Licenced Hospitals, Clinics and Dispensaries in Kenya, Year 2025

An animated plot of the Kenya population increase.

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Introduction

Using the data from Licenced HealthFacilities for the year 2025 [1], we analyze hospital distribution in kenya per county.

[1] Archive - Licenced HealthFacilities for the year 2025

Kenya's healthcare system employs a six-tiered structure. **Level 1** Community Health Units (CHUs) focused on preventive and promotive healthcare care through community health workers. **Level 2** dispensaries and clinics focus on basic outpatient services for common ailments. **Level 3** health centers provide curative and preventative care, including maternal and child health. **Level 4** sub-county and district hospitals offer primary referral services. **Level 5** county referral and teaching hospitals handle secondary referrals and specialized care. Finally, **Level 6** national referral hospitals, such as Kenyatta National Hospital provide the highest level of tertiary care [2] [3].

Analysis

Importing Libraries

```
import matplotlib.pyplot as plt
import pygadm
import pandas as pd
import requests
from io import StringIO
import geopandas as gpd
from adjustText import adjust_text
from IPython.display import display, Markdown
import matplotlib.colors as colors
```

Data

```
# Get the data
health_facilities_data = requests.get(
    "https://kmpdc.go.ke/Registers/H-Facilities.php").text
# Parse the data
health_facilities_df = pd.read_html(StringIO(health_facilities_data))[0]
# Drop columns that are not useful
health_facilities_df = health_facilities_df.drop([
    'View', # Empty column
    'status', # All values are 'Active'
    'Reg_No', # Not useful because it's unique and obscured
], axis=1)
# Make levels categorical
```

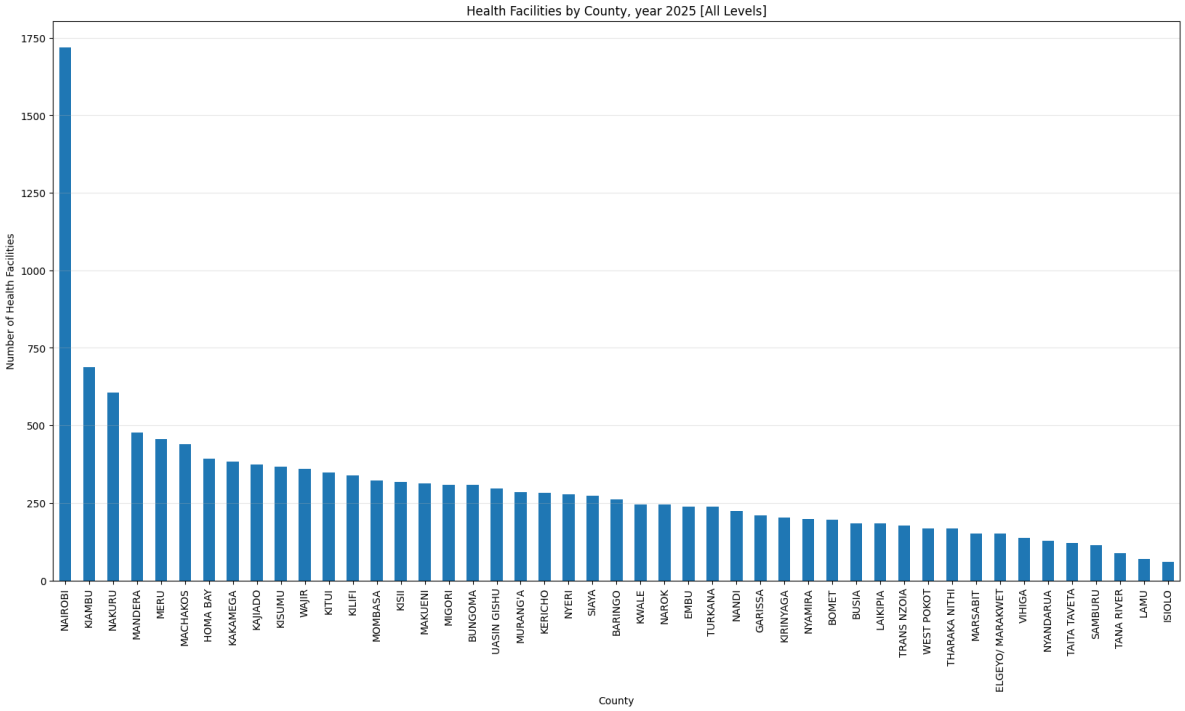
[2] Explainer: Six levels of hospitals and services they offer
[3] Healthcare in Kenya

```
health_facilities_df['Level'] = pd.Categorical(
    health_facilities_df['Level'].str.lower().str.strip().str.upper())
# drop duplicates
health_facilities_df = health_facilities_df.drop_duplicates()
health_facilities_df
```

