AN ANALYSIS OF THE DOCTOR DEFICIT PROJECTION IN GERMANY IN NEXT 20 YEARS

What does this mean for Africa?

1.0 Task Overview

Based on population trends, retirement age, graph out the doctor deficit in Germany over the next 20 years. Calculate what it would mean for Africa.

2.0 Data Collection

Based on the task requirements, data was sourced and collected for the below:

- **Doctors in Germany**: The dataset includes the number of practicing doctors and those without medical activity from 2019 to 2023.

	Year	Practicing Doctors	Doctors Without medical activity
0	2023	428500	140300
1	2022	421300	136200
2	2021	416100	132200
3	2020	409100	127800
4	2019	402100	123600

- **Mean Retirement Age**: This includes retirement age data over the years, with different categories such as standard age and various other special cases.

	Year	Standard Age	Insured for 35 years	Insured for 45 years	Severely Disabled	Unemployed	Women	Mine Workers
0	1992	65.000	63.000	63.000	60.000	60.000	60.000	60.000
1	1993	65.000	63.000	63.000	60.000	60.000	60.000	60.000
2	1994	65.000	63.000	63.000	60.000	60.000	60.000	60.000
3	1995	65.000	63.000	63.000	60.000	60.000	60.000	60.000
4	1996	65.000	63.000	63.000	60.000	60.000	60.000	60.000
5	1997	65.000	63.000	63.000	60.000	60.292	60.000	60.000
6	1998	65.000	63.000	63.000	60.000	60.792	60.000	60.000
7	1999	65.000	63.000	63.000	60.000	61.292	60.000	60.000
8	2000	65.000	63.292	63.292	60.292	61.792	60.292	60.000
9	2001	65.000	63.792	63.792	60.792	62.292	60.792	60.000
10	2002	65.000	64.292	64.292	61.292	62.792	61.292	60.000
11	2003	65.000	64.792	64.792	61.792	63.292	61.792	60.000
12	2004	65.000	65.000	65.000	62.292	63.792	62.292	60.000
13	2005	65.000	65.000	65.000	62.792	64.292	62.792	60.000
14	2006	65.000	65.000	65.000	63.000	64.792	63.292	60.000
15	2007	65.000	65.000	65.000	63.000	65.000	63.792	60.000
16	2008	65.000	65.000	65.000	63.000	65.000	64.292	60.000
17	2009	65.000	65.000	65.000	63.000	65.000	64.792	60.000
18	2010	65.000	65.000	65.000	63.000	65.000	65.000	60.000
19	2011	65.000	65.000	65.000	63.000	65.000	65.000	60.000
20	2012	65.083	65.083	65.083	63.000	65.083	65.083	60.292
21	2013	65.159	65.159	65.159	63.000	65.159	65.159	60.538
22	2014	65.235	65.235	63.000	63.000	65.235	65.235	60.614
23	2015	65.311	65.311	63.000	63.292	65.311	65.311	60.689
24	2016	65.386	65.386	63.167	63.538	65.386	65.386	60.765

- *Labour Force*: Contains data on Germany's labor force, including employment figures.

	Year	Labour force	Persons in employment (national concept)	Persons in employment (domestic concept)	Self-employed	Employees	Agriculture, forestry and fishing	Production industry (incl. construction)	Services	Unemployed	Unemployment rate (%)	Employees subject to social insurance contributions	Pers exclusi in marg employn
0	2013	44309000	42285000	42350000	4495000	37855000	641000	10434000	31275000	2024000	0.046	29616000	5066
1	2022	46800000	45457000	45596000	3909000	41687000	557000	10738000	34301000	1343000	0.029	34445000	4164
2	2023	47119000	45785000	45933000	3879000	42054000	554000	10780000	34599000	1334000	0.028	34709000	4266

- *Germany Population*: Population data from 1960 to 2024.

	Year	Total Population
0	1960	72814900
1	1961	73377632
2	1962	74025784
3	1963	74714353
4	1964	75318337
...	...	...
60	2020	83160871
61	2021	83196078
62	2022	83797985
63	2023	84482267
64	2024	84552242

- *Population Projection by Age Group*: Projects population by age groups from 2021 to 2070.

