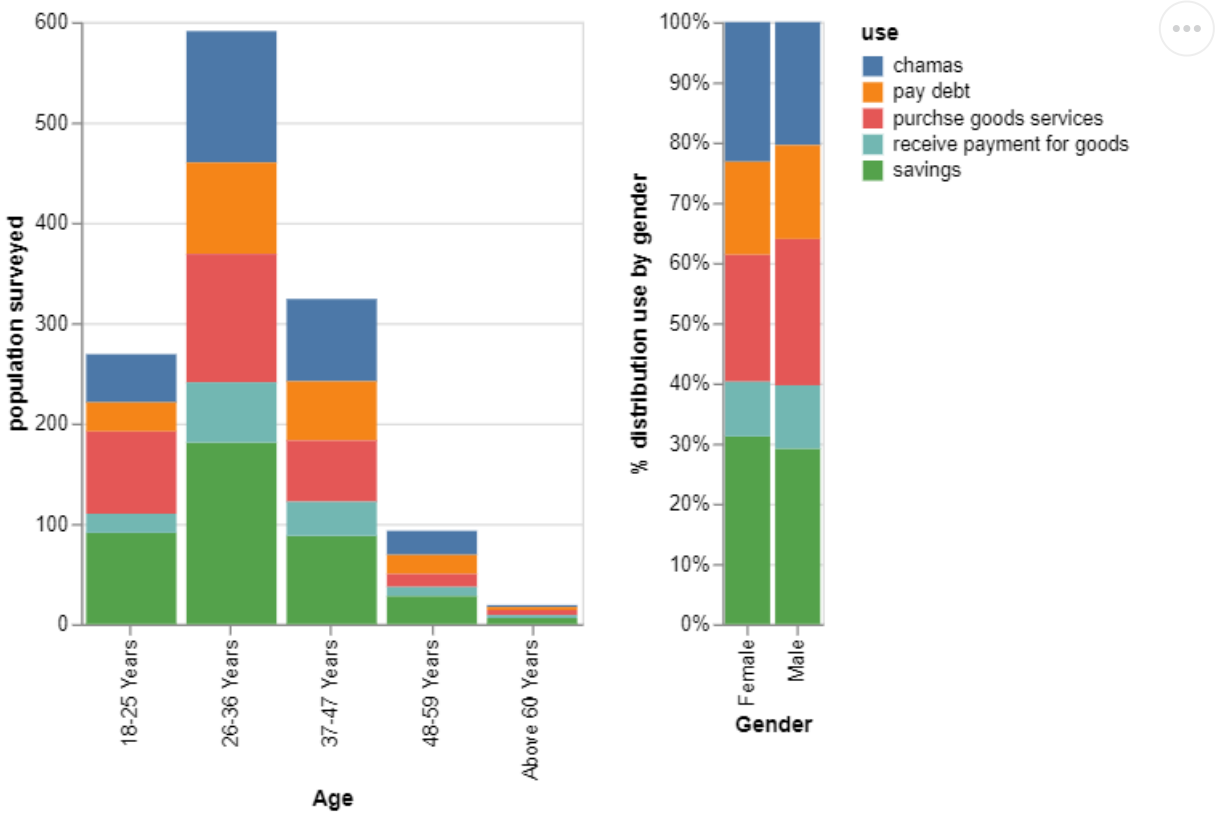
By gender, use of Sarafu is **nearly identical**

In [64]:
```
use_age = alt.Chart(use).mark_bar().encode(
    x=('Age'),
    y = alt.Y('sum(population)', title = 'population surveyed'),
    color = 'use',
    tooltip = ('use', 'sum(population)')
        ).interactive()
use_gen = alt.Chart(use).mark_bar().encode(
    x=alt.X('Gender'),
    y=alt.Y('sum(population)', title = '% distribution use by gender', stack="normalize", axis=alt.Axis(format='%')),
    color='use',
    tooltip=('use', 'sum(population)')
).interactive()
j = use_age.properties(width = 250)|use_gen.properties(width=50)
```

In [65]:
```
print('Sarafu use by age and gender')
j
```

```
Sarafu use by age and gender
```

Out[65]:



Sarafu and COVID

In [ ]:
```
```

In [66]:
```
cov = df_cic_users[['Age','Gender','5) Has your awareness regarding COVID-19 increased because of Sarafu? ',
 'a) If so, what have you learned?',
 'b) Have you shared this information about Sarafu with family/household? ']]
```

In [67]:
```
cov.rename(columns = {'5) Has your awareness regarding COVID-19 increased because of Sarafu? ':'more_aware',
 'a) If so, what have you learned?':'lessons',
 'b) Have you shared this information about Sarafu with family/household? ':'shared'}, inplace = True)
```

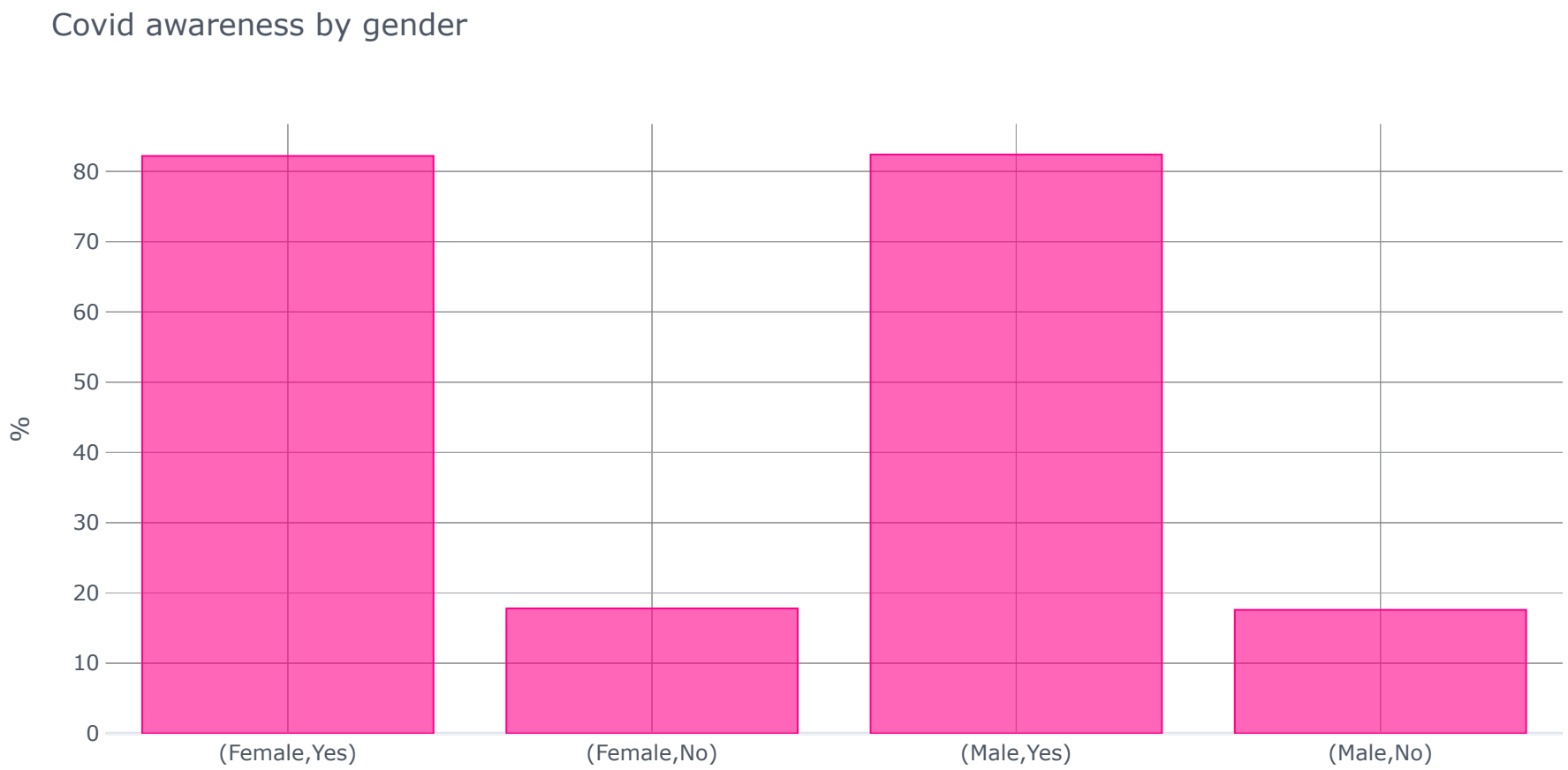
In [68]:
```
cov.more_aware.value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[68]:
```
Yes    82.3%
No     17.7%
Name: more_aware, dtype: object
```

In [69]:
```
cov.groupby('Gender')['more_aware'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[69]:
```
Gender  more_aware
Female  Yes           82.2%
        No            17.8%
Male    Yes           82.4%
        No            17.6%
Name: more_aware, dtype: object
```

In [97]:
```
cov.groupby('Gender')['more_aware'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', titl
e='Covid awareness by gender', color = 'pink')
```



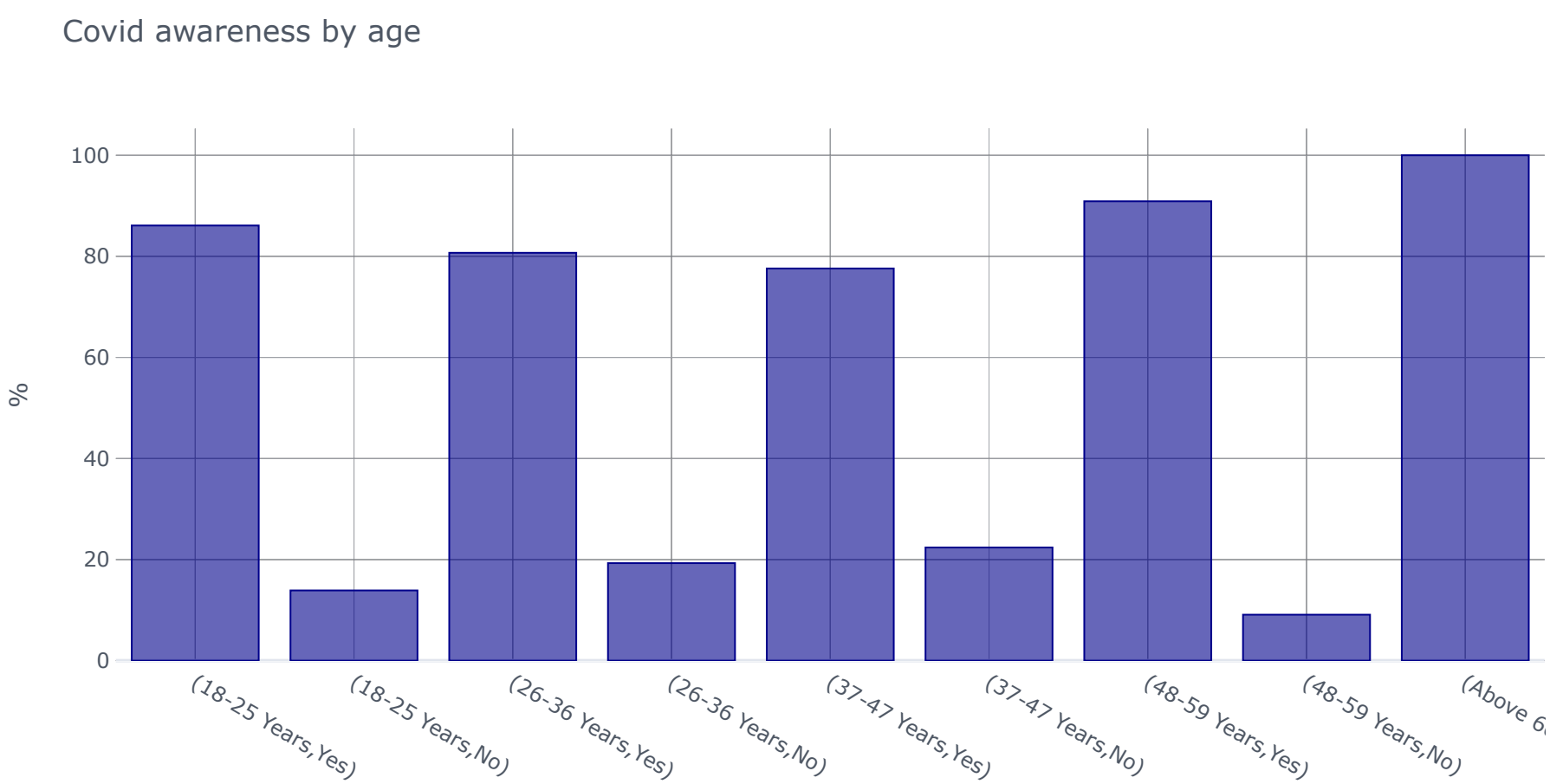
In [71]:
```
cov.Age.value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[71]:
```
26-36 Years       44.9%
18-25 Years       25.1%
37-47 Years       22.0%
48-59 Years        6.8%
Above 60 Years     1.2%
Name: Age, dtype: object
```

In [72]:
```
cov.groupby('Age')['more_aware'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[72]:
```
Age             more_aware
18-25 Years     Yes            86.1%
                No             13.9%
26-36 Years     Yes            80.7%
                No             19.3%
37-47 Years     Yes            77.6%
                No             22.4%
48-59 Years     Yes            90.9%
                No              9.1%
Above 60 Years  Yes           100.0%
Name: more_aware, dtype: object
```

In [99]:
```
cov.groupby('Age')['more_aware'].value_counts(normalize = True).mul(100).round(1).iplot(kind='bar',yTitle='%', title=
'Covid awareness by age', color = 'darkblue')
```



It seems ***by both age and gender***, users of Sarafu were more aware of COVID-19. **Especially those above 60 who reported 100% awareness**

In [ ]:
```

```

In [146]:
```
df_sim = df_cic[['Age', 'Gender', 'Have you used Sarafu?','Do you have a mobile phone ', 'Do you have Internet access
 ','if yes how do you access it',]]
```

In [147]:
```
df_sim = df_sim.loc[df_sim['Have you used Sarafu?'] == 'Yes']
```

In [148]:
```
df_sim
```

Out[148]:

