

WORLDWIDE COLORECTAL CANCER INCIDENCE RATES

Comparative Analysis of Gender Differences in Global Colorectal Cancer Rates (2020)

Dr Ali Ammar

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Prepared with the support of Julius AI.

EXECUTIVE SUMMARY

This report examines the relationship between colorectal cancer incidence rates in men and women across 193 countries, with a focus on 2020 data. The analysis reveals a strong positive correlation ($r = 0.864$) between male and female cancer rates, indicating shared risk factors across populations. The gender gap peaked in 2019 at 7.94 cases per 100,000, with men consistently showing higher rates than women globally.

1. DATA OVERVIEW

The analysis uses two datasets containing colorectal cancer incidence rates per 100,000 population from 1990 to 2021:

- **Men's Dataset:** 193 countries, 32 years of data
- **Women's Dataset:** 193 countries, 32 years of data

Sample countries and their 2020 rates:

- Afghanistan: Men = 8.8, Women = 18.51
 - Argentina: Men = 39.14, Women = 24.54
 - Andorra: Men = 67.97, Women = 21.66
 - Albania: Men = 13.7, Women = 9.3
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2. GEOGRAPHIC DISTRIBUTION (2020)

2.1 Men's Cancer Rates Worldwide

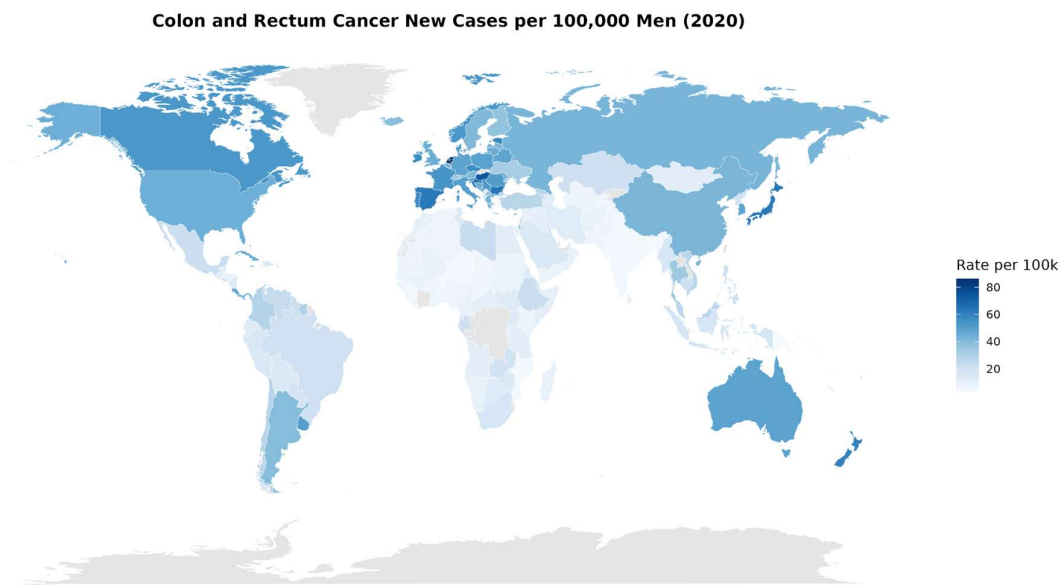
The global distribution shows higher rates in developed nations, particularly:

- Europe (especially Western and Southern Europe)

- North America
- Parts of East Asia and Oceania

Lower rates are observed in:

- Sub-Saharan Africa
- South and Southeast Asia



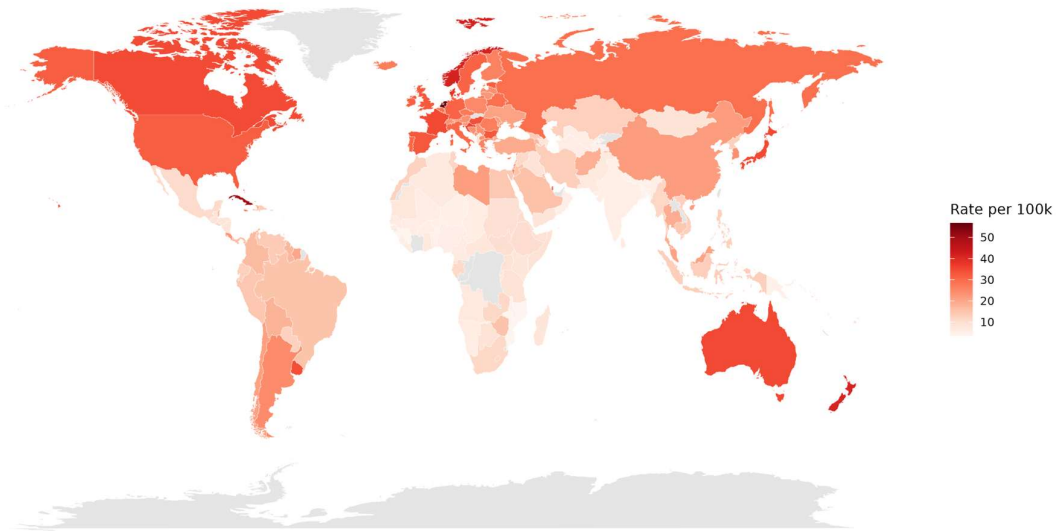
2.2 Women's Cancer Rates Worldwide

Similar geographic patterns emerge for women, though with generally lower absolute rates:

- Developed nations show elevated rates
- Strong regional clustering suggests environmental and lifestyle factors

- Some notable exceptions exist (e.g., the UAE shows high rates in women)

Colon and Rectum Cancer New Cases per 100,000 Women (2020)



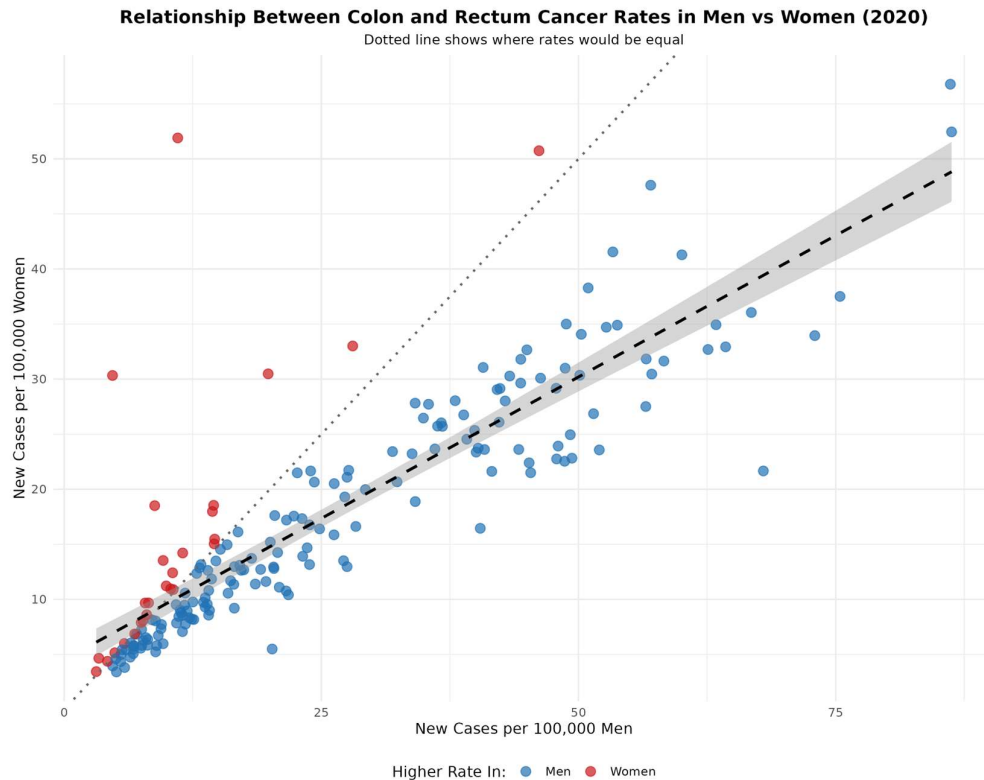
3. RELATIONSHIP ANALYSIS

3.1 Correlation Between Men and Women

Correlation Coefficient: 0.864

This strong positive correlation indicates that:

- Countries with high rates in men typically have high rates in women
- Shared risk factors (diet, lifestyle, environmental exposures) likely drive incidence
- Public health interventions can benefit both genders simultaneously



3.2 Gender Differences

Key observations from the scatterplot:

- Most countries fall below the equality line (men have higher rates)
- Some countries show women with higher rates (notable exceptions)
- The relationship is linear across the full range of incidence rates

4. TEMPORAL TRENDS (1990-2021)

4.1 Gender Gap Evolution

Peak Gender Gap: 2019 (7.94 cases per 100,000)

The gender gap has been steadily widening:

- 1990: 4.66 cases per 100,000
- 2019: 7.94 cases per 100,000 (PEAK)
- 2021: Slight decline observed