	Year	Total Population	Population (Under 20yrs)	Population (20-66yrs)	Population (67 yrs+)	Growth Rate (Under 20yrs)	Growth Rate (20-66yrs)	Growth Rate (67 yrs+)
0	2021	83200000	15400000	51400000	16400000.0	NaN	NaN	NaN
1	2030	85140000	16440000	49960000	18720000.0	0.067532	-0.028016	0.141463
2	2040	84780000	15980000	48000000	20800000.0	-0.027981	-0.039231	0.111111
3	2050	83840000	15560000	47860000	20400000.0	-0.026283	-0.002917	-0.019231
4	2060	82700000	15560000	46440000	20740000.0	0.000000	-0.029670	0.016667
5	2070	82260000	15400000	45740000	21140000.0	-0.010283	-0.015073	0.019286

- *Age Distribution:* Percentage distribution of age groups in Germany from 2019 to 2023.

	Year	Total Population	Population (Under 20yrs)	Population (20-66yrs)	Population (67 yrs+)
0	2021	83200000	15400000	51400000	16400000.0
1	2030	85140000	16440000	49960000	18720000.0
2	2040	84780000	15980000	48000000	20800000.0
3	2050	83840000	15560000	47860000	20400000.0
4	2060	82700000	15560000	46440000	20740000.0
5	2070	82260000	15400000	45740000	21140000.0

- ***Number of Medical Graduates:*** Number of medical graduates from 2002 to 2021.

	Year	Number of employees
0	2021	10320
1	2020	10007
2	2019	10234
3	2018	9563
4	2017	9928
5	2016	9647
6	2015	9215
7	2014	9599
8	2013	9801
9	2012	9587
10	2011	9572
11	2010	9894
12	2009	10069
13	2008	9857
14	2007	9574
15	2006	8724
16	2005	8870
17	2004	8896
18	2003	8947
19	2002	8852

3.0 Summary of Data Analysis Performed

- Raw data was collected from various sources and loaded into our Jupyter notebook.

- Data exploration followed to understand the different raw data collected such as their structure and content.

- **Population Growth and Aging Trend**: Analysis was performed, and visuals created to showcase trend. Calculated growth rates for different age groups in the raw data and displayed the updated dataframe with growth rates.

- **Estimating the Supply of Doctors**: Used linear regression to project the number of practicing doctors for the next 20 years. Created a dataframe with the projected number of doctors.

- **Forecasting the Demand for Doctors**:

  - Interpolated population projections for each year from 2021 to 2051.
  - Calculated the ratio of doctors to the total population and the elderly population.
  - Projected the demand for doctors based on the aging population.

2. **Calculating and Visualizing the Doctor Deficit**:
   - Merged the supply and demand projections to calculate the doctor deficit.
   - Visualized the projected supply, demand, and deficit of doctors using a line plot with a shaded area indicating the deficit.

4.0 Key Insights

1. **Doctor Supply**: According to the "Doctors in Germany" data, there has been a steady increase in the number of practicing doctors in Germany over the years. In 2023, there are approximately 428,500 practicing doctors, up from 301,000 in 2002 and that figure is expected to grow steadily in the coming years.