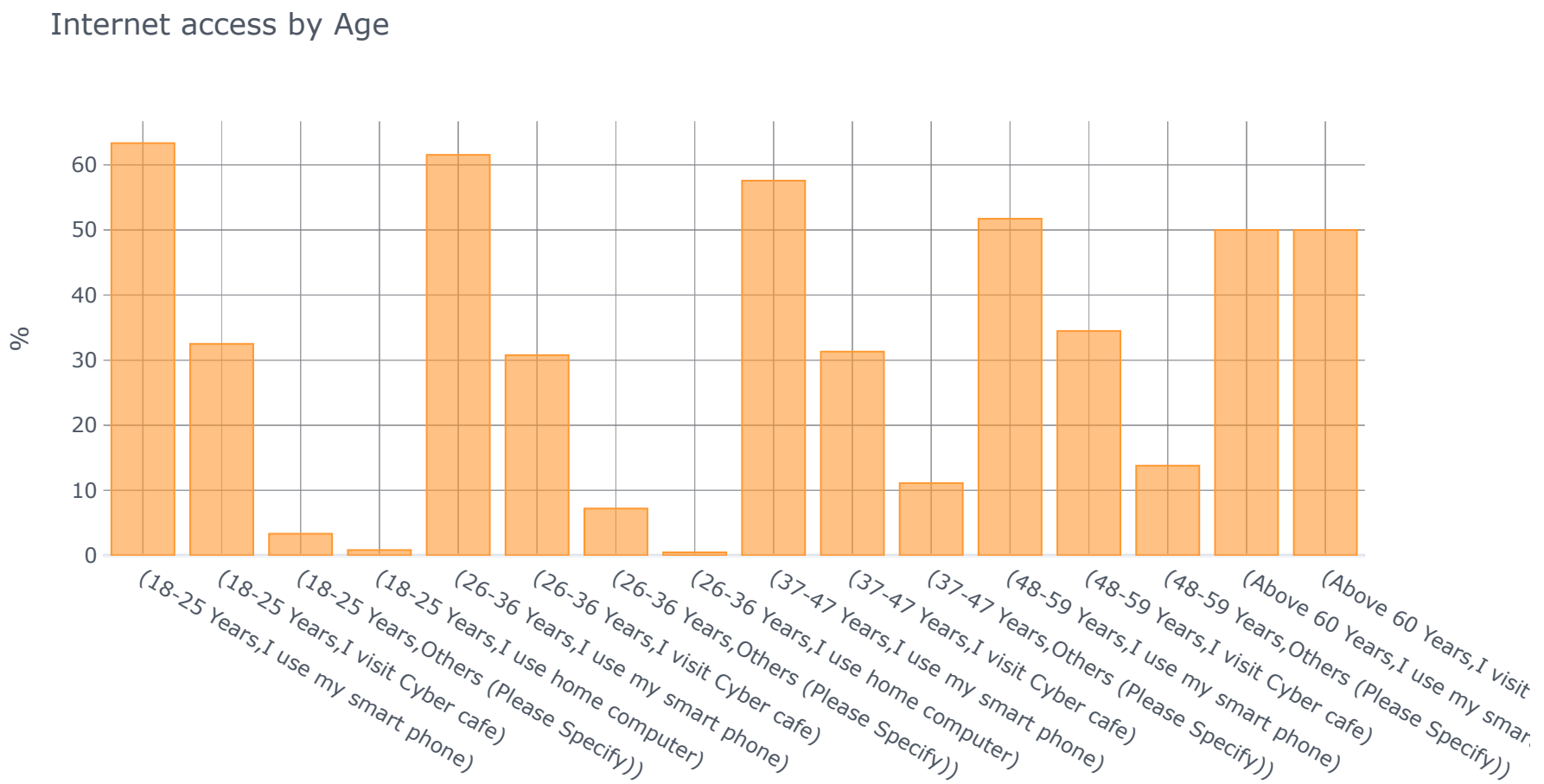
	Age	Gender	Have you used Sarafu?	Do you have a mobile phone	Do you have Internet access	if yes how do you access it
0	26-36 Years	Male	Yes	Yes	Yes	I use my smart phone
1	26-36 Years	Female	Yes	Yes	Yes	I use my smart phone
2	26-36 Years	Female	Yes	Yes	Yes	I use my smart phone
3	37-47 Years	Female	Yes	Yes	Yes	I use my smart phone
4	18-25 Years	Female	Yes	Yes	Yes	I use my smart phone
...	...	...	...	...	...	...
608	26-36 Years	Female	Yes	Yes	Yes	I use my smart phone
609	37-47 Years	Female	Yes	Yes	Yes	I use my smart phone
618	37-47 Years	Female	Yes	Yes	Yes	I use my smart phone
619	37-47 Years	Male	Yes	Yes	Yes	I visit Cyber cafe
620	26-36 Years	Female	Yes	Yes	Yes	I visit Cyber cafe

486 rows × 6 columns

In [114]:
```
df_sim.groupby('Age')['if yes how do you access it'].value_counts(normalize = True).mul(100).round(1).astype(str) +
'%'
```

Out[114]:
```
Age            if yes how do you access it
18-25 Years    I use my smart phone          63.3%
               I visit Cyber cafe            32.5%
               Others (Please Specify)        3.3%
               I use home computer            0.8%
26-36 Years    I use my smart phone          61.5%
               I visit Cyber cafe            30.8%
               Others (Please Specify)        7.2%
               I use home computer            0.5%
37-47 Years    I use my smart phone          57.6%
               I visit Cyber cafe            31.3%
               Others (Please Specify)       11.1%
48-59 Years    I use my smart phone          51.7%
               I visit Cyber cafe            34.5%
               Others (Please Specify)       13.8%
Above 60 Years I use my smart phone          50.0%
               I visit Cyber cafe            50.0%
Name: if yes how do you access it, dtype: object
```

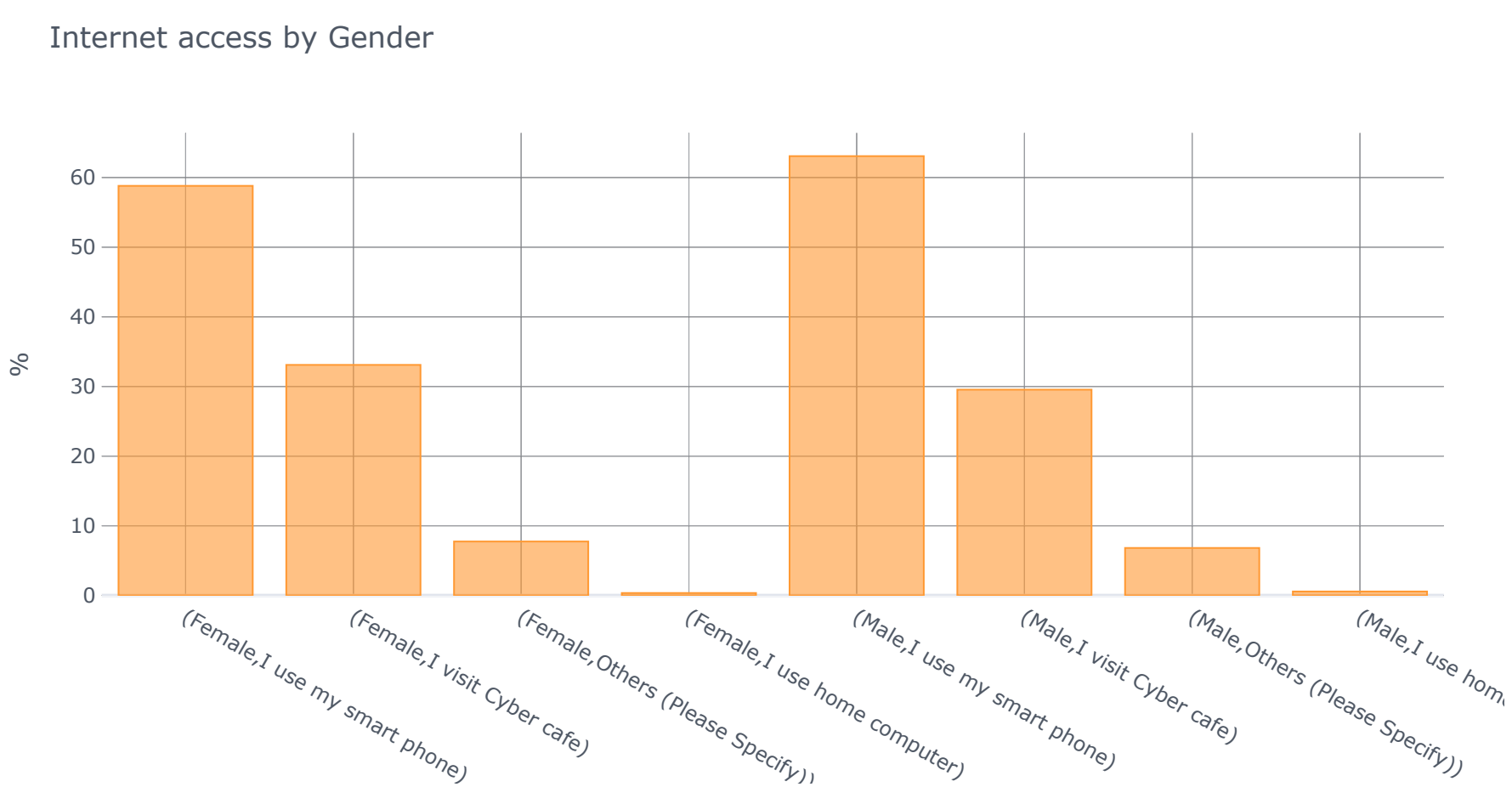
In [123]:
```
df_sim.groupby('Age')['if yes how do you access it'].value_counts(normalize = True).mul(100).iplot(kind='bar', yTitle
= '%', title = 'Internet access by Age')
```



In [106]:
```
df_sim.groupby('Gender')['if yes how do you access it'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[106]:
```
Gender  if yes how do you access it
Female  I use my smart phone           58.8%
        I visit Cyber cafe             33.1%
        Others (Please Specify)         7.7%
        I use home computer             0.4%
Male    I use my smart phone           63.1%
        I visit Cyber cafe             29.5%
        Others (Please Specify)         6.8%
        I use home computer             0.6%
Name: if yes how do you access it, dtype: object
```

In [124]:
```
df_sim.groupby('Gender')['if yes how do you access it'].value_counts(normalize = True).mul(100).iplot(kind='bar', yTitle = '%', title = 'Internet access by Gender')
```



In [ ]:

In [ ]:

In [149]:
```
df_acc_ch = df_cic[['Age', 'Gender','By using Sarafu, have you been able to buy goods or services you would not be abl
e to buy otherwise?',
 'Do you face any challenges/obstacles/delay in using Mpesa? ',
 'if yes please describe:',
 'Do you face any challenges/obstacles in using Sarafu? ', 'if yes please describe:.1']]
```

In [150]:
```
df_acc_ch
```

Out[150]:

	Age	Gender	By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?	Do you face any challenges/obstacles/delay in using Mpesa?	if yes please describe:	Do you face any challenges/obstacles in using Sarafu?	if yes please describe:.1
0	26-36 Years	Male	Yes	No	NaN	No	NaN
1	26-36 Years	Female	Yes	No	NaN	No	NaN
2	26-36 Years	Female	Yes	Yes	Network	No	NaN
3	37-47 Years	Female	Yes	No	NaN	No	NaN
4	18-25 Years	Female	Yes	No	NaN	No	NaN
...	...	...	...	...	...	...	...
616	26-36 Years	Female	No	No	NaN	No	NaN
617	26-36 Years	Male	No	No	NaN	No	NaN
618	37-47 Years	Female	Yes	Yes	Network	Yes	Money
619	37-47 Years	Male	Yes	Yes	Wrong. Number in mpesa	Yes	Credit
620	26-36 Years	Female	Yes	Yes	Network	Yes	Credit

604 rows × 7 columns

In [136]:
```
df_acc_ch.groupby('Age')['By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[136]:
```
Age            By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?
18-25 Years    Yes
76.8%
               No
23.2%
26-36 Years    Yes
70.1%
               No
29.9%
37-47 Years    Yes
69.9%
               No
30.1%
48-59 Years    Yes
78.6%
               No
21.4%
Above 60 Years Yes
66.7%
               No
33.3%
Name: By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?, dtype: ob
ject
```

In [137]:
```
df_acc_ch.groupby('Gender')['By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[137]:
```
Gender  By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?
Female  Yes                                                                                                  72.9%
        No                                                                                                   27.1%
Male    Yes                                                                                                  71.1%
        No                                                                                                   28.9%
Name: By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?, dtype: ob
ject
```

In [156]:
```
df_acc_ch.groupby('Age')['Do you face any challenges/obstacles/delay in using Mpesa? '].value_counts(normalize = True)
.mul(100).round(1).astype(str) + '%'
```

Out[156]:
```
Age            Do you face any challenges/obstacles/delay in using Mpesa?
18-25 Years    No                                                    84.5%
               Yes                                                   15.5%
26-36 Years    No                                                    78.8%
               Yes                                                   21.2%
37-47 Years    No                                                    82.4%
               Yes                                                   17.6%
48-59 Years    No                                                    83.3%
               Yes                                                   16.7%
Above 60 Years No                                                    83.3%
               Yes                                                   16.7%
Name: Do you face any challenges/obstacles/delay in using Mpesa? , dtype: object
```

In [157]:
```
df_acc_ch.groupby('Gender')['Do you face any challenges/obstacles/delay in using Mpesa? '].value_counts(normalize = Tr
ue).mul(100).round(1).astype(str) + '%'
```

Out[157]:
```
Gender  Do you face any challenges/obstacles/delay in using Mpesa?
Female  No                                                    81.9%
        Yes                                                   18.1%
Male    No                                                    80.3%
        Yes                                                   19.7%
Name: Do you face any challenges/obstacles/delay in using Mpesa? , dtype: object
```

In [138]:
```
df_acc_ch.groupby('Age')['if yes please describe:'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[138]:
```
Age            if yes please describe:
18-25 Years    Network                          31.8%
               Credit                            9.1%
               Credit                            9.1%
               Delayed m pesa message            4.5%
               Delayed payment                   4.5%
                                                ...
48-59 Years    Lack of l                        14.3%
               Network failer                   14.3%
               Sometimes network is a problem   14.3%
               Transaction fee                  14.3%
Above 60 Years Network errors same times       100.0%
Name: if yes please describe:, Length: 83, dtype: object
```

In [139]:
```
df_acc_ch.groupby('Gender')['if yes please describe:'].value_counts(normalize = True).mul(100).round(1).astype(str) +
'%'
```

Out[139]:
```
Gender  if yes please describe:
Female  Network                          16.4%
        Transaction fee                   9.0%
        Network failer                    4.5%
        Fuliza                            3.0%
        Network delays                    3.0%
                                         ...
Male    Transaction fee                   2.2%
        When I have fuliza                2.2%
        With  cone men                    2.2%
        Withdrawal uses a lot of money    2.2%
        Wrong. Number in mpesa            2.2%
Name: if yes please describe:, Length: 79, dtype: object
```

In [140]:
```
df_acc_ch.groupby('Age')['Do you face any challenges/obstacles in using Sarafu? '].value_counts(normalize = True).mul(
100).round(1).astype(str) + '%'
```

Out[140]:
```
Age            Do you face any challenges/obstacles in using Sarafu?
18-25 Years    No                                                      67.6%
               Yes                                                     32.4%
26-36 Years    No                                                      63.7%
               Yes                                                     36.3%
37-47 Years    No                                                      59.6%
               Yes                                                     40.4%
48-59 Years    No                                                      57.1%
               Yes                                                     42.9%
Above 60 Years No                                                      83.3%
               Yes                                                     16.7%
Name: Do you face any challenges/obstacles in using Sarafu? , dtype: object
```

In [141]:
```
df_acc_ch.groupby('Gender')['Do you face any challenges/obstacles in using Sarafu? '].value_counts(normalize = True).m
ul(100).round(1).astype(str) + '%'
```

Out[141]:
```
Gender  Do you face any challenges/obstacles in using Sarafu?
Female  No                                                      62.5%
        Yes                                                     37.5%
Male    No                                                      64.9%
        Yes                                                     35.1%
Name: Do you face any challenges/obstacles in using Sarafu? , dtype: object
```