	Facility_Name	Address	Facility_Typ
0	A.C.K ST. PAULS MIHUTI DISPENSARY	P.O BOX 227-10202 KANGEMA	DISPENSAR
1	NEEMA MEDICARE MEDICAL CENTRE	P.O BOX 59461-00200 NAIROBI	MEDICAL C
2	AMUNG\'ENTI CATHOLIC DISPESARY	P.O BOX 75-60600 MAUA	DISPENSAR
3	LIFOG CENTRE MEDICAL CLINIC	P.O BOX 84-80100 MOMBASA	MEDICAL C
4	RAPHA JOY MEDICAL CLINIC	P.O BOX 244-00221 LAIKIPIA	MEDICAL C
...	...	...	...
14094	NJORO HUDUMA MEDICAL CLINIC NAKURU	P.O BOX 86-20107 NJORO	NURSING H
14095	DYNAMED MEDICAL CLINIC	P.O BOX 454-01001 KALIMONI	MEDICAL C
14096	SLENMARK MEDICAL CLINIC	P.O BOX 267-10304 KUTUS	MEDICAL C
14097	SLENMAC CARE CENTRE LIMITED	P.O BOX 267- KERUGOYA	MEDICAL C
14098	LUIZ HOASIS MEDICAL CENTRE EBATE	P.O BOX 366-40200 KISII	MEDICAL C

```
def health_facilities_county(title: str, levels = None):
    display(Markdown(
        "\n"
        f"### {title}"
        "\n"))
    df = health_facilities_df\
        if levels == None\
        else health_facilities_df[health_facilities_df['Level'].isin(levels)]
    sizes = df.groupby('County').size()
    sizes.sort_values(ascending=False)\
        .plot(kind='bar', figsize=(20, 10))
    plt.title(title)
    plt.ylabel('Number of Health Facilities')
    plt.xlabel('County')
    plt.grid(True, alpha=0.3, axis='y',)
    plt.show()

    print(sizes.describe())

health_facilities_county(
    'Health Facilities by County, year 2025 [All Levels]')
```

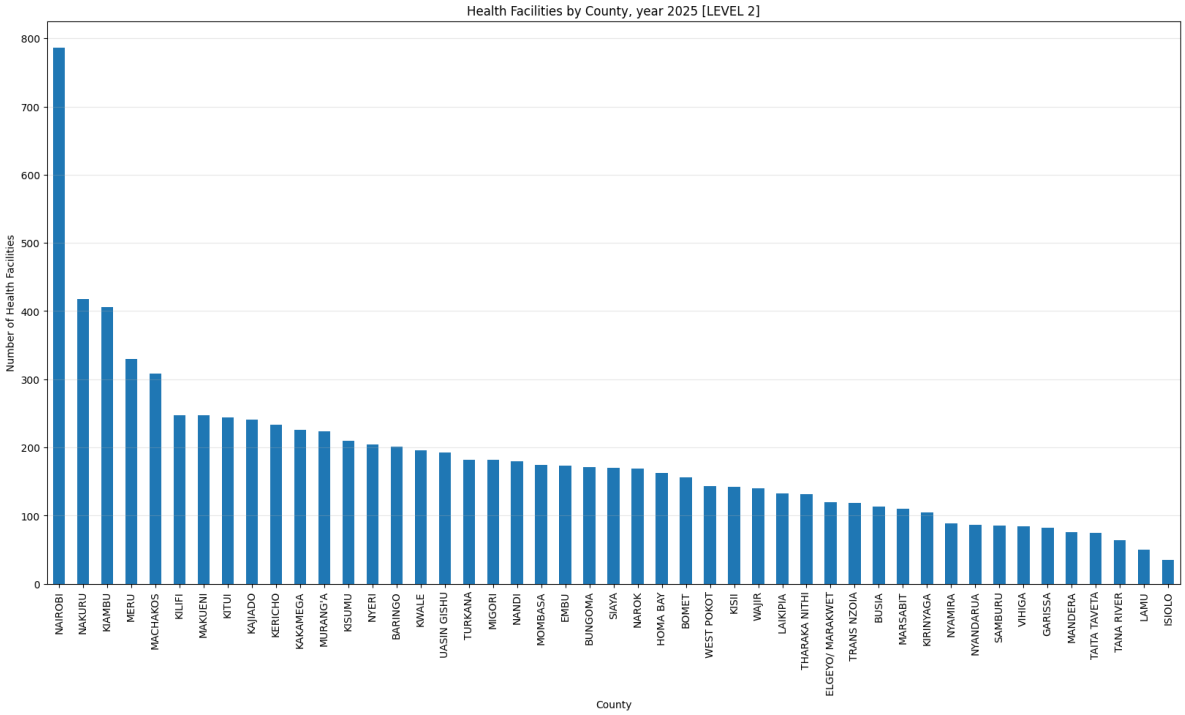
Health Facilities by County, year 2025 [All Levels]