Projection of Practicing Doctors in Germany (2024-2043)
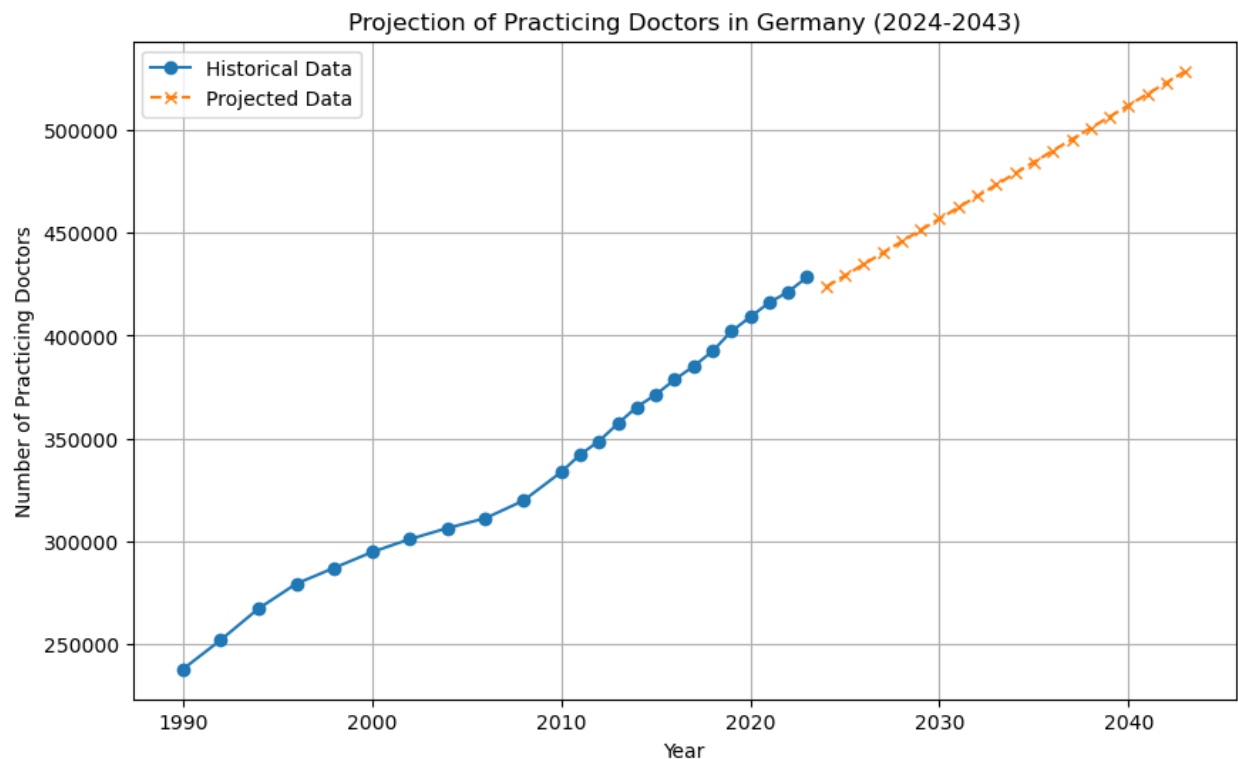
2. **Retirement Age:** The "Mean Retirement Age" data shows that the standard retirement age in Germany is projected to remain at 65 - 67 years over the next two decades. However, there are variations for different insured periods and specific occupations.