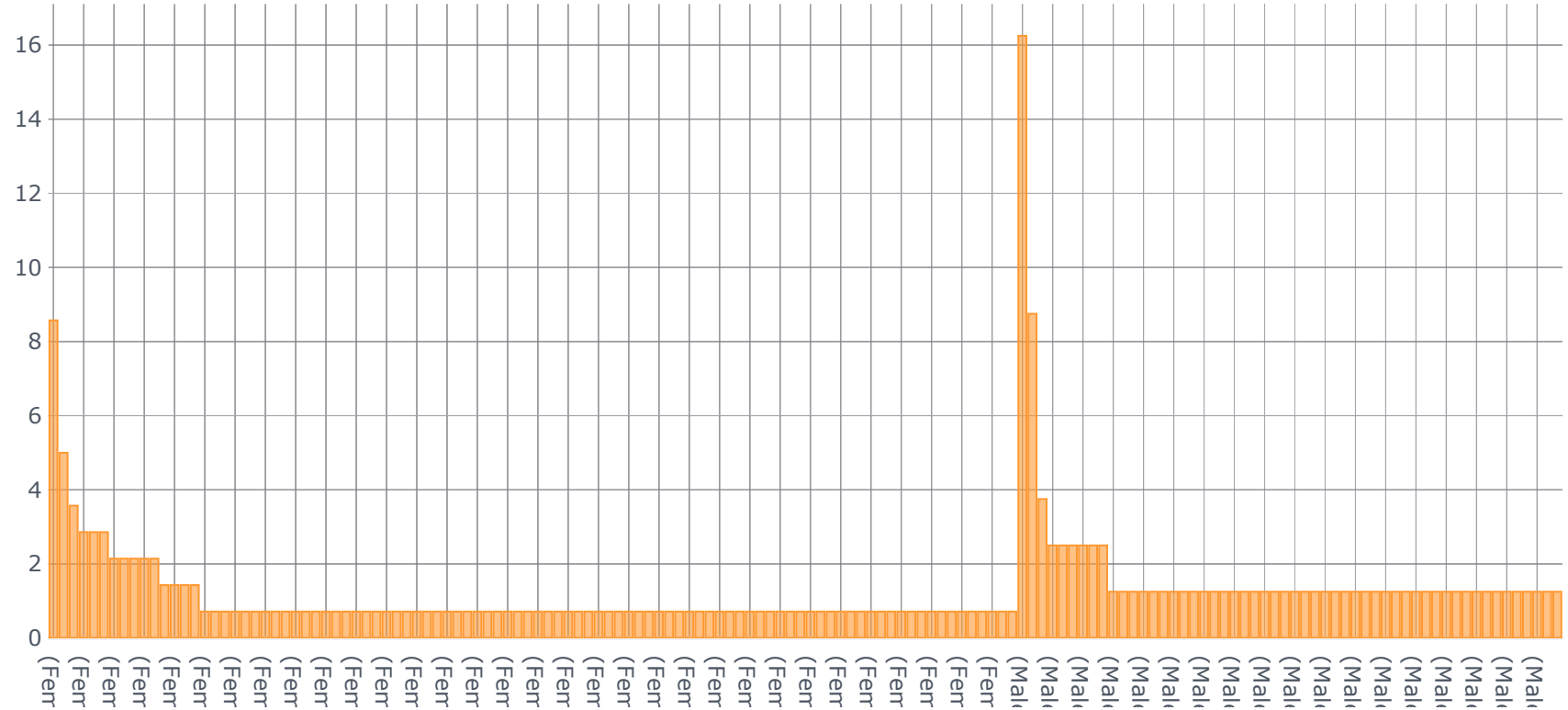
In [151]:
```
df_acc_ch.groupby('Gender')['if yes please describe:.1'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[151]:
```
Gender  if yes please describe:.1
Female  Credit                                          8.6%
        Lack of airtime                                 5.0%
        Lack of credit                                  3.6%
        Credit                                          2.9%
        Delaying of transactions                        2.9%
                                                        ...
Male    Using credit                                    1.2%
        You can't transact without credit               1.2%
        You can't transact without credit               1.2%
        You cannot transact without a phones and credit 1.2%
        You must have credit to transact                1.2%
Name: if yes please describe:.1, Length: 150, dtype: object
```

In [152]:
```
df_acc_ch.groupby('Age')['if yes please describe:.1'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[152]:
```
Age             if yes please describe:.1
18-25 Years     Credit                                                      19.6%
                Delaying of transactions                                     6.5%
                Delay in transactions                                        4.3%
                Sometimes the network is law                                 4.3%
                The introduction of transaction fee                          4.3%
                                                                            ...
48-59 Years     One can not use with out credit card.                        5.6%
                Shortage of airtime                                          5.6%
                The whole month of waiting for the transaction               5.6%
                There is a lot of delay before changing Sarafu into Kenya Shillings  5.6%
Above 60 Years  The duration of the transaction is abit long               100.0%
Name: if yes please describe:.1, Length: 159, dtype: object
```

In [153]:
```
df_acc_ch.groupby('Gender')['if yes please describe:.1'].value_counts(normalize = True).mul(100).iplot(kind = 'bar')
```



In [ ]:
```

```

In [160]:
```
df_cic.groupby('Age')['Do you face any challenges/obstacles in using Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[160]:
```
Age            Do you face any challenges/obstacles in using Sarafu?
18-25 Years    No                                                      67.6%
               Yes                                                     32.4%
26-36 Years    No                                                      63.7%
               Yes                                                     36.3%
37-47 Years    No                                                      59.6%
               Yes                                                     40.4%
48-59 Years    No                                                      57.1%
               Yes                                                     42.9%
Above 60 Years No                                                      83.3%
               Yes                                                     16.7%
Name: Do you face any challenges/obstacles in using Sarafu? , dtype: object
```

In [161]:
```
df_cic.groupby('Gender')['Do you face any challenges/obstacles in using Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[161]:
```
Gender  Do you face any challenges/obstacles in using Sarafu?
Female  No                                                      62.5%
        Yes                                                     37.5%
Male    No                                                      64.9%
        Yes                                                     35.1%
Name: Do you face any challenges/obstacles in using Sarafu? , dtype: object
```

In [162]:
```
df_cic.groupby('Age')['if yes please describe:.1'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[162]:
```
Age            if yes please describe:.1
18-25 Years    Credit                                                          19.6%
               Delaying of transactions                                         6.5%
               Delay in transactions                                            4.3%
               Sometimes the network is law                                     4.3%
               The introduction of transaction fee                              4.3%
                                                                                ...
48-59 Years    One can not use with out credit card.                            5.6%
               Shortage of airtime                                              5.6%
               The whole month of waiting for the transaction                   5.6%
               There is a lot of delay before changing Sarafu into Kenya Shillings  5.6%
Above 60 Years The duration of the transaction is abit long                   100.0%
Name: if yes please describe:.1, Length: 159, dtype: object
```

In [163]:
```
df_cic.groupby('Gender')['if yes please describe:.1'].value_counts(normalize = True).mul(100).round(1).astype(str) +
'%'
```

Out[163]:
```
Gender  if yes please describe:.1
Female  Credit                                          8.6%
        Lack of airtime                                 5.0%
        Lack of credit                                  3.6%
        Credit                                          2.9%
        Delaying of transactions                        2.9%
                                                        ...
Male    Using credit                                    1.2%
        You can't transact without credit               1.2%
        You can't transact without credit               1.2%
        You cannot transact without a phones and credit 1.2%
        You must have credit to transact                1.2%
Name: if yes please describe:.1, Length: 150, dtype: object
```

In [164]:
```
df_cic.groupby('Age')['Do you face any challenges/obstacles in accepting Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[164]:
```
Age            Do you face any challenges/obstacles in accepting Sarafu?
18-25 Years    No                                                          88.7%
               Yes                                                         11.3%
26-36 Years    No                                                          87.8%
               Yes                                                         12.2%
37-47 Years    No                                                          87.5%
               Yes                                                         12.5%
48-59 Years    No                                                          83.3%
               Yes                                                         16.7%
Above 60 Years No                                                         100.0%
Name: Do you face any challenges/obstacles in accepting Sarafu? , dtype: object
```

In [165]:
```
df_cic.groupby('Gender')['Do you face any challenges/obstacles in accepting Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[165]:
```
Gender  Do you face any challenges/obstacles in accepting Sarafu?
Female  No                                                          87.8%
        Yes                                                         12.2%
Male    No                                                          87.7%
        Yes                                                         12.3%
Name: Do you face any challenges/obstacles in accepting Sarafu? , dtype: object
```

In [166]:
```
df_cic.groupby('Age')['If yes please describe '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

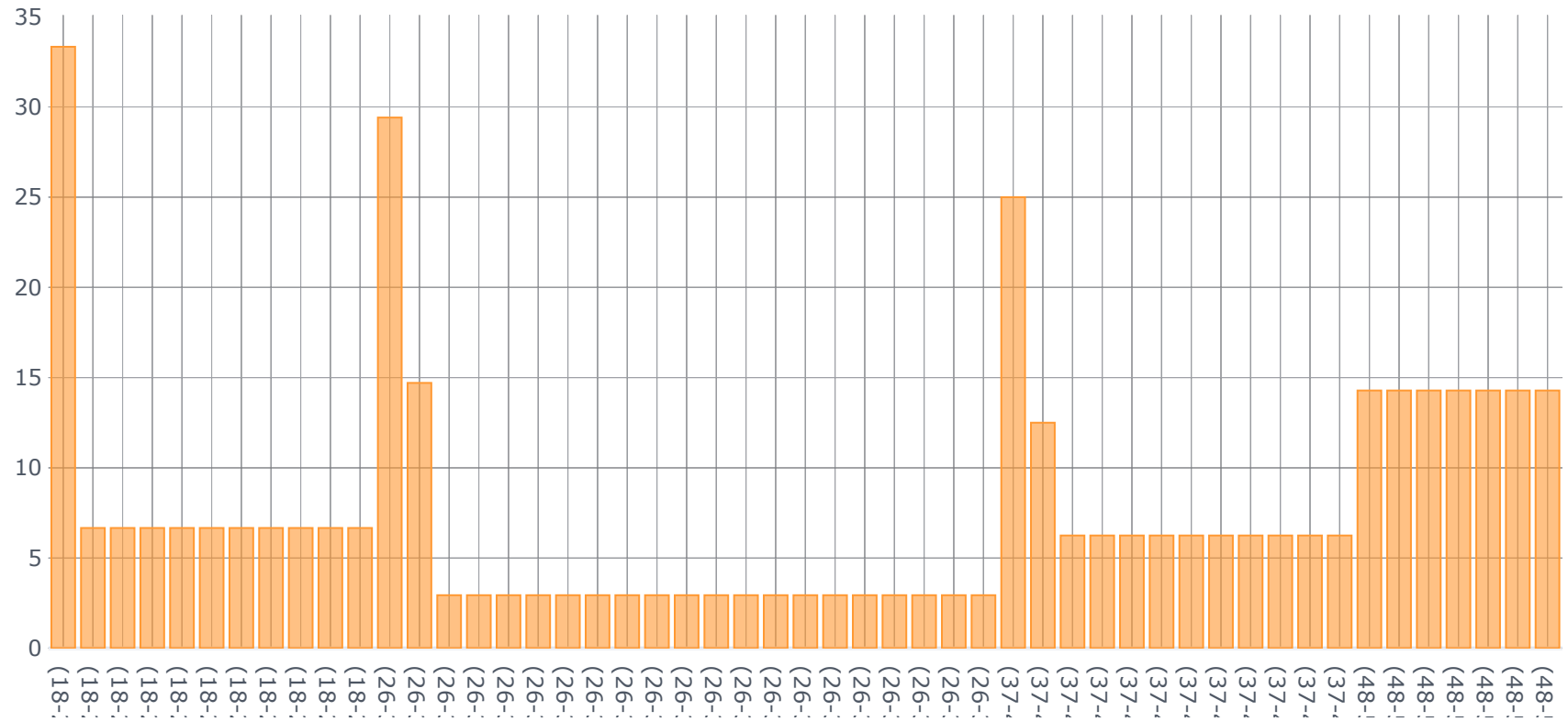
Out[166]:

Age	If yes please describe
18-25 Years 33.3%	Credit
	After accepting sarafu credit on the ratio 1/1 I Can only cash out 1/0.5 at the end the month which is really discouraging when it comes to accepting the credit 6.7%
	Credit 6.7%
	Credit problem 6.7%
	Exchange delay 6.7%
	Limitations 6.7%
	Money is not yet on time 6.7%
	Not many shops accept sarafu as mode of payment. 6.7%
	Slow servers 6.7%
	Sometimes i lack credit 6.7%
	When purchasing. Goods. The Shopkeeper. Adds some extra. Tokens 6.7%
26-36 Years 29.4%	Credit
	Credit 14.7%
	Airtime 2.9%
	Am not registered 2.9%
	Avoid boredom 2.9%
	Because of the delay on the transaction 2.9%
	Changing sarafu to cash entails a process 2.9%
	Delay 2.9%
	I don't know how to use it 2.9%

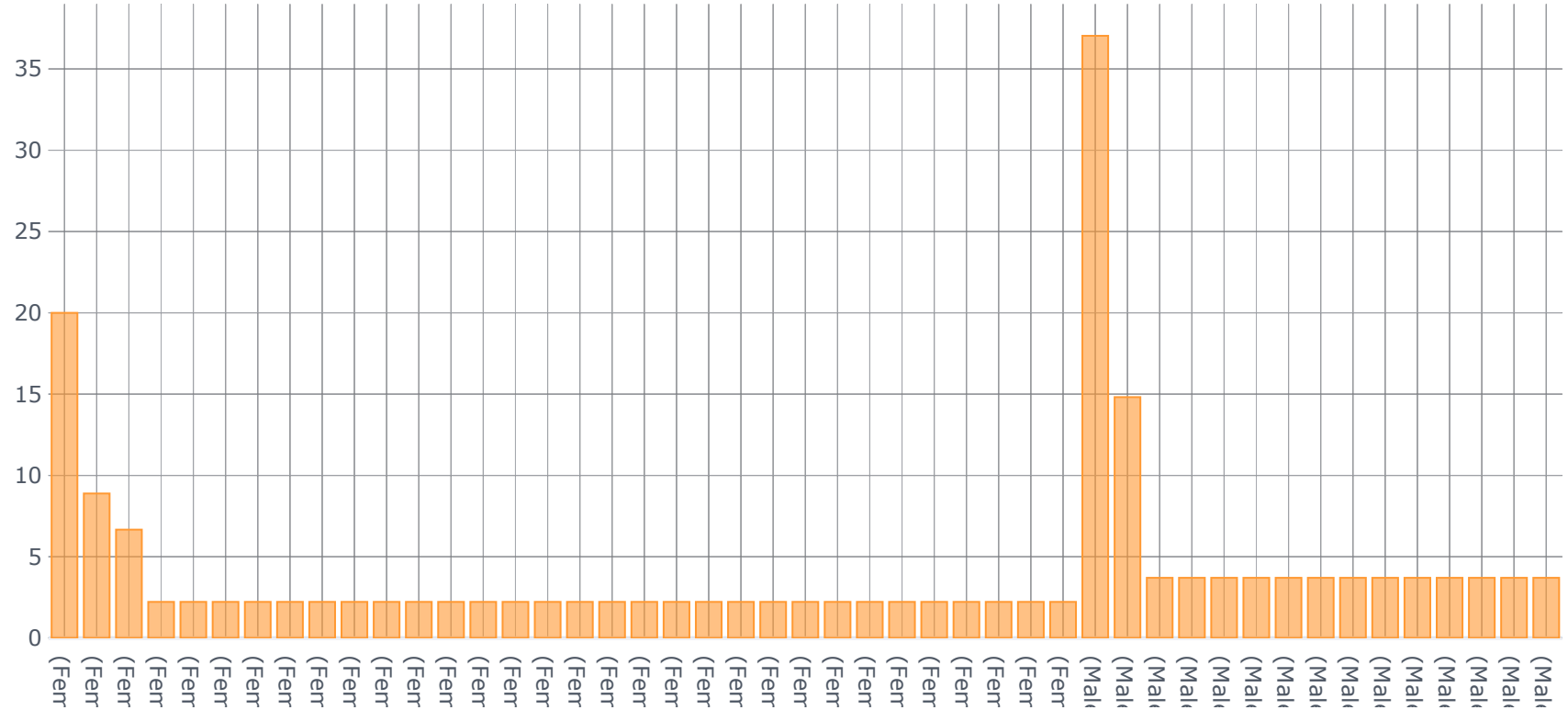
	I don't think sarafu will work for long	
2.9%		
	I need how sarafu can be changed to local currency	
2.9%		
	It's keeps me busy	
2.9%		
	More use of credit	
2.9%		
	Not cash	
2.9%		
	Not registered	
2.9%		
	Not sure if it is real	
2.9%		
	People do,nt return	
2.9%		
	Sarafu is discounting while cashing out.	
2.9%		
	Sarafu looks fishy	
2.9%		
	Sometimes I lack credit to trade	
2.9%		
	We are using more credit	
2.9%		
37-47 Years	Credit	
25.0%		
	Not registered	
12.5%		
	Beussines owners do not accept sarafu easily	
6.2%		
	Credit	
6.2%		
	I have never used it	
6.2%		
	It needs credit	
6.2%		
	My business have to dig in my pockets until the end of the month so that I can change to buy stock	
6.2%		
	Only credit	
6.2%		
	Rent end month	
6.2%		

```
            Sometimes when you do transactions it does not go but your airtime is used
6.2%
            Trading
6.2%
            Waiting. For. All month to get. Money
6.2%
48-59 Years  Am not using sarafu
14.3%
            Credit
14.3%
            Credit and luck of shops of sarafu
14.3%
            Delayment
14.3%
            Don't have
14.3%
            Lack of credit
14.3%
            Limitations
14.3%
Name: If yes please describe , dtype: object
```