count 47.000000 mean 299.957447 std 247.828654 min 61.000000 25% 180.500000 50% 261.000000 75% 342.500000 max 1718.000000 dtype: float64

```
health_facilities_county(
    'Health Facilities by County, year 2025 [LEVEL 2]',
    ['LEVEL 2'])
```

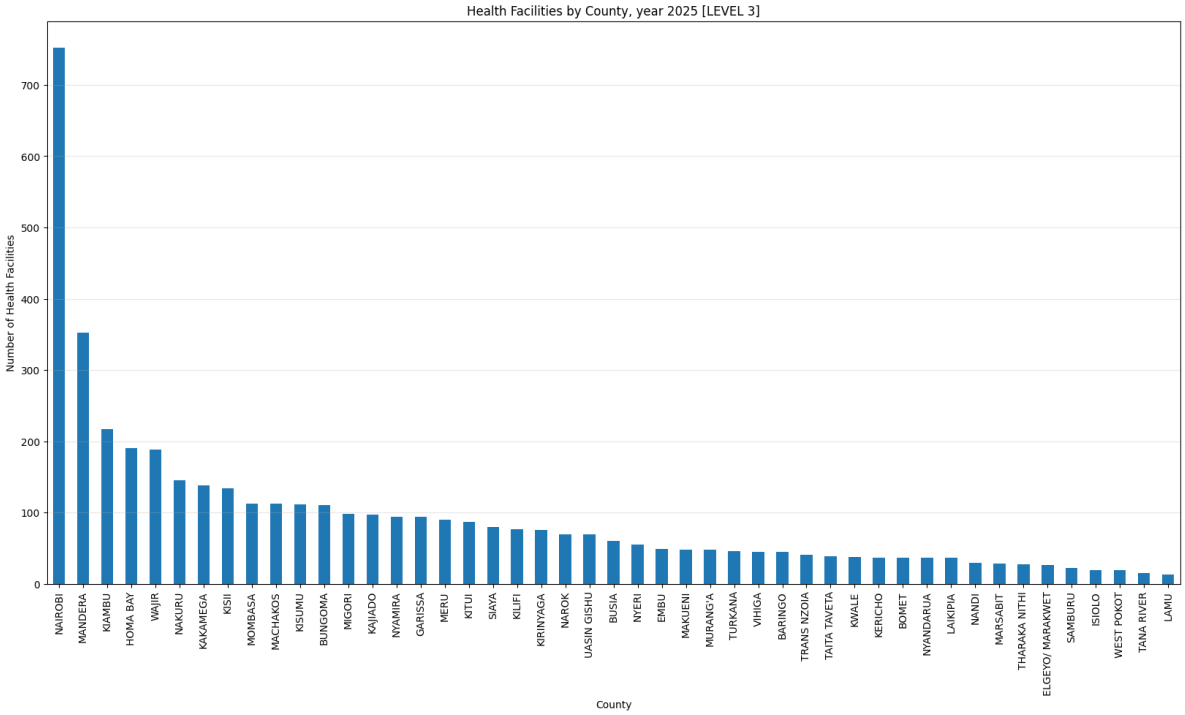
Health Facilities by County, year 2025 [LEVEL 2]




```
count     47.000000
mean     183.297872
std      122.494350
min       35.000000
25%      111.500000
50%      170.000000
75%      217.000000
max      786.000000
dtype: float64
```

```
health_facilities_county(
    'Health Facilities by County, year 2025 [LEVEL 3]',
    ['LEVEL 3A', 'LEVEL 3B'])
```