Mean Retirement Age Over Time
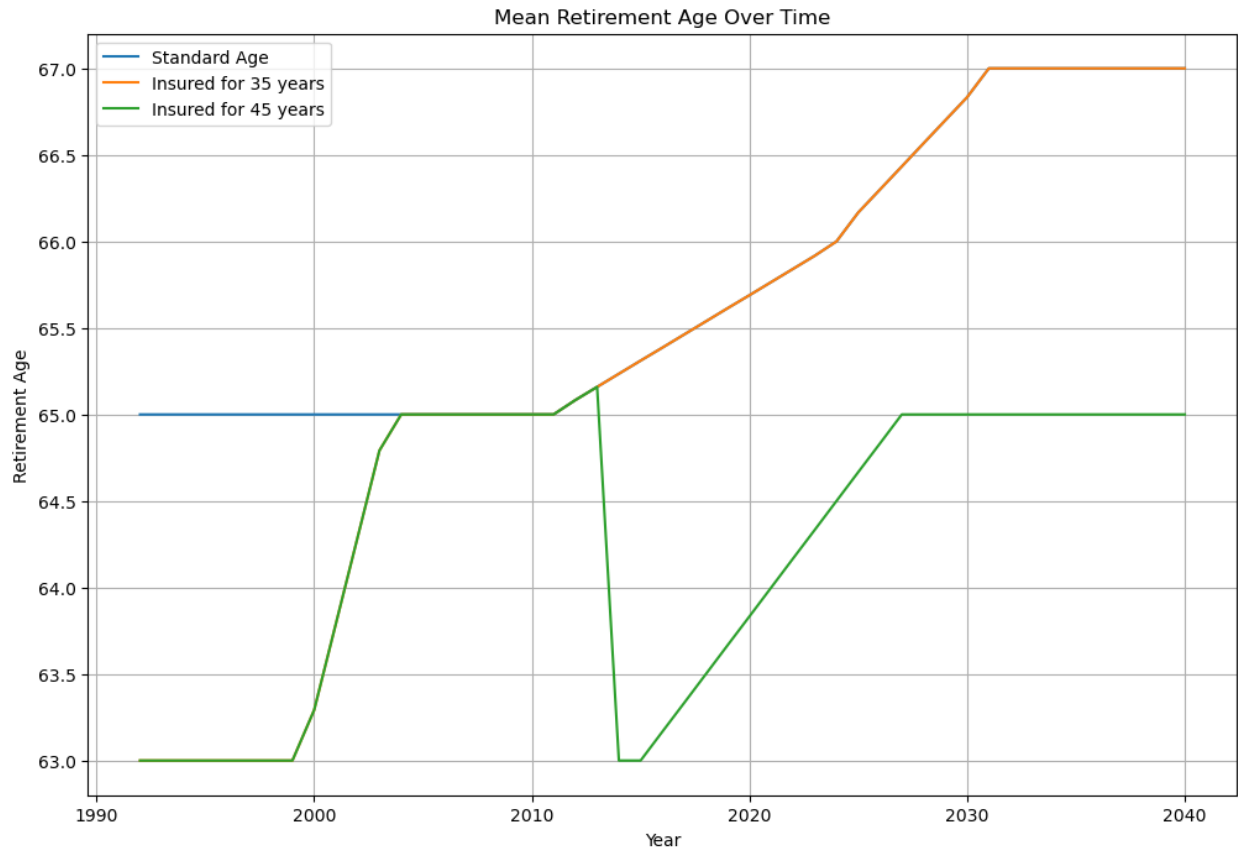
3. **Population:** Germany's population has been growing and is projected to continue growing, reaching approximately 85 million by 2040, according to the "Population Projection by Age Group" data collected.