In [167]:
```
df_cic.groupby('Age')['If yes please describe '].value_counts(normalize = True).mul(100).iplot(kind='bar')
```



In [277]:
```
df_cic.groupby('Gender')['If yes please describe '].value_counts(normalize = True).mul(100).iplot(kind='bar')
```



In [ ]:
```

```

In [170]:
```
df_cic.groupby('Age')['Is there anything you like about Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[170]:
```
Age            Is there anything you like about Sarafu?
18-25 Years    Yes                                        82.4%
               No                                         17.6%
26-36 Years    Yes                                        76.3%
               No                                         23.7%
37-47 Years    Yes                                        80.1%
               No                                         19.9%
48-59 Years    Yes                                        76.2%
               No                                         23.8%
Above 60 Years Yes                                       100.0%
Name: Is there anything you like about Sarafu? , dtype: object
```

In [171]:
```
df_cic.groupby('Gender')['Is there anything you like about Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[171]:
```
Gender  Is there anything you like about Sarafu?
Female  Yes                                        77.9%
        No                                         22.1%
Male    Yes                                        80.3%
        No                                         19.7%
Name: Is there anything you like about Sarafu? , dtype: object
```

In [172]:
```
df_cic.groupby('Age')['if yes please describe:.2'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[172]:
```
Age            if yes please describe:.2
18-25 Years    It is a cashless transaction                  4.4%
               Bonuses                                       2.7%
               Cash                                          2.7%
               Help me save for future                       1.8%
               It's readily available                        1.8%
                                                            ...
Above 60 Years Togetherness of the community                33.3%
               End month cash after trading the all month   16.7%
               Free money                                   16.7%
               It is a cashless transaction                 16.7%
               Waiting to change sarafu to cash             16.7%
Name: if yes please describe:.2, Length: 391, dtype: object
```

In [173]:
```
df_cic.groupby('Gender')['if yes please describe:.2'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[173]:
```
Gender  if yes please describe:.2
Female  It is a cashless transaction                    7.0%
        Trading                                         4.2%
        Savings                                         2.4%
        Trading                                         2.1%
        Money                                           1.7%
                                                        ...
Male    You buy food without cash                       0.5%
        You can exchange                                0.5%
        You can exchange Sarafu for goods or services   0.5%
        You can go hungry when you have sarafu          0.5%
        You gate your money on time                     0.5%
Name: if yes please describe:.2, Length: 374, dtype: object
```

In [174]:
```
df_cic.groupby('Age')['if no please describe?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[174]:
```
Age          if no please describe?
18-25 Years  I don't know about it                 15.0%
             Am not yet registered                 5.0%
             Delay in cash out in chamas           5.0%
             Hefty transaction charges             5.0%
             Hefty transactions charges            5.0%
                                                   ...
48-59 Years  I don't have it                       14.3%
             I don't understand how sarafu works   14.3%
             I have never used it                  14.3%
             I have never used sarafu              14.3%
             This days it uses. Credit             14.3%
Name: if no please describe?, Length: 92, dtype: object
```

In [175]:
```
df_cic.groupby('Gender')['if no please describe?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[175]:
```
Gender  if no please describe?
Female  Not registered                    4.7%
        Am not rejected                   3.1%
        I don't know about it             3.1%
        I don't know about sarafu         3.1%
        I don't use sarafu                3.1%
                                          ...
Male    Not registered                    2.6%
        Not registered yet                2.6%
        Not yet registered                2.6%
        The points added are so little    2.6%
        What is sarafu                    2.6%
Name: if no please describe?, Length: 91, dtype: object
```

In [176]:
```
df_cic.groupby('Age')['How do you perceive Sarafu’s impact on your income?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[176]:

Age	How do you perceive Sarafu’s impact on your income?	
18-25 Years	Important	36.6%
	Slightly Important	21.8%
	Fairly Important	20.4%
	Very Important	12.7%
	Not at all Important	8.5%
26-36 Years	Important	43.2%
	Slightly Important	18.3%
	Fairly Important	16.2%
	Not at all Important	14.7%
	Very Important	7.6%
37-47 Years	Important	41.9%
	Fairly Important	21.3%
	Not at all Important	16.9%
	Slightly Important	16.9%
	Very Important	2.9%
48-59 Years	Important	40.5%
	Fairly Important	21.4%
	Slightly Important	19.0%
	Not at all Important	14.3%
	Very Important	4.8%
Above 60 Years	Important	50.0%
	Fairly Important	16.7%
	Slightly Important	16.7%
	Very Important	16.7%

Name: How do you perceive Sarafu’s impact on your income?, dtype: object

In [177]:
```
df_cic.groupby('Gender')['How do you perceive Sarafu’s impact on your income?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[177]:
```
Gender  How do you perceive Sarafu’s impact on your income?
Female  Important                                            44.4%
        Slightly Important                                   18.4%
        Fairly Important                                     17.0%
        Not at all Important                                 13.6%
        Very Important                                        6.6%
Male    Important                                            36.0%
        Fairly Important                                     21.5%
        Slightly Important                                   19.7%
        Not at all Important                                 13.6%
        Very Important                                        9.2%
Name: How do you perceive Sarafu’s impact on your income?, dtype: object
```

In [178]:
```
df_cic.groupby('Age')['Are you able to save more Kenya shillings, due to the use of Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[178]:
```
Age            Are you able to save more Kenya shillings, due to the use of Sarafu?
18-25 Years    Yes                                                                    84.5%
               No                                                                     15.5%
26-36 Years    Yes                                                                    76.3%
               No                                                                     23.7%
37-47 Years    Yes                                                                    72.8%
               No                                                                     27.2%
48-59 Years    Yes                                                                    81.0%
               No                                                                     19.0%
Above 60 Years Yes                                                                   100.0%
Name: Are you able to save more Kenya shillings, due to the use of Sarafu?, dtype: object
```

In [180]:
```
df_cic.groupby('Gender')['Are you able to save more Kenya shillings, due to the use of Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[180]:
```
Gender  Are you able to save more Kenya shillings, due to the use of Sarafu?
Female  Yes                                                                   77.1%
        No                                                                    22.9%
Male    Yes                                                                   79.4%
        No                                                                    20.6%
Name: Are you able to save more Kenya shillings, due to the use of Sarafu?, dtype: object
```

In [183]:
```
df_cic.groupby('Age')['How has Sarafu usage affected your purchases of goods and services? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[183]:

Age	How has Sarafu usage affected your purchases of goods and services?	
18-25 Years	Increased some	64.1%
	Stayed the same	25.4%
	Increased a lot	8.5%
	Decreased a little	1.4%
	Decreased a lot	0.7%
26-36 Years	Increased some	58.3%
	Stayed the same	27.3%
	Increased a lot	6.8%
	Decreased a little	4.7%
	Decreased a lot	2.9%
37-47 Years	Increased some	58.8%
	Stayed the same	29.4%
	Increased a lot	5.1%
	Decreased a little	3.7%
	Decreased a lot	2.9%
48-59 Years	Increased some	64.3%
	Stayed the same	23.8%
	Increased a lot	7.1%
	Decreased a little	4.8%
Above 60 Years	Increased some	66.7%
	Increased a lot	33.3%

Name: How has Sarafu usage affected your purchases of goods and services? , dtype: object

In [182]:
```
df_cic.groupby('Gender')['How has Sarafu usage affected your purchases of goods and services? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[182]:
```
Gender  How has Sarafu usage affected your purchases of goods and services?
Female  Increased some                                                        58.0%
        Stayed the same                                                      28.5%
        Increased a lot                                                       7.4%
        Decreased a little                                                    4.3%
        Decreased a lot                                                       1.9%
Male    Increased some                                                       64.0%
        Stayed the same                                                      24.1%
        Increased a lot                                                       6.6%
        Decreased a little                                                    2.6%
        Decreased a lot                                                       2.6%
Name: How has Sarafu usage affected your purchases of goods and services? , dtype: object
```

In [195]:
```
df_cic.columns = df_cic.columns.str.replace("'"," ")
df_cic.groupby('Age')['How s your access to clean water?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[195]:
```
Age            How s your access to clean water?
18-25 Years    Fair                                37.3%
               Very good                           33.8%
               Good                                28.9%
26-36 Years    Fair                                50.4%
               Good                                35.3%
               Very good                           10.4%
               Bad                                  4.0%
37-47 Years    Good                                41.2%
               Fair                                37.5%
               Very good                           17.6%
               Bad                                  3.7%
48-59 Years    Good                                52.4%
               Fair                                28.6%
               Very good                           16.7%
               Bad                                  2.4%
Above 60 Years Fair                                66.7%
               Good                                16.7%
               Very good                           16.7%
Name: How s your access to clean water?, dtype: object
```

In [197]:
```
df_cic.groupby('Gender')['How s your access to clean water?'].value_counts(normalize = True).mul(100).round(1).astype(
str) + '%'
```

Out[197]:
```
Gender  How s your access to clean water?
Female  Fair                                46.5%
        Good                                35.1%
        Very good                           15.7%
        Bad                                  2.7%
Male    Good                                37.7%
        Fair                                37.3%
        Very good                           21.9%
        Bad                                  3.1%
Name: How s your access to clean water?, dtype: object
```

In [198]:
```
list(df_cic.columns)
```

Out[198]:
```
['start',
 'end',
 'A. Enumerator Information',
 'Name of Enumerator',
 'Phone number (used for Sarafu if any)',
 'Living location ',
 'Work Location',
 'Good morning/ afternoon. My name is ${Name_of_Enumerator} and I am from Kenya Red Cross Society. We are conducting
a survey to understand the impact of sarafu in the community in Mukuru Kayaba. The responses from these questions wil
l be used to inform future scale-up decisions, programming practice.',
 'Are you willing to participate',
 'Respondent information',
 'Name of the respondent                                                ',
 'Phone number (used for Sarafu if any) Please verify. *438*46#',
 'Is the number confirmed Sarafu user?',
 'Living location .1',
 'Work Location.1',
 'Number of the people in your Household',
 'Age',
 'Village Name',
 'Gender',
 'Ethnicity',
 'Others(Please Specify)',
 'Disability status(observe)',
 'What are your sources of income?(All that apply)',
 'What are your sources of income?(All that apply)/Own business',
 'What are your sources of income?(All that apply)/stable job',
 'What are your sources of income?(All that apply)/informal labour',
 'What are your sources of income?(All that apply)/aid assistance',
 'What are your sources of income?(All that apply)/no income',
 'Have you used Sarafu?',
 'Do you use other types of aid assistance ? (Mark all that apply)',
 'Do you use other types of aid assistance ? (Mark all that apply)/Food aid',
 'Do you use other types of aid assistance ? (Mark all that apply)/Cash aid',
 'Do you use other types of aid assistance ? (Mark all that apply)/None',
 'Do you use other types of aid assistance ? (Mark all that apply)/Others (Please Specify)',
 'Others (Please Specify)',
 'How important is assistance aid in your total household income?',
 'How important is Sarafu with your other forms of assistance or aid?',
 'How has your savings changed recently? ',
 'What do you use Sarafu for? (Mark all that Apply)',
```

```
'What do you use Sarafu for? (Mark all that Apply)/Cash out with chamas, ',
'What do you use Sarafu for? (Mark all that Apply)/Pay debts',
'What do you use Sarafu for? (Mark all that Apply)/Saving',
'What do you use Sarafu for? (Mark all that Apply)/Purchase goods or services',
'What do you use Sarafu for? (Mark all that Apply)/Acceptance for sales of goods or services',
'What do you use Sarafu for? (Mark all that Apply)/Other(Please Specify)',
'What do you use Sarafu for? (Mark all that Apply)/Other(Please Specify).1',
'Other(Please Specify)',
'What goods or services did you purchase with Sarafu? (All that apply)',
'What goods or services did you purchase with Sarafu? (All that apply)/Food/Water',
'What goods or services did you purchase with Sarafu? (All that apply)/Transport',
'What goods or services did you purchase with Sarafu? (All that apply)/Environment',
'What goods or services did you purchase with Sarafu? (All that apply)/Health',
'What goods or services did you purchase with Sarafu? (All that apply)/Education',
'What goods or services did you purchase with Sarafu? (All that apply)/Energy',
'What goods or services did you purchase with Sarafu? (All that apply)/Others (Please Specify)',
'Others (Please Specify).1',
'By using Sarafu, have you been able to buy goods or services you would not be able to buy otherwise?',
'Do you face any challenges/obstacles/delay in using Mpesa? ',
'if yes please describe:',
'Do you face any challenges/obstacles in using Sarafu? ',
'if yes please describe:.1',
'Do you face any challenges/obstacles in accepting Sarafu? ',
'If yes please describe ',
'Is there anything you like about Sarafu? ',
'if yes please describe:.2',
'if no please describe?',
'How do you perceive Sarafu’s impact on your income?',
'Are you able to save more Kenya shillings, due to the use of Sarafu?',
'How has Sarafu usage affected your purchases of goods and services? ',
'How s your access to clean water?',
'Has Sarafu changed your access to clean water?',
'How is your access to soap? ',
'Has Sarafu changed your access to soap ',
'How is your access to toilet facilities? ',
'Has Sarafu changed your access to toilet facilities?',
'How is your access to medicine or clinics? ',
'Has Sarafu changed your access to medicine or clinics?',
'How has your income changed recently? ',
'Are prices of goods and services more expensive than usual?',
'Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?',
'When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?',
```

```
 'How hard is it to restock your business when you accept Sarafu?',
 'Do you offer goods or services on credit? (not including Sarafu)',
 'Is the food you need available? ',
 'How has Sarafu changed how much food you eat?',
 'What is the quality of the food you eat? ',
 'How has Sarafu changed the quality of food you eat?',
 'How well do you understand what Sarafu is? ',
 'Do you have a mobile phone ',
 'if yes which one',
 'Others (Please Specify).2',
 'If no, How do you access mobile phone',
 'Others(Please Specify).1',
 'Do you have Internet access ',
 'if yes how do you access it',
 'Others (Please Specify).3',
 'How much do you have to consult others before using Kenyan Shillings?',
 'How much do you have to consult others before using Sarafu?',
 'Does Sarafu affect your household relations?',
 'Does Sarafu affect your community relations?',
 'Generally, to what extent do you feel part of the community?',
 'Now that you have been involved in Sarafu do you feel more engaged in the community? ',
 'Do you have access to timely, reliable information on COVID-19? ',
 '2) Do you practice healthy and safe COVID-19  prevention practices? ',
 '3) Do you have access to emotional support when dealing with COVID-19 issue?  ',
 '4) Has your behaviour changed as a result of Sarafu?',
 '5) Has your awareness regarding COVID-19 increased because of Sarafu? ',
 'a) If so, what have you learned?',
 'b) Have you shared this information about Sarafu with family/household? ',
 'To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the community to understand
Sarafu? ',
 'Do you know how you can reach KRCS should you have any issue or feedback about the project ',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)/Calling through toll free line',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)/Walk in to office',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)/Through the local administrators',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)/Through the KRCS staff or Volunteers',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
```

```
the ones the respondent gives)/Social media platform',
 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Select
the ones the respondent gives)/Other (Please specify)',
 'Other (Please specify)',
 'What are people saying about COVID-19 in the community that you think is not correct (rumours or myths)',
 'What questions do you have or do people in your community have about COVID-19 that need to be answered?',
 'Pick GPS Coordinates',
 '_Pick GPS Coordinates_latitude',
 '_Pick GPS Coordinates_longitude',
 '_Pick GPS Coordinates_altitude',
 '_Pick GPS Coordinates_precision',
 'Thank you very much for your participation!',
 'a. Names',
 'b. Phone number (used for Sarafu if any)',
 'Phone number (used for Sarafu if any).1',
 'Phone number (used for Sarafu if any).2',
 'c. Living location ',
 'd. Work Location',
 'B. Respondent information',
 'a. Names.1',
 'b. Phone number (used for Sarafu if any).1',
 'c. Living location .1',
 'd. Work Location.1',
 'e. Number in HH',
 'f. Age',
 'g. Gender',
 'h. Mother tongue',
 'i. Disability status',
 '1) How well do you understand Sarafu? 1-5 (1 not at all and 5 is very well)   ',
 '2) To what extent is Sarafu consistent with community economic needs? 1-5 (1 is not at all and 10 is very consisten
t) ',
 '3) To what extent is the project objective consistent with meeting basic needs such as food? 1-10',
 'What are your sources of income?',
 'What are your sources of income?/Own business',
 'What are your sources of income?/stable job',
 'What are your sources of income?/informal labour',
 'What are your sources of income?/aid assistance',
 'What are your sources of income?/no income',
 '4) Is using Sarafu realistic based on local context? 1-10   ',
 '● Have you used Sarafu?',
 '5) To what extent does KRCS and GE engage the community to understand the Sarafu? 1-10',
 'Do you use other types of aid assistance ? (mark all that apply)',
```