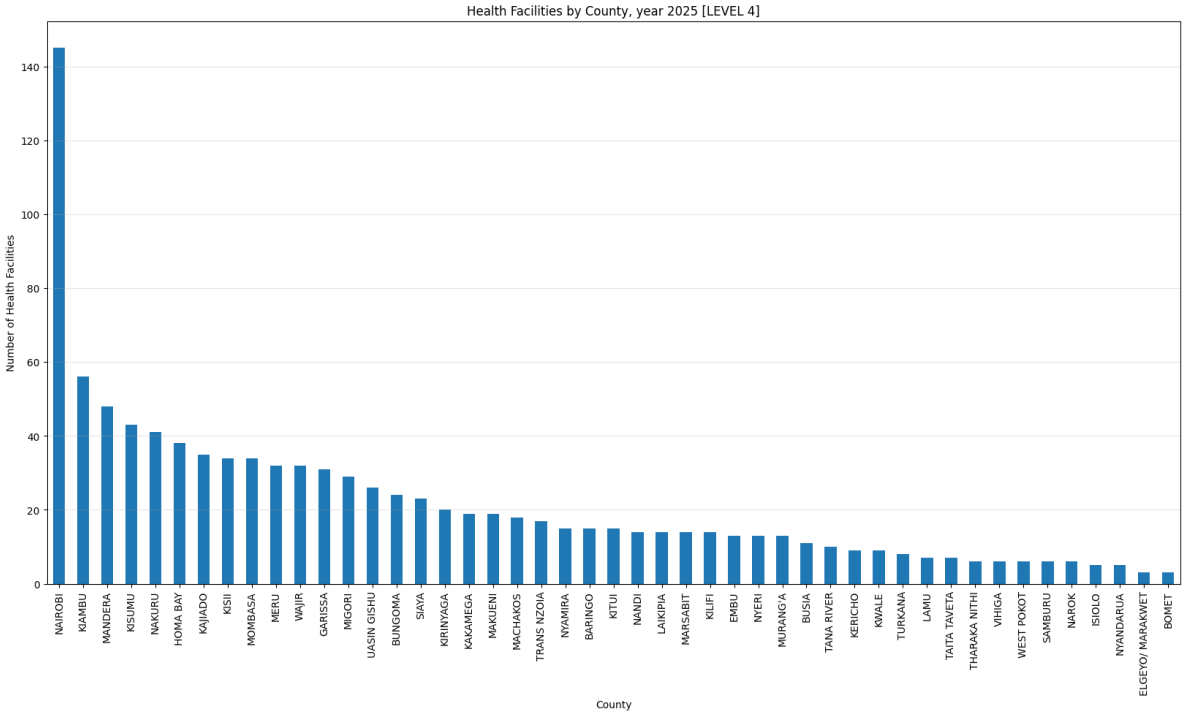
Health Facilities by County, year 2025 [LEVEL 3]




```
count     47.000000
mean      92.510638
std      116.786850
min       13.000000
25%       36.500000
50%       60.000000
75%      104.000000
max      752.000000
dtype: float64
```

```
health_facilities_county(
    'Health Facilities by County, year 2025 [LEVEL 4]',
    ['LEVEL 4', 'LEVEL 4B'])
```