Historical Population of Germany (1960 - 2024)

Population Projection (2021 - 2070)
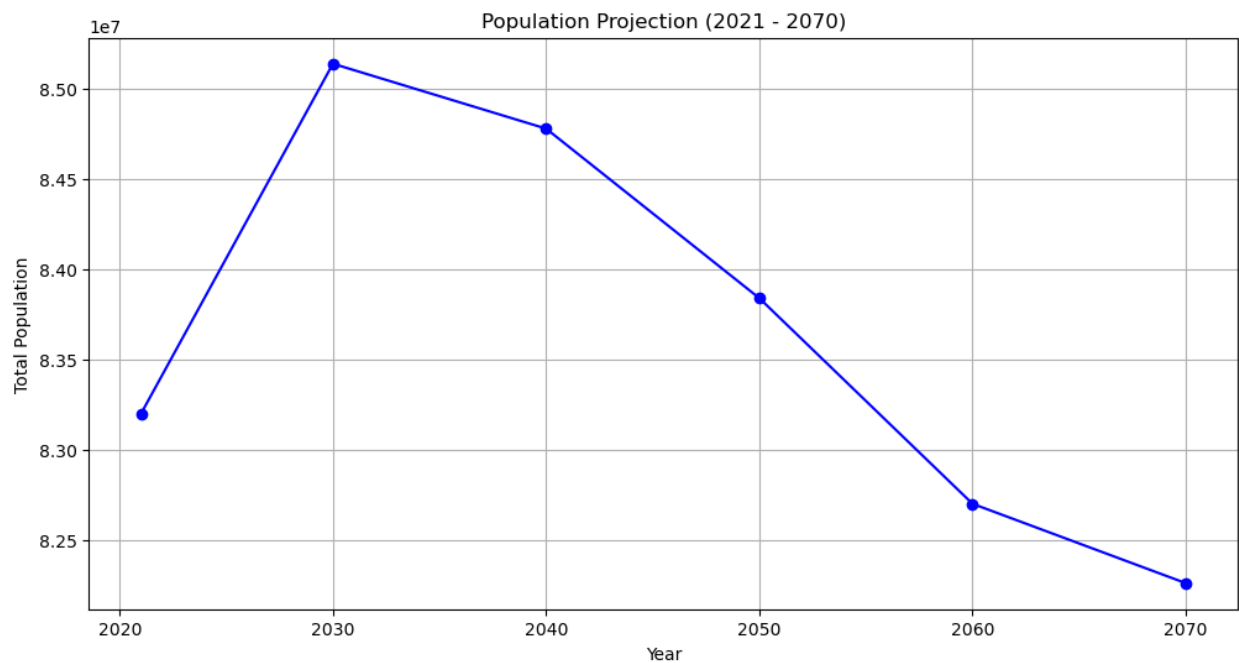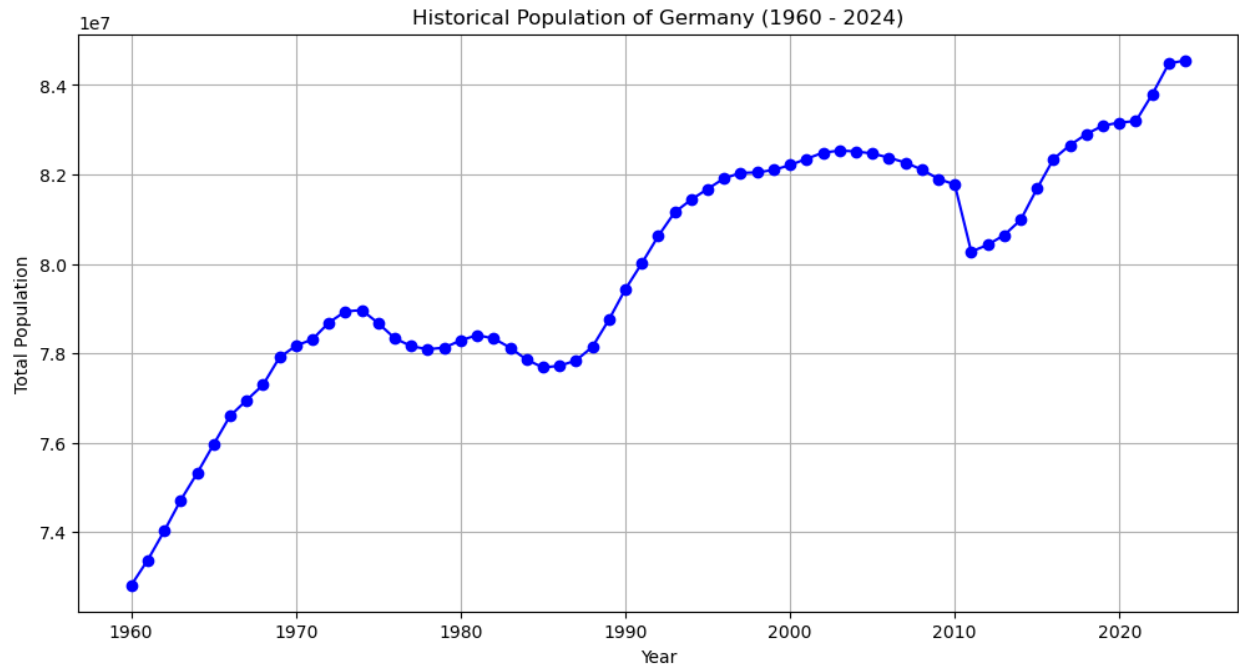
4. **Medical Graduates:** The number of medical graduates has fluctuated over the years, with a recent increase to 10,320 in 2021.