```
'Do you use other types of aid assistance ? (mark all that apply)/food aid',
'Do you use other types of aid assistance ? (mark all that apply)/cash aid',
'Do you use other types of aid assistance ? (mark all that apply)/No',
'Do you use other types of aid assistance ? (mark all that apply)/Others (Please Specify)',
'6) If you are using Sarafu do you think you are better off that not using Sarafu? ',
'1) How successful is the project in achieving its outputs in relation to Covid-19 i.e ',
'2) To what extent has the project ensured that basic necessities are available to the community? ',
'3) To what extent did the project improve the living standards of the community?   ',
'4) Are basic steps of using Sarafu understandable to you?  ',
'● What are your sources of income?',
'● What are your sources of income?/a. Own business',
'● What are your sources of income?/stable job',
'● What are your sources of income?/informal labour',
'● What are your sources of income?/aid assistance',
'● What are your sources of income?/no income',
'What goods or services did you purchase with Sarafu? (dashboard categories)',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Food/Water',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Transport',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Environment',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Health',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Education',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Energy',
'What goods or services did you purchase with Sarafu? (dashboard categories)/Others (Please Specify)',
'● Do you use other types of aid assistance?',
'● How has your savings changed recently? ',
'Do you face any challenges/obstacles/delay in using Mpesa? .1',
'● What do you use Sarafu for? ',
'● What do you use Sarafu for? /a. Cash out with chamas',
'● What do you use Sarafu for? /Pay debts',
'● What do you use Sarafu for? /saving',
'● What do you use Sarafu for? /purchase goods or services',
'● What do you use Sarafu for? /acceptance for sales of goods or services',
'● What do you use Sarafu for? /Others (Please Specify)',
'Do you face any challenges/obstacles in using Sarafu? .1',
'● What goods or services did you purchase with CC? (dashboard categories)',
'● What goods or services did you purchase with CC? (dashboard categories)/a. Food/Water',
'● What goods or services did you purchase with CC? (dashboard categories)/Transport',
'● What goods or services did you purchase with CC? (dashboard categories)/Environment',
'● What goods or services did you purchase with CC? (dashboard categories)/Health',
'● What goods or services did you purchase with CC? (dashboard categories)/Education',
'● What goods or services did you purchase with CC? (dashboard categories)/Energy',
'● What goods or services did you purchase with CC? (dashboard categories)/Others (Please Specify)',
```

```
'Do you face any challenges/obstacles in accepting Sarafu? .1',
'● By using Sarafu, have you been able to buy goods or services you were not able to buy before?',
'● Which type of goods or services can you buy more of with Sarafu?',
'Is there anything you like about Sarafu? .1',
'● How important is assistance aid in your total household income?',
'● How important is Sarafu with your other forms of assistance or aid?',
'● Do you face any challenges/obstacles/delay in using Mpesa? ',
'a. if yes please describe:',
'● Do you face any challenges/obstacles in using Sarafu? ',
'● How s your access to clean water ',
'○ if yes please describe:',
'● Do you face any challenges/obstacles in accepting Sarafu? ',
'○ If yes please describe ',
'● Is there anything you like about Sarafu? ',
'○ if yes please describe:.1',
'● How do you perceive Sarafu’s impact on your income?',
'● Are you able to save more Ksh, due to the use of Sarafu?',
'● How has Sarafu usage affected your purchases of goods and services? ',
'● How has your income changed recently? ',
'● Are prices of goods and services more expensive than usual?',
'● Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?',
'● When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?',
'● How hard is it to restock your business when you accept Sarafu?',
'● Do you offer goods or services on credit? (not including Sarafu)',
'● Do you barter for goods or services? (not including Sarafu)',
'● What goods or services are currently in high demand (if any)?',
'● What goods or services are currently in high demand (if any)?/Chai',
'● What goods or services are currently in high demand (if any)?/flour(Ugali)',
'● What goods or services are currently in high demand (if any)?/Vegetables (mboga)',
'● What goods or services are currently in high demand (if any)?/Beans',
'● What goods or services are currently in high demand (if any)?/Others (Please Specify)',
'● What goods or services are currently in low supply (if any)?',
'● What goods or services are currently in low supply (if any)?/Chai',
'● What goods or services are currently in low supply (if any)?/flour(Ugali)',
'● What goods or services are currently in low supply (if any)?/Vegetables (mboga)',
'● What goods or services are currently in low supply (if any)?/Beans',
'● What goods or services are currently in low supply (if any)?/Others (Please Specify)',
'● Is the food you need available? ',
'● Have the prices of key food drastically changed? ',
'● During the past week how many times have you eaten:',
'● How has the quantity of the food you eat changed?',
'If no, How do you access mobile phone.1',
```

```
 '● How has the quality of the food you eat changed?',
 '● How well do you understand what Sarafu is? ',
 '● Do you understand how the Sarafu works?',
 '● Do you have a mobile phone ',
 '● Do you have Internet access ',
 '● How much do you have to consult others before using Kenyan Shillings?',
 '● Do you consult your family or friends before using Sarafu?',
 '● Does Sarafu affect your household relations?',
 '● Does Sarafu affect your community relations?',
 '● Generally, to what extent do you feel part of the community?',
 '● Now that you have been involved in CICs do you feel more engaged? ',
 '1) Do you have access to timely, safe and equitable, critical, life-saving information on COVID-19? ',
 '2) Do you practice healthy, safe and preventative practices? ',
 '3) Do you have access to psychological first aid so that you can adopt healthy, safe and preventative practices and
reduce community fear, stigma and misinformation',
 '4)  Is this information coming from a trusted channel? ',
 'To what extent does KRCS and GE engage the community to understand Sarafu? 1-5',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Calling through toll free line',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Walk in to office',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Through the local administrators',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Through the KRCS staff or Volunteers',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Social media platform',
 '1. If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or read the list. Sele
ct the ones the respondent gives)/Other (Please specify)',
 '2. What are people saying about COVID-19 in the community that you think is not correct ',
 '3. What questions do you have or do people in your community have about COVID-19 that need to be answered?',
 '_id',
 '_uuid',
 '_submission_time',
 '_validation_status',
 '_index']
```

In [199]:
```
df_cic.groupby('Age')['Has Sarafu changed your access to clean water?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[199]:
```
Age            Has Sarafu changed your access to clean water?
18-25 Years    Better                                           67.6%
               Not at all                                       21.1%
               Much Better                                      10.6%
               Worse                                             0.7%
26-36 Years    Better                                           66.2%
               Not at all                                       23.4%
               Much Better                                       8.3%
               Worse                                             1.8%
               Much worse                                        0.4%
37-47 Years    Better                                           61.0%
               Not at all                                       28.7%
               Much Better                                       8.8%
               Much worse                                        0.7%
               Worse                                             0.7%
48-59 Years    Better                                           69.0%
               Not at all                                       21.4%
               Much Better                                       9.5%
Above 60 Years Better                                           83.3%
               Not at all                                       16.7%
Name: Has Sarafu changed your access to clean water?, dtype: object
```

In [200]:
```
df_cic.groupby('Gender')['Has Sarafu changed your access to clean water?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[200]:
```
Gender  Has Sarafu changed your access to clean water?
Female  Better                                           65.2%
        Not at all                                       23.7%
        Much Better                                       9.3%
        Worse                                             1.6%
        Much worse                                        0.3%
Male    Better                                           66.7%
        Not at all                                       24.1%
        Much Better                                       8.3%
        Much worse                                        0.4%
        Worse                                             0.4%
Name: Has Sarafu changed your access to clean water?, dtype: object
```

In [202]:
```
df_cic.groupby('Age')['How is your access to toilet facilities? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[202]:
```
Age            How is your access to toilet facilities?
18-25 Years    Fair                                       44.4%
               Good                                       28.9%
               Very good                                  24.6%
               Bad                                         1.4%
               Very bad                                    0.7%
26-36 Years    Fair                                       56.1%
               Good                                       30.6%
               Very good                                   7.6%
               Bad                                         5.8%
37-47 Years    Fair                                       45.6%
               Good                                       37.5%
               Very good                                  13.2%
               Bad                                         3.7%
48-59 Years    Fair                                       59.5%
               Good                                       35.7%
               Very good                                   4.8%
Above 60 Years Fair                                       50.0%
               Good                                       33.3%
               Very good                                  16.7%
Name: How is your access to toilet facilities? , dtype: object
```

In [203]:
```
df_cic.groupby('Gender')['How is your access to toilet facilities? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[203]:
```
Gender  How is your access to toilet facilities?
Female  Fair                                      52.1%
        Good                                      35.4%
        Very good                                  9.0%
        Bad                                        3.5%
Male    Fair                                      49.6%
        Good                                      26.8%
        Very good                                 18.9%
        Bad                                        4.4%
        Very bad                                   0.4%
Name: How is your access to toilet facilities? , dtype: object
```

In [205]:
```
df_cic.groupby('Age')['Has Sarafu changed your access to toilet facilities?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[205]:

Age	Has Sarafu changed your access to toilet facilities?	
18-25 Years	Fairly	35.2%
	Much	29.6%
	Very much	17.6%
	Not at all	13.4%
	Little	4.2%
26-36 Years	Fairly	42.4%
	Much	24.5%
	Not at all	14.0%
	Very much	10.8%
	Little	8.3%
37-47 Years	Fairly	37.5%
	Much	23.5%
	Not at all	16.9%
	Very much	15.4%
	Little	6.6%
48-59 Years	Fairly	35.7%
	Much	35.7%
	Not at all	19.0%
	Little	9.5%
Above 60 Years	Fairly	50.0%
	Much	50.0%

Name: Has Sarafu changed your access to toilet facilities?, dtype: object

In [206]:
```
df_cic.groupby('Gender')['Has Sarafu changed your access to toilet facilities?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[206]:
```
Gender  Has Sarafu changed your access to toilet facilities?
Female  Fairly                                                 40.2%
        Much                                                   26.6%
        Not at all                                             13.0%
        Very much                                              12.5%
        Little                                                  7.7%
Male    Fairly                                                 37.7%
        Much                                                   26.3%
        Not at all                                             17.5%
        Very much                                              12.7%
        Little                                                  5.7%
Name: Has Sarafu changed your access to toilet facilities?, dtype: object
```

In [207]:
```
df_cic.groupby('Age')['Has Sarafu changed your access to medicine or clinics?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[207]:
```
Age            Has Sarafu changed your access to medicine or clinics?
18-25 Years    Better                                                 65.5%
               Not at all                                             21.1%
               Much Better                                            11.3%
               Worse                                                   2.1%
26-36 Years    Better                                                 61.2%
               Not at all                                             29.9%
               Much Better                                             8.3%
               Worse                                                   0.7%
37-47 Years    Better                                                 47.8%
               Not at all                                             38.2%
               Much Better                                            13.2%
               Worse                                                   0.7%
48-59 Years    Better                                                 71.4%
               Not at all                                             28.6%
Above 60 Years Better                                                 83.3%
               Worse                                                  16.7%
Name: Has Sarafu changed your access to medicine or clinics?, dtype: object
```

In [208]:
```
df_cic.groupby('Gender')['Has Sarafu changed your access to medicine or clinics?'].value_counts(normalize = True).mul(
100).round(1).astype(str) + '%'
```

Out[208]:
```
Gender  Has Sarafu changed your access to medicine or clinics?
Female  Better                                                   60.1%
        Not at all                                               29.3%
        Much Better                                               9.3%
        Worse                                                     1.3%
Male    Better                                                   60.1%
        Not at all                                               29.4%
        Much Better                                               9.6%
        Worse                                                     0.9%
Name: Has Sarafu changed your access to medicine or clinics?, dtype: object
```

In [210]:
```
df_cic.groupby('Age')['How has your income changed recently? ' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[210]:

Age	How has your income changed recently?	
18-25 Years	Increased a little	60.6%
	No change	14.8%
	Decreased a little	11.3%
	Increased a lot	11.3%
	Decreased a lot	2.1%
26-36 Years	Increased a little	58.3%
	No change	18.7%
	Decreased a little	9.7%
	Decreased a lot	6.8%
	Increased a lot	6.5%
37-47 Years	Increased a little	57.4%
	No change	25.7%
	Decreased a lot	5.9%
	Increased a lot	5.9%
	Decreased a little	5.1%
48-59 Years	Increased a little	61.9%
	No change	16.7%
	Decreased a little	14.3%
	Decreased a lot	4.8%
	Increased a lot	2.4%
Above 60 Years	Increased a little	83.3%
	No change	16.7%

Name: How has your income changed recently? , dtype: object

In [211]:
```
df_cic.groupby('Gender')['How has your income changed recently? ' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[211]:
```
Gender  How has your income changed recently?
Female  Increased a little                      58.2%
        No change                               20.5%
        Decreased a little                       9.0%
        Decreased a lot                          6.1%
        Increased a lot                          6.1%
Male    Increased a little                      60.5%
        No change                               17.1%
        Decreased a little                       9.6%
        Increased a lot                          8.8%
        Decreased a lot                          3.9%
Name: How has your income changed recently? , dtype: object
```

In [212]:
```
df_cic.groupby('Age')['Are prices of goods and services more expensive than usual?' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[212]:

Age	Are prices of goods and services more expensive than usual?	
18-25 Years	Agree	35.2%
	Disagree	33.8%
	Neither agree nor disagree	15.5%
	Strongly Agree	14.1%
	Strongly disagree	1.4%
26-36 Years	Agree	39.9%
	Disagree	27.3%
	Neither agree nor disagree	19.1%
	Strongly Agree	12.9%
	Strongly disagree	0.7%
37-47 Years	Agree	33.1%
	Disagree	32.4%
	Neither agree nor disagree	20.6%
	Strongly Agree	12.5%
	Strongly disagree	1.5%
48-59 Years	Disagree	35.7%
	Agree	26.2%
	Strongly Agree	19.0%
	Neither agree nor disagree	16.7%
	Strongly disagree	2.4%
Above 60 Years	Agree	33.3%
	Disagree	33.3%
	Neither agree nor disagree	33.3%

Name: Are prices of goods and services more expensive than usual?, dtype: object

In [213]:
```
df_cic.groupby('Gender')['Are prices of goods and services more expensive than usual?' ].value_counts(normalize = True
).mul(100).round(1).astype(str) + '%'
```

Out[213]:
```
Gender  Are prices of goods and services more expensive than usual?
Female  Agree                                                         37.0%
        Disagree                                                      28.2%
        Neither agree nor disagree                                    18.6%
        Strongly Agree                                                14.9%
        Strongly disagree                                              1.3%
Male    Agree                                                         35.1%
        Disagree                                                      34.6%
        Neither agree nor disagree                                    18.4%
        Strongly Agree                                                11.0%
        Strongly disagree                                              0.9%
Name: Are prices of goods and services more expensive than usual?, dtype: object
```

In [214]:
```
df_cic.groupby('Age')['Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[214]:

Age	Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?	
18-25 Years	Agree	32.4%
	Disagree	24.6%
	Strongly Agree	23.9%
	Neither agree nor disagree	17.6%
	Strongly disagree	1.4%
26-36 Years	Agree	35.3%
	Neither agree nor disagree	28.8%
	Disagree	22.7%
	Strongly Agree	12.6%
	Strongly disagree	0.7%
37-47 Years	Agree	39.7%
	Disagree	25.0%
	Neither agree nor disagree	25.0%
	Strongly Agree	8.8%
	Strongly disagree	1.5%
48-59 Years	Agree	42.9%
	Neither agree nor disagree	21.4%
	Disagree	19.0%
	Strongly Agree	11.9%
	Strongly disagree	4.8%
Above 60 Years	Agree	50.0%
	Neither agree nor disagree	33.3%
	Disagree	16.7%

Name: Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?, dtype: object

In [216]:
```
df_cic.groupby('Gender')['Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[216]:
```
Gender  Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?
Female  Agree                                                                                 38.0%
        Neither agree nor disagree                                                            23.9%
        Disagree                                                                              19.9%
        Strongly Agree                                                                        16.0%
        Strongly disagree                                                                      2.1%
Male    Agree                                                                                 33.3%
        Disagree                                                                              28.9%
        Neither agree nor disagree                                                            26.3%
        Strongly Agree                                                                        11.4%
Name: Are prices of goods and services bought in Sarafu higher compared to Kenyan Shillings?, dtype: object
```

In [218]:
```
df_cic.groupby('Age')['When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[218]:

Age	When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?
18-25 Years	Agree
28.2%	
	Disagree
21.1%	
	Neither agree nor disagree
17.6%	
	I don’t know
16.2%	
	Strongly Agree
15.5%	
	Strongly disagree
1.4%	
26-36 Years	Agree
29.9%	
	Neither agree nor disagree
25.9%	
	Disagree
24.5%	
	Strongly Agree
10.4%	
	I don’t know
7.9%	
	Strongly disagree
1.4%	
37-47 Years	Agree
29.4%	
	Disagree
27.2%	
	Neither agree nor disagree
20.6%	
	Strongly Agree
12.5%	
	I don’t know
7.4%	
	Strongly disagree
2.9%	
48-59 Years	Agree
31.0%	
	Disagree
23.8%	

```
                  I don’t know
16.7%
                  Neither agree nor disagree
16.7%
                  Strongly Agree
11.9%
Above 60 Years    Agree
33.3%
                  I don’t know
33.3%
                  Disagree
16.7%
                  Neither agree nor disagree
16.7%
Name: When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?, dtype: obj
ect
```

In [219]:
```
df_cic.groupby('Gender')['When selling goods and services in Sarafu do you increase their price compared to Kenyan Shi
llings?' ].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[219]:
```
Gender  When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?
Female  Agree                                                                                                  31.6%
        Disagree                                                                                               21.5%
        Neither agree nor disagree                                                                             20.5%
        Strongly Agree                                                                                         13.8%
        I don’t know                                                                                           10.6%
        Strongly disagree                                                                                       1.9%
Male    Disagree                                                                                               28.5%
        Agree                                                                                                  25.9%
        Neither agree nor disagree                                                                             24.6%
        I don’t know                                                                                           10.5%
        Strongly Agree                                                                                          9.2%
        Strongly disagree                                                                                       1.3%
Name: When selling goods and services in Sarafu do you increase their price compared to Kenyan Shillings?, dtype: obj
ect
```

In [ ]:

In [221]:
```
df_cic.groupby('Age')['How hard is it to restock your business when you accept Sarafu?'].value_counts(normalize = True
).mul(100).round(1).astype(str) + '%'
```

Out[221]:
```
Age            How hard is it to restock your business when you accept Sarafu?
18-25 Years    somewhat hard                                                    53.5%
               not hard                                                         24.6%
               Very hard                                                        21.8%
26-36 Years    somewhat hard                                                    58.6%
               Very hard                                                        22.3%
               not hard                                                         19.1%
37-47 Years    somewhat hard                                                    59.6%
               Very hard                                                        28.7%
               not hard                                                         11.8%
48-59 Years    somewhat hard                                                    47.6%
               Very hard                                                        28.6%
               not hard                                                         23.8%
Above 60 Years somewhat hard                                                    83.3%
               Very hard                                                        16.7%
Name: How hard is it to restock your business when you accept Sarafu?, dtype: object
```

In [222]:
```
df_cic.groupby('Gender')['How hard is it to restock your business when you accept Sarafu?'].value_counts(normalize = T
rue).mul(100).round(1).astype(str) + '%'
```

Out[222]:
```
Gender  How hard is it to restock your business when you accept Sarafu?
Female  somewhat hard                                                    55.9%
        Very hard                                                        25.8%
        not hard                                                         18.4%
Male    somewhat hard                                                    59.2%
        Very hard                                                        21.1%
        not hard                                                         19.7%
Name: How hard is it to restock your business when you accept Sarafu?, dtype: object
```

In [ ]:

In [223]:
```
df_cic.groupby('Age')['How has Sarafu changed how much food you eat?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[223]:

Age	How has Sarafu changed how much food you eat?	
18-25 Years	More	49.3%
	No change	33.8%
	Less	10.6%
	Much more	5.6%
	Much less	0.7%
26-36 Years	More	51.1%
	No change	36.0%
	Less	7.9%
	Much more	4.3%
	Much less	0.7%
37-47 Years	More	51.5%
	No change	38.2%
	Less	5.9%
	Much more	3.7%
	Much less	0.7%
48-59 Years	More	61.9%
	No change	26.2%
	Much more	7.1%
	Less	4.8%
Above 60 Years	More	83.3%
	Less	16.7%

Name: How has Sarafu changed how much food you eat?, dtype: object

In [224]:
```
df_cic.groupby('Gender')['How has Sarafu changed how much food you eat?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[224]:
```
Gender  How has Sarafu changed how much food you eat?
Female  More                                            51.6%
        No change                                       34.8%
        Less                                             8.0%
        Much more                                        4.8%
        Much less                                        0.8%
Male    More                                            52.2%
        No change                                       35.1%
        Less                                             7.9%
        Much more                                        4.4%
        Much less                                        0.4%
Name: How has Sarafu changed how much food you eat?, dtype: object
```

In [225]:
```
df_cic.groupby('Age')['How well do you understand what Sarafu is? '].value_counts(normalize = True).mul(100).round(1).
astype(str) + '%'
```

Out[225]:

Age	How well do you understand what Sarafu is?	
18-25 Years	Very well	44.4%
	Well	39.4%
	Have heard about it but i don't know it ?	7.0%
	Have not heard of it	7.0%
	I don't no	2.1%
26-36 Years	Well	48.9%
	Very well	28.8%
	Have heard about it but i don't know it ?	12.6%
	I don't no	5.8%
	Have not heard of it	4.0%
37-47 Years	Well	41.9%
	Very well	37.5%
	Have heard about it but i don't know it ?	11.8%
	Have not heard of it	5.1%
	I don't no	3.7%
48-59 Years	Well	47.6%
	Very well	31.0%
	Have heard about it but i don't know it ?	14.3%
	I don't no	7.1%
Above 60 Years	Very well	83.3%
	Well	16.7%

Name: How well do you understand what Sarafu is? , dtype: object

In [226]:
```
df_cic.groupby('Gender')['How well do you understand what Sarafu is? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[226]:
```
Gender  How well do you understand what Sarafu is?
Female  Well                                          44.7%
        Very well                                     34.6%
        Have heard about it but i don't know it ?     11.7%
        I don't no                                     4.8%
        Have not heard of it                           4.3%
Male    Well                                          44.7%
        Very well                                     36.0%
        Have heard about it but i don't know it ?     10.1%
        Have not heard of it                           5.3%
        I don't no                                     3.9%
Name: How well do you understand what Sarafu is? , dtype: object
```

In [227]:
```
df_cic.groupby('Age')['How much do you have to consult others before using Kenyan Shillings?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[227]:
```
Age            How much do you have to consult others before using Kenyan Shillings?
18-25 Years    Not at all                                                    71.1%
               A lot                                                         21.8%
               Little                                                         7.0%
26-36 Years    Not at all                                                    70.5%
               A lot                                                         15.1%
               Little                                                        14.4%
37-47 Years    Not at all                                                    76.5%
               A lot                                                         14.0%
               Little                                                         9.6%
48-59 Years    Not at all                                                    73.8%
               Little                                                        14.3%
               A lot                                                         11.9%
Above 60 Years Not at all                                                    66.7%
               A lot                                                         16.7%
               Little                                                        16.7%
Name: How much do you have to consult others before using Kenyan Shillings?, dtype: object
```

In [228]:
```
df_cic.groupby('Gender')['How much do you have to consult others before using Kenyan Shillings?'].value_counts(normali
ze = True).mul(100).round(1).astype(str) + '%'
```

Out[228]:
```
Gender  How much do you have to consult others before using Kenyan Shillings?
Female  Not at all                                                              72.1%
        A lot                                                                   15.2%
        Little                                                                  12.8%
Male    Not at all                                                              72.4%
        A lot                                                                   18.0%
        Little                                                                   9.6%
Name: How much do you have to consult others before using Kenyan Shillings?, dtype: object
```

In [229]:
```
df_cic.groupby('Age')['How much do you have to consult others before using Sarafu?'].value_counts(normalize = True).mu
l(100).round(1).astype(str) + '%'
```

Out[229]:
```
Age            How much do you have to consult others before using Sarafu?
18-25 Years    Not at all                                                    40.8%
               Little                                                        31.7%
               A lot                                                         27.5%
26-36 Years    Not at all                                                    47.8%
               Little                                                        28.4%
               A lot                                                         23.7%
37-47 Years    Not at all                                                    47.8%
               A lot                                                         34.6%
               Little                                                        17.6%
48-59 Years    Not at all                                                    45.2%
               Little                                                        28.6%
               A lot                                                         26.2%
Above 60 Years A lot                                                         33.3%
               Little                                                        33.3%
               Not at all                                                    33.3%
Name: How much do you have to consult others before using Sarafu?, dtype: object
```

In [230]:
```
df_cic.groupby('Gender')['How much do you have to consult others before using Sarafu?'].value_counts(normalize = True)
.mul(100).round(1).astype(str) + '%'
```

Out[230]:
```
Gender  How much do you have to consult others before using Sarafu?
Female  Not at all                                                    44.9%
        Little                                                        27.7%
        A lot                                                         27.4%
Male    Not at all                                                    47.4%
        A lot                                                         27.2%
        Little                                                        25.4%
Name: How much do you have to consult others before using Sarafu?, dtype: object
```

In [231]:
```
df_cic.groupby('Age')['Does Sarafu affect your household relations?'].value_counts(normalize = True).mul(100).round(1)
.astype(str) + '%'
```

Out[231]:
```
Age            Does Sarafu affect your household relations?
18-25 Years    Positively                                     56.3%
               Very Positively                                26.1%
               No impact                                      16.2%
               Negatively                                      1.4%
26-36 Years    Positively                                     63.7%
               No impact                                      20.9%
               Very Positively                                12.6%
               Negatively                                      2.9%
37-47 Years    Positively                                     57.4%
               Very Positively                                19.9%
               No impact                                      19.1%
               Negatively                                      2.9%
               Very negatively                                 0.7%
48-59 Years    Positively                                     76.2%
               No impact                                      16.7%
               Very Positively                                 7.1%
Above 60 Years Positively                                     83.3%
               Very Positively                                16.7%
Name: Does Sarafu affect your household relations?, dtype: object
```

In [232]:
```
df_cic.groupby('Age')['Does Sarafu affect your household relations?'].value_counts(normalize = True).mul(100).round(1)
.astype(str) + '%'
```

Out[232]:
```
Age            Does Sarafu affect your household relations?
18-25 Years    Positively                                     56.3%
               Very Positively                                26.1%
               No impact                                      16.2%
               Negatively                                      1.4%
26-36 Years    Positively                                     63.7%
               No impact                                      20.9%
               Very Positively                                12.6%
               Negatively                                      2.9%
37-47 Years    Positively                                     57.4%
               Very Positively                                19.9%
               No impact                                      19.1%
               Negatively                                      2.9%
               Very negatively                                 0.7%
48-59 Years    Positively                                     76.2%
               No impact                                      16.7%
               Very Positively                                 7.1%
Above 60 Years Positively                                     83.3%
               Very Positively                                16.7%
Name: Does Sarafu affect your household relations?, dtype: object
```

In [233]:
```
df_cic.groupby('Gender')['Does Sarafu affect your household relations?'].value_counts(normalize = True).mul(100).round
(1).astype(str) + '%'
```

Out[233]:
```
Gender  Does Sarafu affect your household relations?
Female  Positively                                     61.4%
        No impact                                      19.7%
        Very Positively                                15.7%
        Negatively                                      2.9%
        Very negatively                                 0.3%
Male    Positively                                     61.8%
        Very Positively                                19.3%
        No impact                                      17.5%
        Negatively                                      1.3%
Name: Does Sarafu affect your household relations?, dtype: object
```

In [234]:
```
df_cic.groupby('Age')['Does Sarafu affect your community relations?'].value_counts(normalize = True).mul(100).round(1)
.astype(str) + '%'
```

Out[234]:
```
Age            Does Sarafu affect your community relations?
18-25 Years    Positively                                     64.1%
               Very Positively                                20.4%
               No impact                                      13.4%
               Negatively                                      2.1%
26-36 Years    Positively                                     65.5%
               No impact                                      16.9%
               Very Positively                                15.8%
               Negatively                                      1.8%
37-47 Years    Positively                                     59.6%
               Very Positively                                22.8%
               No impact                                      15.4%
               Negatively                                      2.2%
48-59 Years    Positively                                     69.0%
               No impact                                      16.7%
               Very Positively                                14.3%
Above 60 Years Positively                                     66.7%
               Very Positively                                33.3%
Name: Does Sarafu affect your community relations?, dtype: object
```

In [235]:
```
df_cic.groupby('Gender')['Does Sarafu affect your community relations?'].value_counts(normalize = True).mul(100).round
(1).astype(str) + '%'
```

Out[235]:
```
Gender  Does Sarafu affect your community relations?
Female  Positively                                     63.0%
        Very Positively                                18.9%
        No impact                                      15.7%
        Negatively                                      2.4%
Male    Positively                                     65.8%
        Very Positively                                18.0%
        No impact                                      15.4%
        Negatively                                      0.9%
Name: Does Sarafu affect your community relations?, dtype: object
```

In [236]:
```
df_cic.groupby('Age')['Generally, to what extent do you feel part of the community?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[236]:
```
Age            Generally, to what extent do you feel part of the community?
18-25 Years    Strong                                                         76.1%
               Low                                                            10.6%
               Very strong                                                    10.6%
               Very low                                                        2.8%
26-36 Years    Strong                                                         72.3%
               Low                                                            17.6%
               Very strong                                                     8.6%
               Very low                                                        1.4%
37-47 Years    Strong                                                         77.9%
               Low                                                            10.3%
               Very strong                                                     9.6%
               Very low                                                        2.2%
48-59 Years    Strong                                                         76.2%
               Low                                                            16.7%
               Very strong                                                     4.8%
               Very low                                                        2.4%
Above 60 Years Strong                                                         66.7%
               Very strong                                                    33.3%
Name: Generally, to what extent do you feel part of the community?, dtype: object
```

In [237]:
```
df_cic.groupby('Gender')['Generally, to what extent do you feel part of the community?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[237]:
```
Gender  Generally, to what extent do you feel part of the community?
Female  Strong                                                         74.7%
        Low                                                            15.2%
        Very strong                                                     8.8%
        Very low                                                        1.3%
Male    Strong                                                         74.6%
        Low                                                            12.3%
        Very strong                                                    10.1%
        Very low                                                        3.1%
Name: Generally, to what extent do you feel part of the community?, dtype: object
```

In [239]:
```
df_cic.groupby('Age')['Now that you have been involved in Sarafu do you feel more engaged in the community? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[239]:

Age	Now that you have been involved in Sarafu do you feel more engaged in the community?	
18-25 Years	strong	41.5%
	neutral	40.1%
	very strong	15.5%
	low	2.8%
26-36 Years	strong	38.8%
	neutral	35.3%
	very strong	18.0%
	low	5.4%
	very low	2.5%
37-47 Years	strong	47.1%
	neutral	27.2%
	very strong	16.2%
	low	6.6%
	very low	2.9%
48-59 Years	strong	54.8%
	neutral	23.8%
	very strong	11.9%
	low	7.1%
	very low	2.4%
Above 60 Years	strong	50.0%
	very strong	50.0%