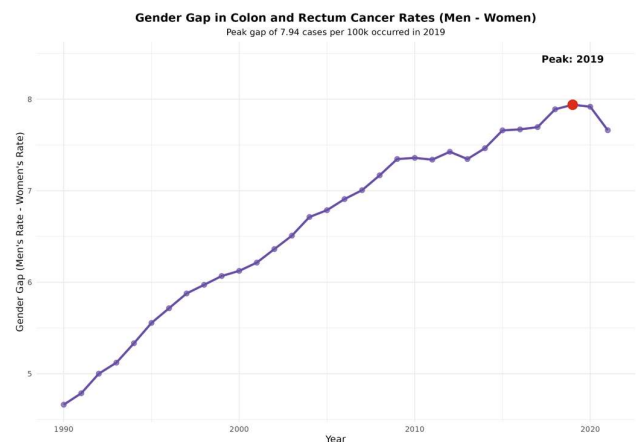
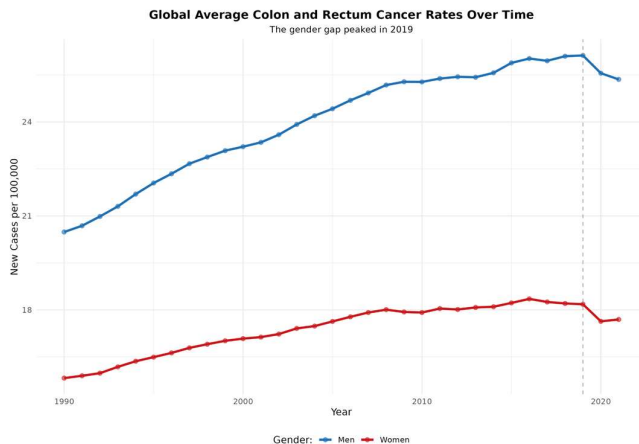
4.2 Global Average Trends

Men's Rates:

- 1990: 20.49 per 100,000
- 2019: 26.12 per 100,000 (peak)
- Steady increase over 30 years

Women's Rates:

- 1990: 15.82 per 100,000
- 2019: 18.18 per 100,000
- More gradual increase compared to men



5. KEY FINDINGS

1. **Strong Geographic Correlation:** Men's and women's rates are highly correlated across countries ($r = 0.864$), suggesting shared environmental and lifestyle risk factors.
2. **Persistent Gender Gap:** Men consistently show higher rates than women globally, with the gap widening from 1990 to 2019.
3. **Developed vs. Developing Nations:** Higher rates are concentrated in developed regions, likely reflecting dietary patterns, screening practices, and aging populations.
4. **Recent Trends:** The slight decline in 2020-2021 may reflect the COVID-19 pandemic's impacts on cancer screening and diagnosis.
5. **Gender-Specific Factors:** While correlation is strong, variation exists, indicating some gender-specific risk factors or protective factors.

6. IMPLICATIONS FOR PUBLIC HEALTH

6.1 Intervention Strategies

- **Universal Approaches:** Given the strong correlation, population-wide interventions targeting diet, physical activity, and screening can benefit both genders.
- **Gender-Specific Programs:** The persistent gap suggests a need for targeted research into why men have higher rates and potential gender-specific prevention strategies.

6.2 Screening Recommendations

- Countries with high rates in one gender should ensure adequate screening for both
 - Resource allocation should consider the strong geographic clustering
 - Pandemic recovery efforts should prioritize restoring screening programs
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7. LIMITATIONS

- Data quality varies by country and healthcare system capacity
 - 2020-2021 data may be affected by the COVID-19 pandemic disruptions
 - Incidence rates reflect both true disease burden and screening intensity
 - Country-level data masks within-country regional variations
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8. CONCLUSIONS

Colorectal cancer shows strong geographic and gender patterns globally. The high correlation between men's and women's rates (0.864) indicates that shared risk factors dominate, though the persistent and widening gender gap (peaking at 7.94 cases per 100,000 in 2019) suggests important gender-specific factors warrant further investigation. Public health strategies should address both universal risk factors and gender-specific vulnerabilities to effectively reduce the global burden of colorectal cancer.

9. Interaction with AI tools for data analysis (my personal experience)

I did interact with both AI tools indicated in the course today. While the results were very similar, the experience wasn't the same.

Cursor requires prior knowledge or at least exposure to the tool and somehow to the coding process. The most laborious part of the experience was the setup and the preparation of the

tool before starting any analysis. But once launched, the result is really worth it, especially since there's a margin of freedom in the format of output (png, jpeg, pdf, or just text, etc), but my final opinion Cursor is not that user-friendly, especially for beginners.

Julius AI requires prior exposure to the currently used AI tools like ChatGPT, and of course, a normal understanding of data, like any similar tool. The setup was very easy and straightforward, the queries were pretty much intuitive, and the changes were, 95% of the time, satisfactory. The images were generated separately, as well as the full report. I think that choosing Claude as the LLM model is the best option, especially due to its writing ability slightly superior to other models. Julius AI is user-friendly, and for beginners like me, I would highly recommend it.