**Number of Medical Graduates Over Time**
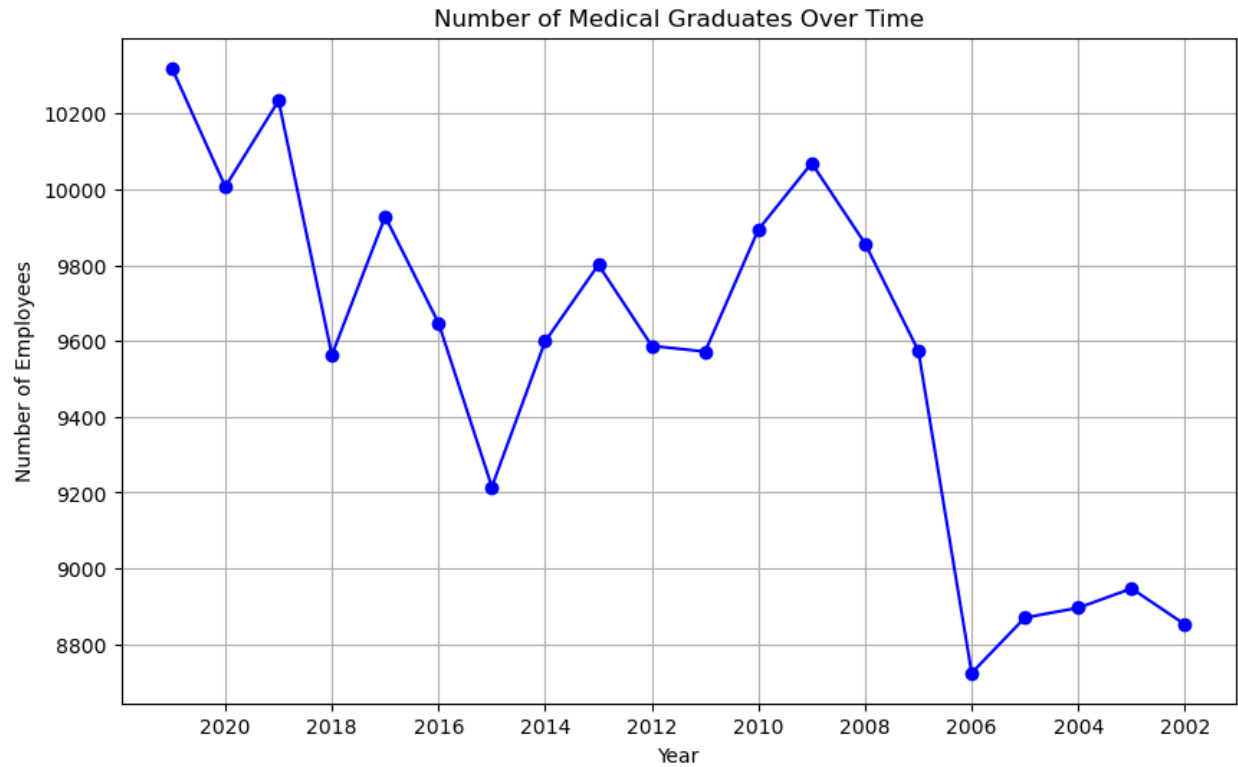
5.0 Results and Graph:

- **Projected Number of Doctors**: The supply of practicing doctors is projected to increase, but not at a rate sufficient to meet the growing demand considering a lower number of new medical graduates entering the workforce.

Projected Doctor Supply, Demand, and Deficit in Germany
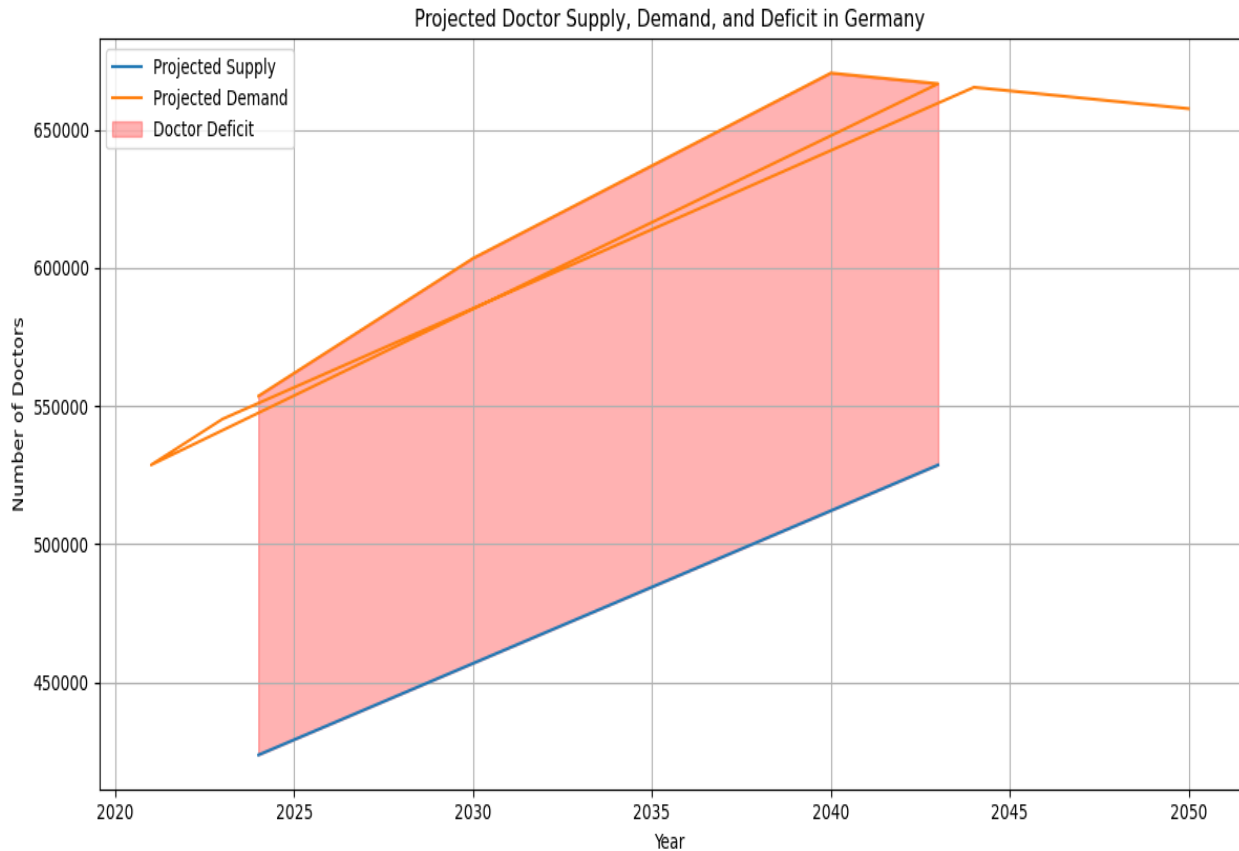
- **Projected Demand for Doctors**: The demand for doctors is expected to increase due to the aging population, particularly the increase in the population aged 67 and above.

- **Population Aging:** The aging population is a major factor driving the increased demand for doctors, particularly those aged 67 and above projected to increase in the next 20 years.

Population Projection by Age Group (2021-2070)
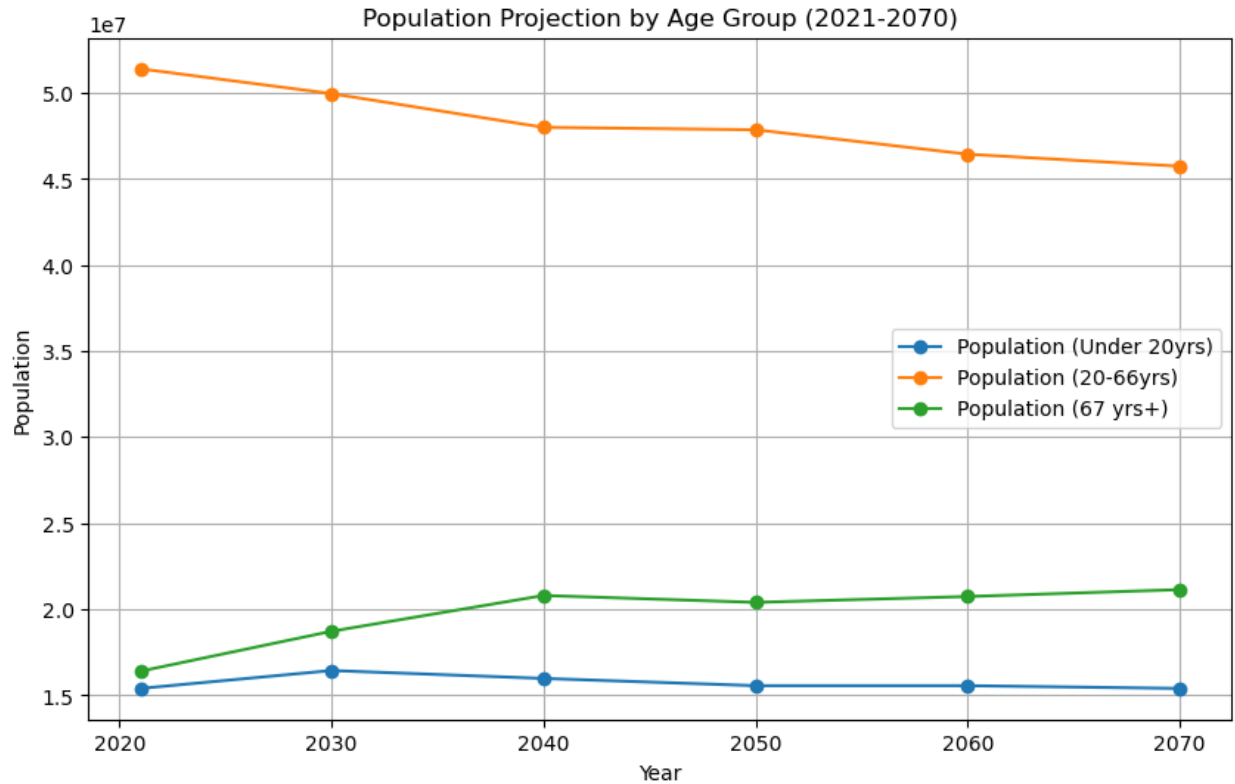
- **Doctor Deficit Projection:** The analysis shows a growing deficit in the number of doctors, with the demand outpacing the supply. There is a significant projected deficit of doctors in Germany over the next 20 years, with the deficit increasing each year. This deficit is visualized in the graph, where the area between the projected supply and demand lines represents the doctor deficit.