Name: Now that you have been involved in Sarafu do you feel more engaged in the community? , dtype: object

In [240]:
```
df_cic.groupby('Gender')['Now that you have been involved in Sarafu do you feel more engaged in the community? '].valu
e_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[240]:
```
Gender  Now that you have been involved in Sarafu do you feel more engaged in the community?
Female  strong                                                                          45.2%
        neutral                                                                         29.5%
        very strong                                                                     17.0%
        low                                                                              5.9%
        very low                                                                         2.4%
Male    neutral                                                                         39.9%
        strong                                                                          38.2%
        very strong                                                                     16.7%
        low                                                                              3.9%
        very low                                                                         1.3%
Name: Now that you have been involved in Sarafu do you feel more engaged in the community? , dtype: object
```

In [243]:
```
df_cic.groupby('Age')['Do you have access to timely, reliable information on COVID-19? '].value_counts(normalize = Tru
e).mul(100).round(1).astype(str) + '%'
```

Out[243]:
```
Age            Do you have access to timely, reliable information on COVID-19?
18-25 Years    Yes                                                              90.1%
               No                                                                9.9%
26-36 Years    Yes                                                              91.7%
               No                                                                8.3%
37-47 Years    Yes                                                              89.0%
               No                                                               11.0%
48-59 Years    Yes                                                              90.5%
               No                                                                9.5%
Above 60 Years Yes                                                             100.0%
Name: Do you have access to timely, reliable information on COVID-19? , dtype: object
```

In [242]:
```
df_cic.groupby('Gender')['Do you have access to timely, reliable information on COVID-19? '].value_counts(normalize =
True).mul(100).round(1).astype(str) + '%'
```

Out[242]:
```
Gender  Do you have access to timely, reliable information on COVID-19?
Female  Yes                                                              91.0%
        No                                                                9.0%
Male    Yes                                                              90.4%
        No                                                                9.6%
Name: Do you have access to timely, reliable information on COVID-19? , dtype: object
```

In [244]:
```
df_cic.groupby('Age')['2) Do you practice healthy and safe COVID-19  prevention practices? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[244]:
```
Age            2) Do you practice healthy and safe COVID-19  prevention practices?
18-25 Years    Yes                                                                95.8%
               No                                                                  4.2%
26-36 Years    Yes                                                                95.7%
               No                                                                  4.3%
37-47 Years    Yes                                                                91.2%
               No                                                                  8.8%
48-59 Years    Yes                                                                92.9%
               No                                                                  7.1%
Above 60 Years Yes                                                               100.0%
Name: 2) Do you practice healthy and safe COVID-19  prevention practices? , dtype: object
```

In [245]:
```
df_cic.groupby('Gender')['2) Do you practice healthy and safe COVID-19  prevention practices? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[245]:
```
Gender  2) Do you practice healthy and safe COVID-19  prevention practices?
Female  Yes                                                                94.7%
        No                                                                  5.3%
Male    Yes                                                                94.3%
        No                                                                  5.7%
Name: 2) Do you practice healthy and safe COVID-19  prevention practices? , dtype: object
```

In [246]:
```
df_cic.groupby('Age')['3) Do you have access to emotional support when dealing with COVID-19 issue?  '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[246]:
```
Age            3) Do you have access to emotional support when dealing with COVID-19 issue?
18-25 Years    Yes                                                                  88.7%
               No                                                                   11.3%
26-36 Years    Yes                                                                  88.1%
               No                                                                   11.9%
37-47 Years    Yes                                                                  87.5%
               No                                                                   12.5%
48-59 Years    Yes                                                                  90.5%
               No                                                                    9.5%
Above 60 Years Yes                                                                 100.0%
Name: 3) Do you have access to emotional support when dealing with COVID-19 issue?  , dtype: object
```

In [247]:
```
df_cic.groupby('Gender')['3) Do you have access to emotional support when dealing with COVID-19 issue?  '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[247]:
```
Gender  3) Do you have access to emotional support when dealing with COVID-19 issue?
Female  Yes                                                                            88.3%
        No                                                                             11.7%
Male    Yes                                                                            88.6%
        No                                                                             11.4%
Name: 3) Do you have access to emotional support when dealing with COVID-19 issue?  , dtype: object
```

In [250]:
```
df_cic.groupby('Age')['4) Has your behaviour changed as a result of Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[250]:
```
Age            4) Has your behaviour changed as a result of Sarafu?
18-25 Years    Yes                                                   81.7%
               No                                                    18.3%
26-36 Years    Yes                                                   75.9%
               No                                                    24.1%
37-47 Years    Yes                                                   71.3%
               No                                                    28.7%
48-59 Years    Yes                                                   76.2%
               No                                                    23.8%
Above 60 Years Yes                                                  100.0%
Name: 4) Has your behaviour changed as a result of Sarafu?, dtype: object
```

In [251]:
```
df_cic.groupby('Gender')['4) Has your behaviour changed as a result of Sarafu?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[251]:
```
Gender  4) Has your behaviour changed as a result of Sarafu?
Female  Yes                                                   78.5%
        No                                                    21.5%
Male    Yes                                                   73.2%
        No                                                    26.8%
Name: 4) Has your behaviour changed as a result of Sarafu?, dtype: object
```

In [252]:
```
df_cic.groupby('Age')['5) Has your awareness regarding COVID-19 increased because of Sarafu? '].value_counts(normalize
= True).mul(100).round(1).astype(str) + '%'
```

Out[252]:
```
Age            5) Has your awareness regarding COVID-19 increased because of Sarafu?
18-25 Years    Yes                                                                 80.3%
               No                                                                  19.7%
26-36 Years    Yes                                                                 72.3%
               No                                                                  27.7%
37-47 Years    Yes                                                                 71.3%
               No                                                                  28.7%
48-59 Years    Yes                                                                 81.0%
               No                                                                  19.0%
Above 60 Years Yes                                                                100.0%
Name: 5) Has your awareness regarding COVID-19 increased because of Sarafu? , dtype: object
```

In [253]:
```
df_cic.groupby('Gender')['5) Has your awareness regarding COVID-19 increased because of Sarafu? '].value_counts(normal
ize = True).mul(100).round(1).astype(str) + '%'
```

Out[253]:
```
Gender  5) Has your awareness regarding COVID-19 increased because of Sarafu?
Female  Yes                                                                 74.7%
        No                                                                  25.3%
Male    Yes                                                                 75.0%
        No                                                                  25.0%
Name: 5) Has your awareness regarding COVID-19 increased because of Sarafu? , dtype: object
```

In [254]:
```
df_cic.groupby('Age')['a) If so, what have you learned?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[254]:
```
Age            a) If so, what have you learned?
18-25 Years    Prevention                                                 3.5%
               Stay at home                                               2.7%
               Washing hands                                              2.7%
               It's good to save money for future use                     1.8%
               Prevention                                                 1.8%
                                                                         ...
Above 60 Years Handling cash                                             16.7%
               I should practice healthy practices                       16.7%
               Its communicable                                          16.7%
               To take the all government measures they have put in place 16.7%
               Washing hands regularly                                   16.7%
Name: a) If so, what have you learned?, Length: 426, dtype: object
```

In [255]:
```
df_cic.groupby('Gender')['a) If so, what have you learned?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[255]:
```
Gender  a) If so, what have you learned?
Female  You can transact without using cash                                                  4.0%
        Stay at home                                                                        1.7%
        No                                                                                  1.3%
        No handling cash                                                                    1.3%
        Prevention                                                                          1.3%
                                                                                           ...
Male    With Sarafu you can buy goods without any cash thus reduces the conduct of the Covid_19    0.5%
        You are. Able to buy goods without any cash                                         0.5%
        You can buy goods without any cash                                                  0.5%
        You can't get covid through the air                                                 0.5%
        You can't notice if someone has contracted Covid 19, it mutates                     0.5%
Name: a) If so, what have you learned?, Length: 408, dtype: object
```

In [257]:
```
df_cic.groupby('Age')['b) Have you shared this information about Sarafu with family/household? '].value_counts(normali
ze = True).mul(100).round(1).astype(str) + '%'
```

Out[257]:
```
Age            b) Have you shared this information about Sarafu with family/household?
18-25 Years    Yes                                                                84.5%
               No                                                                 15.5%
26-36 Years    Yes                                                                79.1%
               No                                                                 20.9%
37-47 Years    Yes                                                                79.4%
               No                                                                 20.6%
48-59 Years    Yes                                                                83.3%
               No                                                                 16.7%
Above 60 Years Yes                                                               100.0%
Name: b) Have you shared this information about Sarafu with family/household? , dtype: object
```

In [258]:
```
df_cic.groupby('Gender')['b) Have you shared this information about Sarafu with family/household? '].value_counts(norm
alize = True).mul(100).round(1).astype(str) + '%'
```

Out[258]:
```
Gender  b) Have you shared this information about Sarafu with family/household?
Female  Yes                                                                81.4%
        No                                                                 18.6%
Male    Yes                                                                80.3%
        No                                                                 19.7%
Name: b) Have you shared this information about Sarafu with family/household? , dtype: object
```

In [259]:
```
df_cic.groupby('Age')['To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the comm
unity to understand Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[259]:

Age	To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the community to understand Sarafu?
18-25 Years	Excellent
57.0%	
	Above average
21.8%	
	average
16.2%	
	below average
3.5%	
	poor
1.4%	
26-36 Years	Excellent
34.5%	
	Above average
32.4%	
	average
30.2%	
	below average
2.5%	
	poor
0.4%	
37-47 Years	Excellent
46.3%	
	Above average
26.5%	
	average
25.0%	
	below average
2.2%	
48-59 Years	Excellent
45.2%	
	Above average
28.6%	
	average
23.8%	
	below average
2.4%	
Above 60 Years	Excellent
83.3%	
	Above average

```
16.7%
Name: To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the community to underst
and Sarafu? , dtype: object
```

In [260]:
```
df_cic.groupby('Gender')['To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the c
ommunity to understand Sarafu? '].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[260]:
```
Gender  To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the community to under
stand Sarafu?
Female  Excellent
43.4%
        Above average
29.3%
        average
24.5%
        below average
2.4%
        poor
0.5%
Male    Excellent
44.3%
        Above average
26.3%
        average
25.9%
        below average
3.1%
        poor
0.4%
Name: To what extent does Kenya Red Cross Society and Grassroots Economics Foundation engage the community to underst
and Sarafu? , dtype: object
```

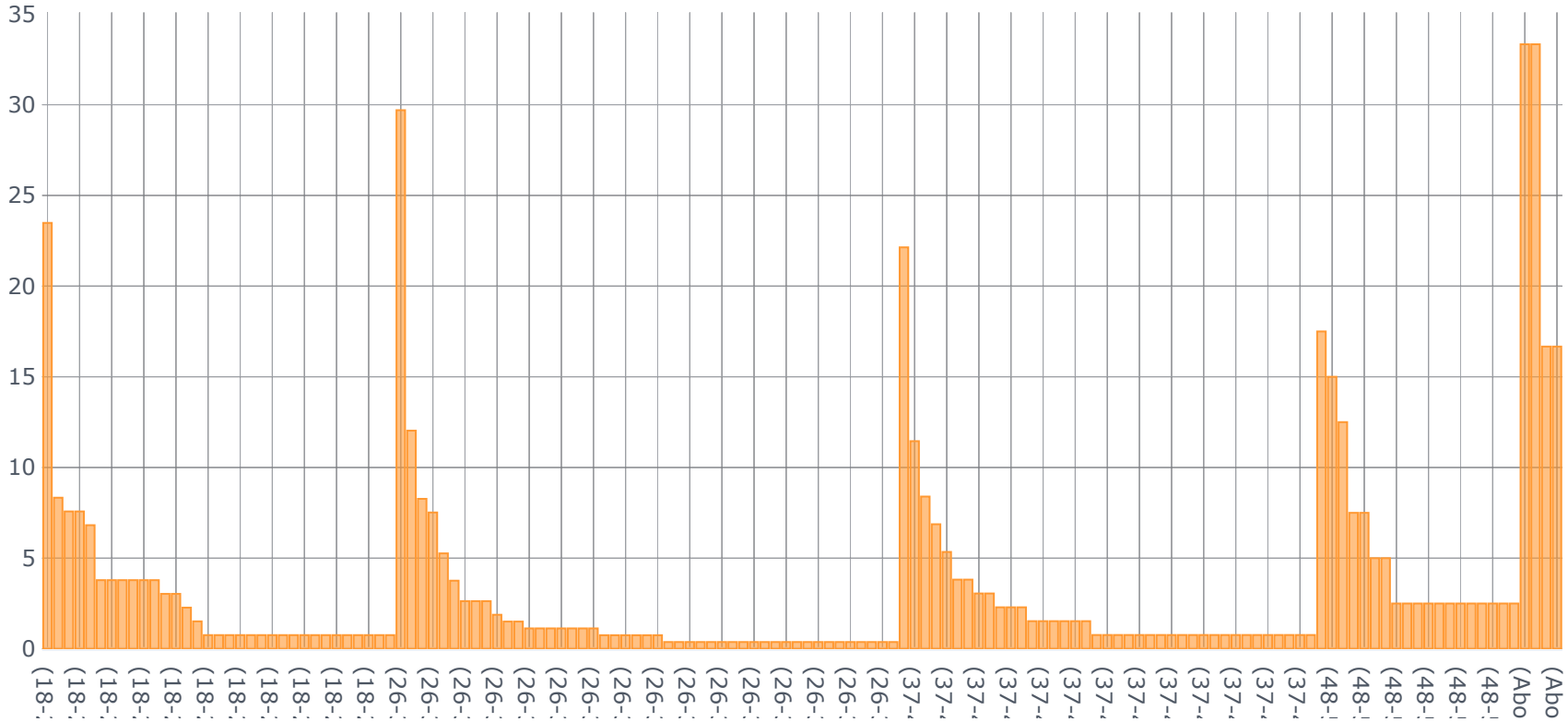
In [261]:
```
df_cic.groupby('Age')[ 'Do you know how you can reach KRCS should you have any issue or feedback about the project '].
value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[261]:
```
Age            Do you know how you can reach KRCS should you have any issue or feedback about the project
18-25 Years    Yes                                                                                 89.4%
               No                                                                                  10.6%
26-36 Years    Yes                                                                                 93.5%
               No                                                                                   6.5%
37-47 Years    Yes                                                                                 94.1%
               No                                                                                   5.9%
48-59 Years    Yes                                                                                 95.2%
               No                                                                                   4.8%
Above 60 Years Yes                                                                                100.0%
Name: Do you know how you can reach KRCS should you have any issue or feedback about the project , dtype: object
```