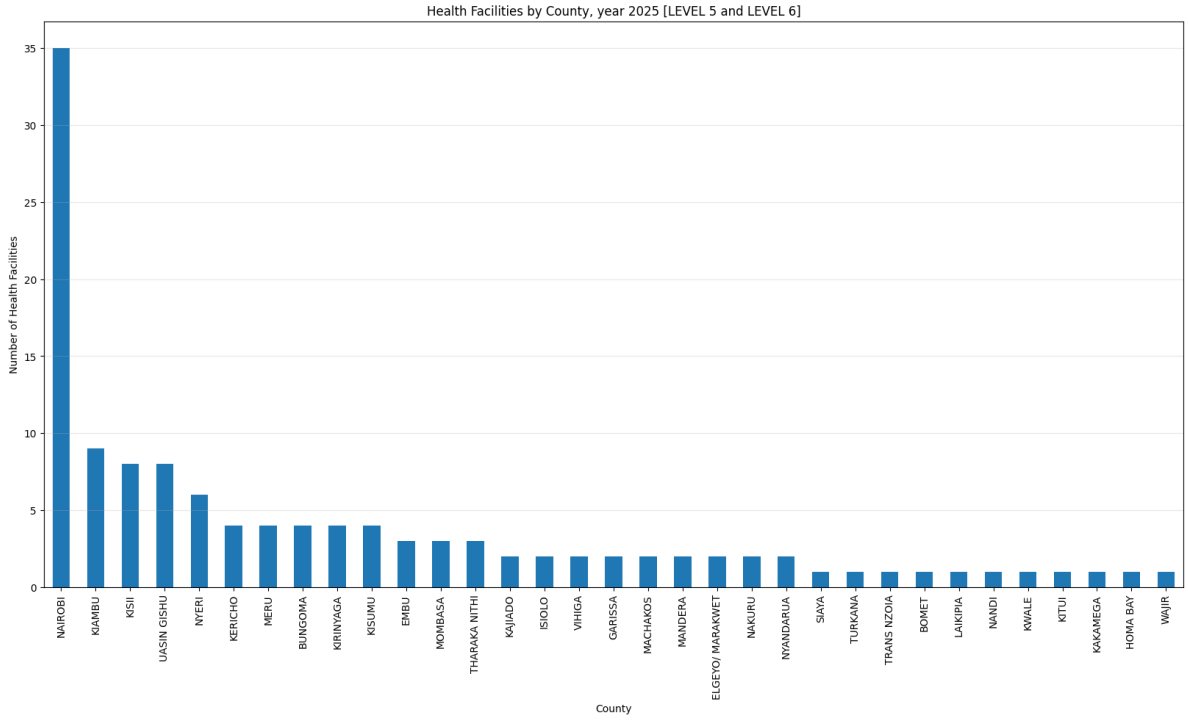
Health Facilities by County, year 2025 [LEVEL 4]




```
count     47.000000
mean      21.510638
std       22.531980
min        3.000000
25%        8.500000
50%       15.000000
75%       30.000000
max      145.000000
dtype: float64
```

```
health_facilities_county(
    'Health Facilities by County, year 2025 [LEVEL 5 and LEVEL 6]',
    ['LEVEL 5', 'LEVEL 6A', 'LEVEL 6B'])
```

Health Facilities by County, year 2025 [LEVEL 5 and LEVEL 6]




```
count    33.000000
mean      3.757576
std       6.015762
min       1.000000
25%       1.000000
50%       2.000000
75%       4.000000
max      35.000000
dtype: float64
```

Only three counties have more than 500 helath facilities (Nairobi, Kiambu and Nakuru). Nairobi county leads with 1,718 facilities while Isiolo county tails with 61 facilities.

Hospital Density

If we gave each health facility a score depending on the level, and sum the scores for each county, we can get a simplistic estimate of the healthcare density in each county. The score is calculated as follows:

```
facility_level_values = {
    j: i
    for i, j
    in enumerate(
        health_facilities_df['Level'].sort_values().unique().tolist(), start = 1)
}
facility_level_values
```

```
{'LEVEL 2': 1,
 'LEVEL 3A': 2,
 'LEVEL 3B': 3,
 'LEVEL 4': 4,
 'LEVEL 4B': 5,
 'LEVEL 5': 6,
 'LEVEL 6A': 7,
 'LEVEL 6B': 8}
```

```
density_data = [
    [
        county,
        int(pd.to_numeric(facilities["Level"].apply(lambda x: facility_level_values[x])).sum
        int(facilities["Level"].count()),
    ]
    for county, facilities
    in health_facilities_df.groupby('County')
]
density_df = pd.DataFrame(density_data, columns=['County', 'Density', 'Count'])\
    .sort_values('Density', ascending=False)\
    .reset_index(drop=True)
density_df
```

	County	Density	Count
0	NAIROBI	3671	1718
1	KIAMBU	1257	688
2	MANDERA	1076	478
3	NAKURU	949	606
4	HOMA BAY	813	392
5	WAJIR	706	361
6	MERU	698	456
7	KISUMU	691	368

	County	Density	Count
8	MACHAKOS	672	440
9	KAKAMEGA	654	384
10	KISII	649	318
11	MOMBASA	632	323
12	KAJIADO	631	375
13	BUNGOMA	599	309
14	MIGORI	528	309
15	UASIN GISHU	524	296
16	KITUI	511	347
17	KILIFI	491	338
18	SIAYA	452	274
19	GARISSA	447	209
20	MAKUENI	436	314
21	NYERI	433	278
22	MURANG'A	395	285
23	KIRINYAGA	386	204
24	KERICHO	379	283
25	EMBU	371	238
26	BARINGO	366	261
27	NYAMIRA	362	198
28	NAROK	356	244
29	TURKANA	331	237
30	KWALE	328	244
31	NANDI	315	224
32	BUSIA	305	184
33	TRANS NZOIA	292	178
34	LAIKIPIA	283	183
35	BOMET	258	196
36	THARAKA NITHI	236	167
37	VIHIGA	231	137
38	MARSABIT	227	152
39	WEST POKOT	211	168
40	ELGEYO/ MARAKWET	201	151
41	NYANDARUA	194	129
42	TAITA TAVETA	193	121
43	SAMBURU	162	113
44	TANA RIVER	141	89
45	LAMU	113	70
46	ISIOLO	111	61

Get the geometry of the counties in Kenya, GADM (Global Administrative Areas).

```
gdf: gpd.geodataframe.GeoDataFrame = pygadm.Items(
    name="Kenya", content_level=1).rename(columns={"NAME_1": "County"})
gdf = gdf.drop(columns=list(set(gdf.columns) - set(["geometry", "County"])),
               axis=1)
gdf.head(5)
```

	geometry	County
0	MULTIPOLYGON (((35.7616 -0.1904, 35.7243 -0.19...	Baringo
1	MULTIPOLYGON (((35.2613 -1.0159, 35.2583 -1.02...	Bomet
2	MULTIPOLYGON (((34.8778 0.8339, 34.9138 0.8524...	Bungoma
3	MULTIPOLYGON (((34.0292 -0.0142, 34.0158 -0.02...	Busia
4	MULTIPOLYGON (((35.5272 0.2167, 35.5261 0.2183...	Elgeyo-Marakwet

Merge the densities and the geometries

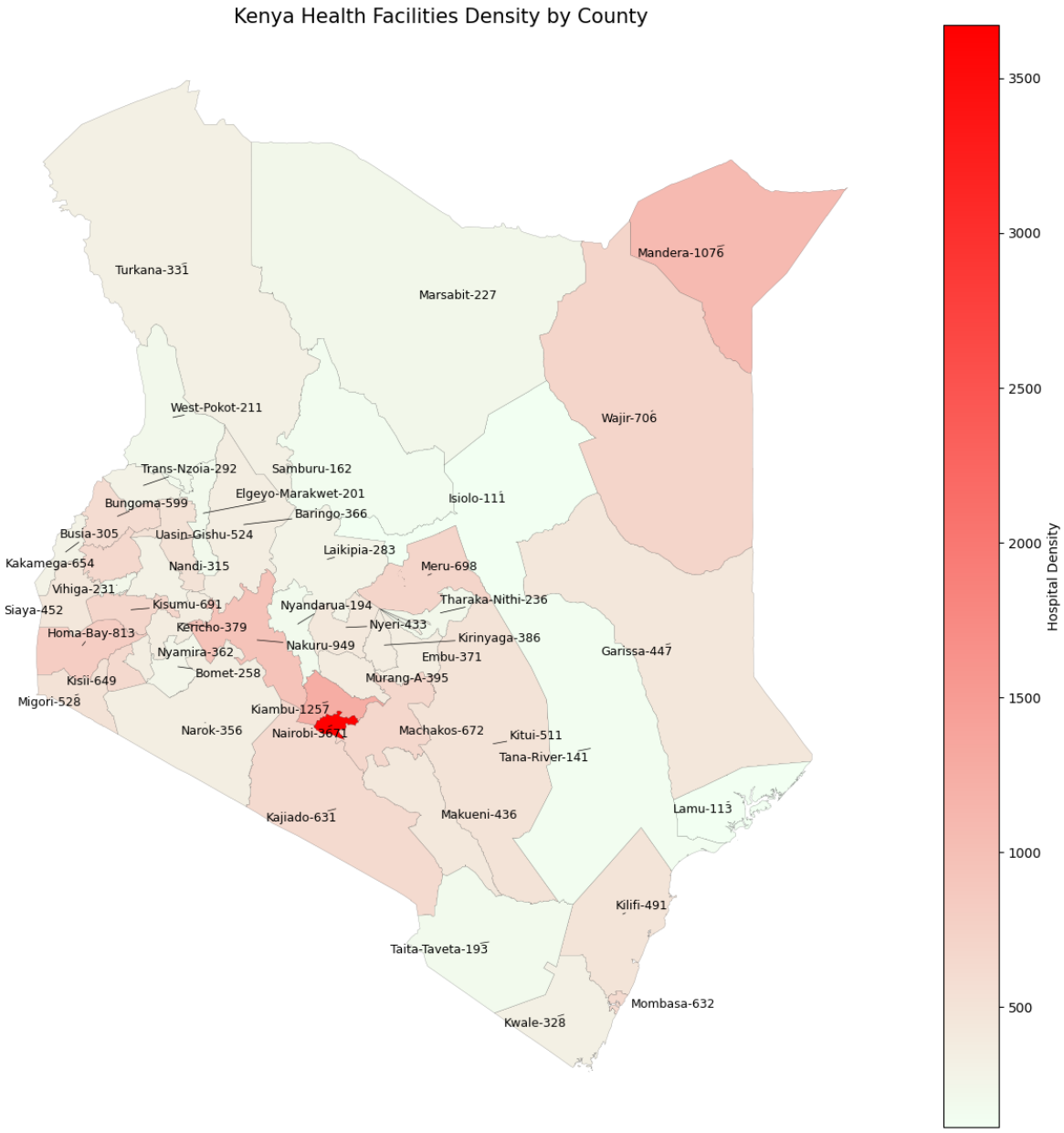
```
def format_county_name(county_name: pd.Series) -> pd.Series:
    return county_name.str.strip().str.lower().str.replace(r'[^a-zA-Z0-9]+', '-', regex=True)
density_df['County'] = format_county_name(density_df['County'])
gdf['County'] = format_county_name(gdf['County'])
merged_gdf = gdf.merge(density_df, on='County', how='left')
merged_gdf.head(5)
```

	geometry	County	Density	Count
0	MULTIPOLYGON (((35.7616 -0.1904, 35.7243 -0.19...	Baringo	366	261
1	MULTIPOLYGON (((35.2613 -1.0159, 35.2583 -1.02...	Bomet	258	196
2	MULTIPOLYGON (((34.8778 0.8339, 34.9138 0.8524...	Bungoma	599	309
3	MULTIPOLYGON (((34.0292 -0.0142, 34.0158 -0.02...	Busia	305	184
4	MULTIPOLYGON (((35.5272 0.2167, 35.5261 0.2183...	Elgeyo-Marakwet	201	151

Plotting the simplistic densities gives us the following map.

```
# Create figure and axis
fig, ax = plt.subplots(1, 1, figsize=(12, 12))

# Create a custom colormap from green to red
cmap = colors.LinearSegmentedColormap.from_list('custom_cmap', ['#f2fff2', '#ff0000'])
```

```
# Plot with hospital count determining the color
merged_gdf.plot(
    ax=ax,
    column='Density',
    cmap=cmap,
    legend=True,
    legend_kwds={'label': "Hospital Density", 'orientation': "vertical"},
    linewidth=0.1, edgecolor='black'
)

texts = [
    ax.text(
        row.geometry.centroid.x,
        row.geometry.centroid.y,
        f"{row['County']}-{row['Density']}",  # Just show the count
        fontsize=9,
        ha='center',
        va='center',
        color='black',
        # fontweight='bold',
        # bbox=dict(facecolor='white', alpha=0.7, boxstyle='round,pad=0.3')
    )
    for idx, row
    in merged_gdf.iterrows()]
adjust_text(texts, arrowprops=dict(arrowstyle='-', color='black', lw=0.5))

# Add title and remove axes
plt.title('Kenya Health Facilities Density by County', fontsize=15)
plt.axis('off')

# Show the map
plt.tight_layout()
plt.show()
```



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