Projected Doctor Deficit in Germany (2024-2043)
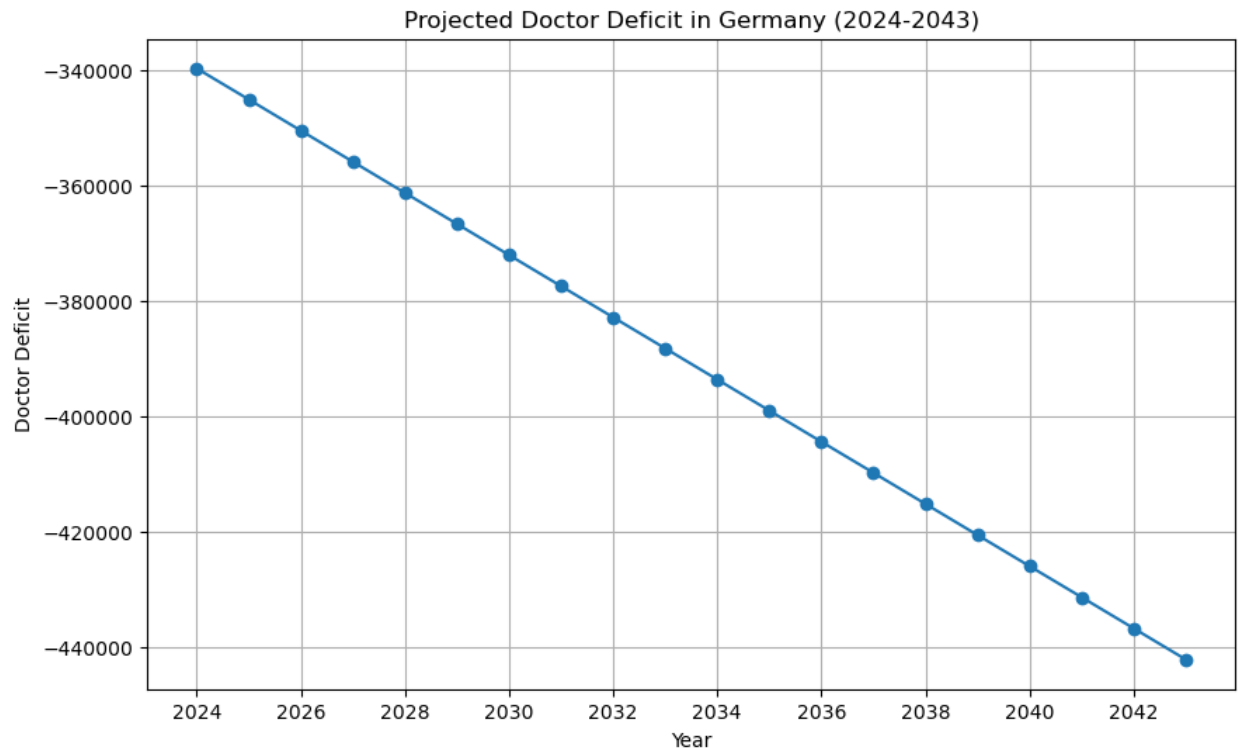
This analysis highlights the need for strategic planning to address the anticipated shortage of doctors in the coming years.

6.0 Implications for Africa:

The doctor deficit in Germany may have implications for Africa, particularly in terms of brain drain and healthcare disparities:

Brain Drain: The doctor deficit in Germany could lead to increased recruitment of doctors from African countries, exacerbating the existing brain drain of healthcare professionals from the continent. This could further strain healthcare systems in Africa.

Healthcare Disparities: The projected doctor deficit in Germany highlights the contrasting situation in many African countries, where there is already a critical shortage of healthcare workers. This disparity in access to healthcare between developed and developing nations may widen.

Collaboration and Investment: Addressing the global imbalance in healthcare worker distribution will require international collaboration and investment in healthcare infrastructure and education in Africa.

In conclusion, the data suggests that Germany is facing a potential doctor deficit in the upcoming years, and this could have significant implications for Africa in terms of brain

drain and healthcare disparities. To fully analyze the impact on Africa, further data on healthcare worker migration patterns, healthcare infrastructure, and country-specific demographics in Africa would be necessary.

7.0 References

1. Vanella, P., Rodriguez Gonzalez, M. and Wilke, C. B. (2022) "Population Ageing and Future Demand for Old-Age and Disability Pensions in Germany – A Probabilistic Approach", Comparative Population Studies. Wiesbaden, Germany, 47. Available at: https://doi.org/10.12765/CPoS-2022-05 (Accessed 21 August 2024)

2. Statista (2024). Number of doctors in Germany from 1990 to 2023. Available at: https://www.statista.com/statistics/582114/doctors-in-germany-number/ (Accessed 23 August 2024)

3. World Bank Group (2024) Data | Population, total. Available at: https://data.worldbank.org/indicator/SP.POP.TOTL (Accessed 21 August 2024)

4. Worldometer (2024). Countries in the world by population (2024). Available at: https://www.worldometers.info/world-population/population-by-country/ (Accessed 24 August 2024)