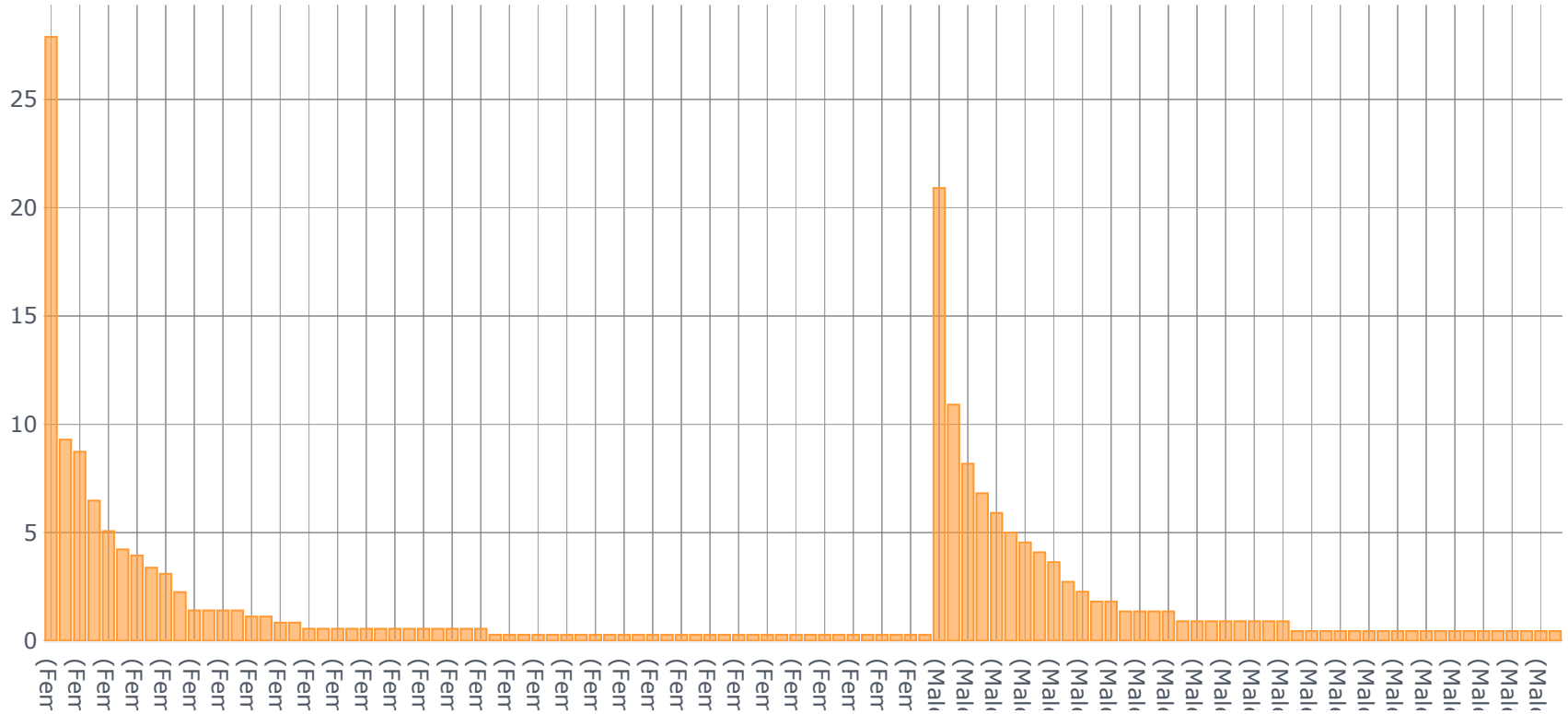
In [262]:
```
df_cic.groupby('Gender')[ 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe o
r read the list. Select the ones the respondent gives)'].value_counts(normalize = True).mul(100).round(1).astype(str)
+ '%'
```

Out[262]:
```
Gender  Do you know how you can reach KRCS should you have any issue or feedback about the project
Female  Yes                                                                                 91.8%
        No                                                                                   8.2%
Male    Yes                                                                                 94.7%
        No                                                                                   5.3%
Name: Do you know how you can reach KRCS should you have any issue or feedback about the project , dtype: object
```

In [273]:
```
df_cic.groupby('Age')[ 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe or r
ead the list. Select the ones the respondent gives)'].value_counts(normalize = True).mul(100).iplot(kind='bar')
```



In [272]:
```
df_cic.groupby('Gender')[ 'If yes, what are the channels you can use to reach KRCS (Multiple selection, DO NOT Probe o
r read the list. Select the ones the respondent gives)'].value_counts(normalize = True).mul(100).iplot(kind ='bar')
```



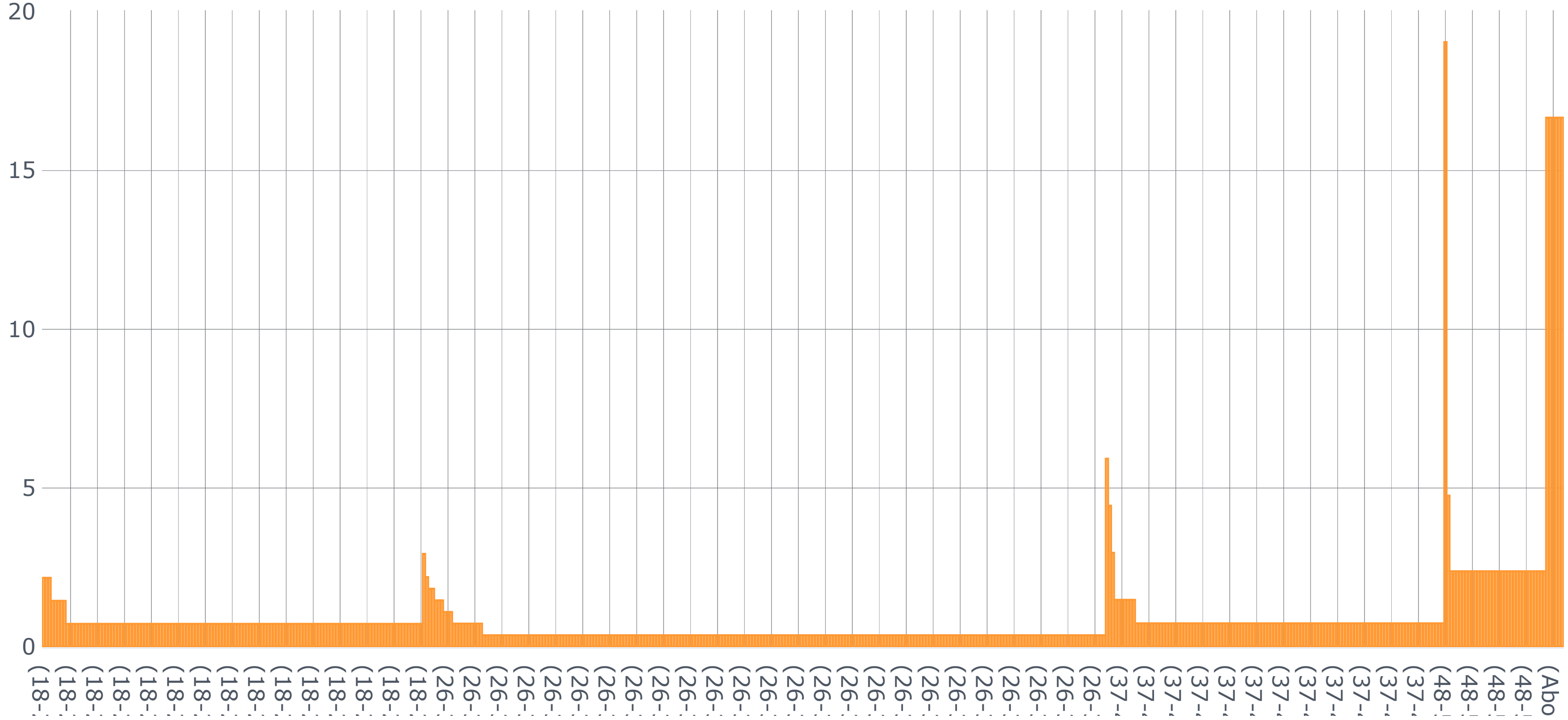
In [266]:
```
df_cic.groupby('Age')['Other (Please specify)'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[266]:
```
Age          Other (Please specify)
26-36 Years  I don't know                   75.0%
             Hasn't. Known toll. Number     25.0%
37-47 Years  I don't know                  100.0%
48-59 Years  You can save                  100.0%
Name: Other (Please specify), dtype: object
```

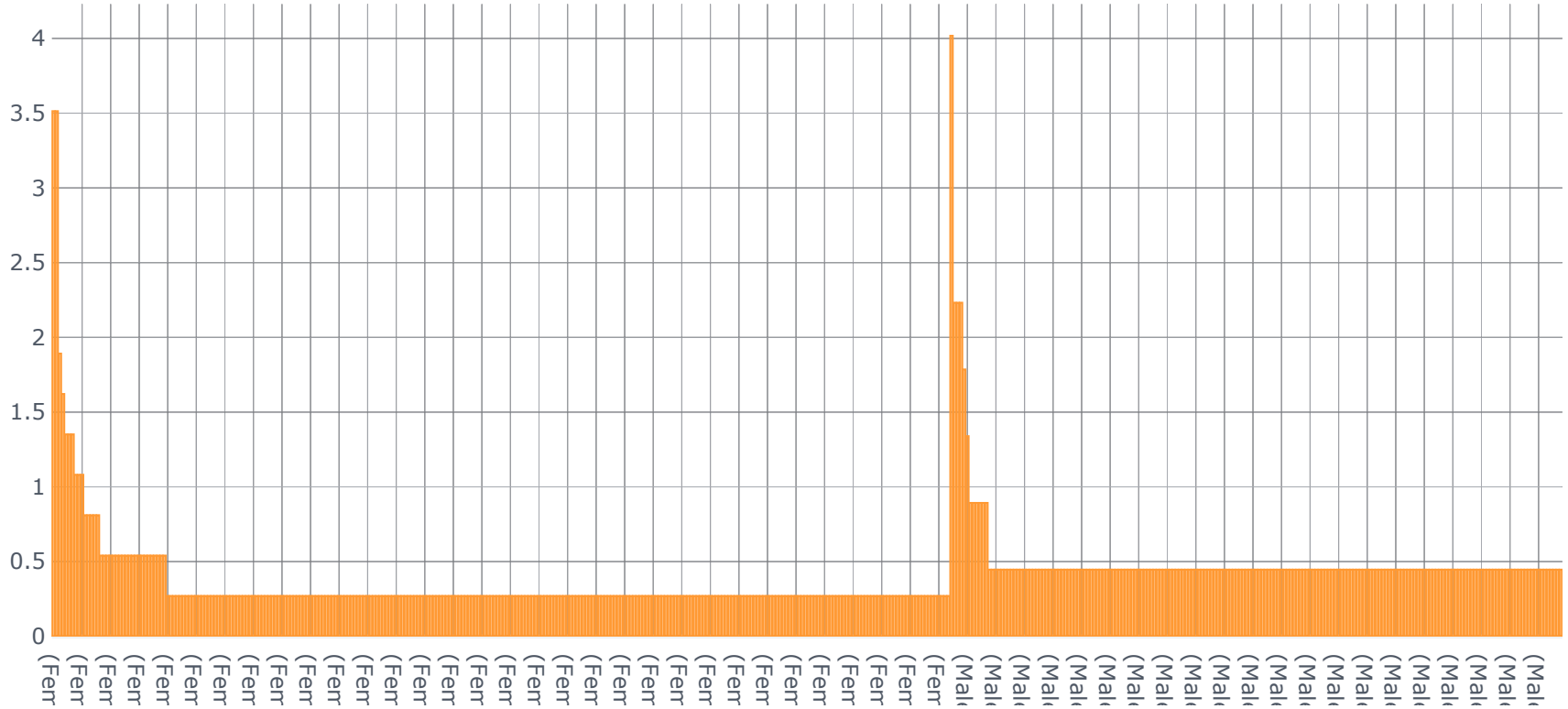
In [267]:
```
df_cic.groupby('Gender')['Other (Please specify)'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[267]:
```
Gender  Other (Please specify)
Female  I don't know                   60.0%
        Hasn't. Known toll. Number     20.0%
        You can save                   20.0%
Male    I don't know                  100.0%
Name: Other (Please specify), dtype: object
```

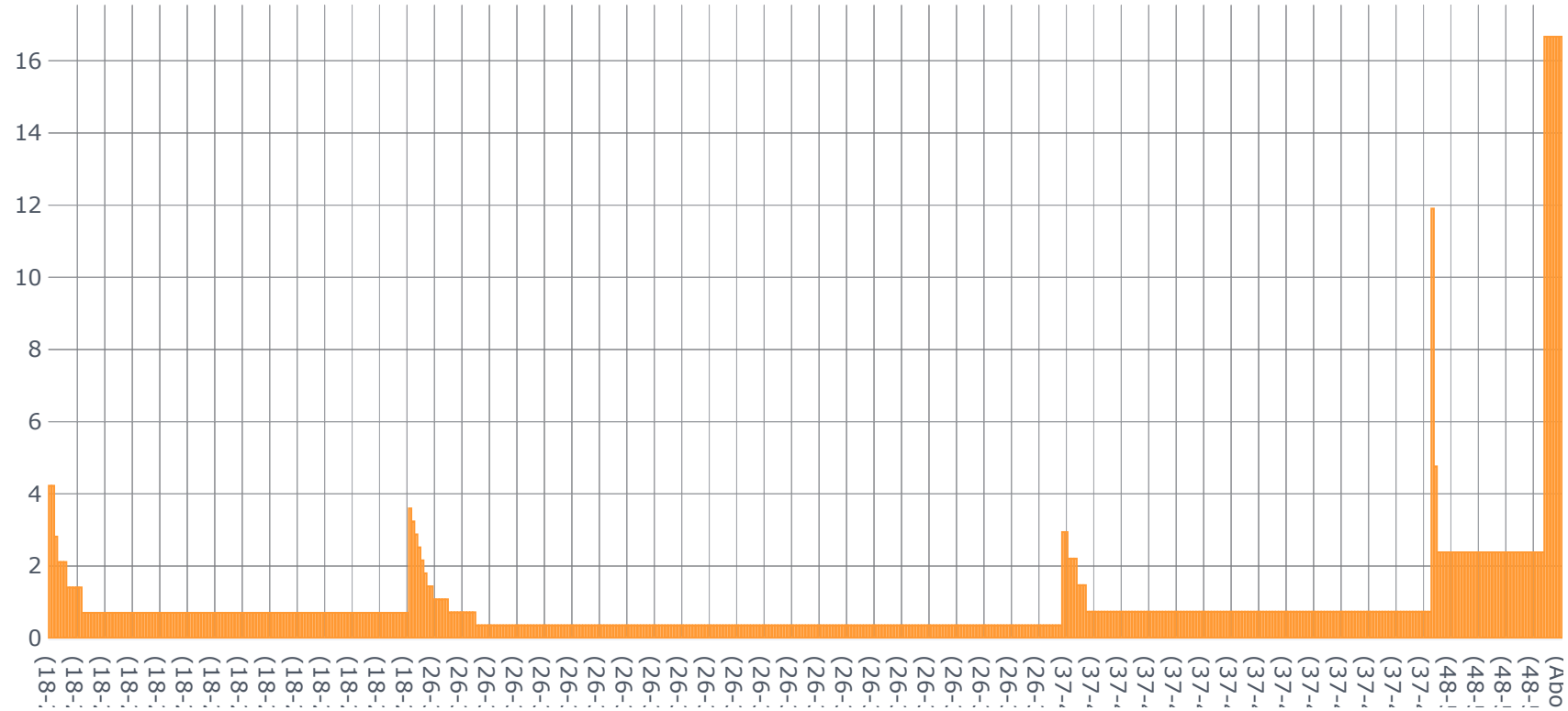
In [274]:
```
df_cic.groupby('Age')['What are people saying about COVID-19 in the community that you think is not correct (rumours o
r myths)'].value_counts(normalize = True).mul(100).iplot(kind ='bar')
```



In [275]:
```
df_cic.groupby('Gender')['What are people saying about COVID-19 in the community that you think is not correct (rumours or myths)'].value_counts(normalize = True).mul(100).iplot(kind='bar')
```



In [276]:
```
df_cic.groupby('Age')['What questions do you have or do people in your community have about COVID-19 that need to be answered?'].value_counts(normalize = True).mul(100).iplot(kind='bar')
```



In [271]:
```
df_cic.groupby('Gender')['What questions do you have or do people in your community have about COVID-19 that need to be answered?'].value_counts(normalize = True).mul(100).round(1).astype(str) + '%'
```

Out[271]:
```
Gender  What questions do you have or do people in your community have about COVID-19 that need to be answered?
Female  When will it end                                                                                          3.
5%
        When will it end                                                                                          3.
2%
        No                                                                                                        2.
7%
        No questions                                                                                              2.
4%
        Nothing                                                                                                   2.
1%


...
Male    Will this Corona end                                                                                      0.
4%
        Will we get our lives back after covid?                                                                   0.
4%
        Will will covid_19 end?                                                                                   0.
4%
        Y did Corona come to our country                                                                          0.
4%
        Youths are saying that COVID-19  is for elderly only                                                      0.
4%
Name: What questions do you have or do people in your community have about COVID-19 that need to be answered?, Lengt
h: 466, dtype: object
```

In [ ]: