60_Finland

October 31, 2025

1 How has the adolescent fertility rate evolved relative to female life expectancy at birth in Finland between 1960 and 2020?

1.1 Abstract

Using World Bank World Development Indicators (WDI) data, this study examines how the adolescent fertility rate has evolved relative to female life expectancy at birth in Finland between 1960 and 2020. These indicators provide insight into the country's progress in reproductive health, demographic transitions, and overall human development. Over the period, female life expectancy increased significantly, rising by approximately 13 years, while the adolescent fertility rate decreased sharply from around 28 births per 1,000 women ages 15–19 to about 4 per 1,000 by 2020. Notably, the adolescent fertility rate initially increased sharply between 1960 and 1967 by roughly 10%, before entering a period of consistent and substantial decline. This early fluctuation followed by sustained reduction illustrates both demographic shifts and the impact of evolving social, educational, and healthcare policies on adolescent reproductive behavior. Together, the trends highlight Finland's significant improvements in female health outcomes and declining early fertility, reflecting broader transformations in population health, education, and social norms.

1.2 1. Question

How has the adolescent fertility rate evolved relative to female life expectancy at birth in Finland between 1960 and 2020?

- **Adolescent fertility proxy**: Adolescent fertility rate (births per 1,000 women ages 15–19)
- **Female life expectancy proxy**: Life expectancy at birth, female (years)

1.3 2. Data

- **Source**: World Bank World Development Indicators (WDI)
- **Indicators**:
  - Adolescent fertility rate (births per 1,000 women ages 15–19)
  - Life expectancy at birth, female (years)
- **Coverage**: Finland, 1960–2020
- **Notes**: National-level data only

1.4 3. Method

1. Filtered the dataset for Finland and selected the two indicators.
2. **Extracted relevant columns**: Year, Indicator Name, and Value.

3. Pivoted the dataset to create a chronological comparison of adolescent fertility and female life expectancy.
4. Produced a dual-line time series plot to visualize trends, magnitude, and relative convergence over time.

(Analysis is descriptive; no causal inference applied.)

1.5 4. Results

- **Adolescent fertility rate**: Initially rose sharply from 1960 to 1967 by roughly 10%, then declined consistently and significantly from the late 1960s to 2020, reaching about 4 per 1,000 women.
- **Female life expectancy**: Increased steadily over the period by approximately 13 years, reflecting improvements in health care, nutrition, and overall living conditions.
- **Comparison**: While life expectancy steadily rose, adolescent fertility initially increased briefly but then decreased at a faster pace, illustrating demographic transitions and the declining prevalence of early childbearing.

(Figure 1. Finland: Adolescent Fertility Rate vs. Female Life Expectancy at Birth, 1960–2020)

(Table 1. Pivoted dataset summary)

1.6 5. Interpretation

- The sustained increase in female life expectancy reflects long-term improvements in health care, maternal services, and socioeconomic conditions.
- The sharp initial rise in adolescent fertility may reflect post-war demographic trends and early population pressures, while the subsequent consistent decline highlights the impact of education, access to contraception, and shifting social norms regarding early motherhood.
- The inverse relationship between adolescent fertility and female life expectancy underscores the interplay between reproductive health and broader development outcomes.
- These trends indicate Finland's successful policies and social transitions that reduced early childbearing while improving overall female health and longevity.

1.7 6. Limitations

- Data are national averages and may mask regional or socioeconomic variation within Finland.
- The analysis is descriptive and does not attribute changes to specific policies, cultural shifts, or economic factors.
- Early years may contain less precise data due to historical reporting limitations.

1.8 7. Next Steps / Extensions

- Investigate how education, access to contraception, and youth-focused health policies contributed to the decline in adolescent fertility.
- Examine regional differences within Finland to identify areas of slower progress or persistent early childbearing.
- Compare Finland's demographic trajectory with other Nordic countries to contextualize its experience in broader regional trends.

- Explore correlations between declining adolescent fertility and female life expectancy with indicators such as educational attainment, labor force participation, and maternal health outcomes.

[1]:
```
# How has the adolescent fertility rate evolved relative to female life␣
 ↪expectancy at birth in Finland between 1960 and 2020?

import pandas as pd
import matplotlib.pyplot as plt
import os

# Folders
data_raw_folder = "data_raw/"
data_clean_folder = "data_clean/"
figures_folder = "figures/"

# Load CSV
filename = "social-development_fin_filtered.csv"  # Filtered dataset with only␣
 ↪relevant rows
df = pd.read_csv(os.path.join(data_raw_folder, filename))

# Keep only needed columns
df = df[["Year", "Indicator Name", "Value"]]

# Convert Year and Value to numeric, drop invalid rows
df["Year"] = pd.to_numeric(df["Year"], errors="coerce")
df["Value"] = pd.to_numeric(df["Value"], errors="coerce")
df = df.dropna(subset=["Year", "Value"])

# Pivot indicators into separate columns
df_pivot = df.pivot(index="Year", columns="Indicator Name", values="Value").
 ↪reset_index()
df_pivot = df_pivot.sort_values("Year")

print("Pivoted Finland dataset:")
display(df_pivot)

# Interpolate missing values for smooth plotting (optional)
df_plot = df_pivot.interpolate(method='linear')

# Plot the indicators
plt.figure(figsize=(10,6))
plt.plot(df_plot["Year"], df_plot["Adolescent fertility rate (births per 1,000␣
 ↪women ages 15-19)"],
         marker='o', linestyle='-', label="Adolescent fertility rate (births␣
 ↪per 1,000 women ages 15-19)")
plt.plot(df_plot["Year"], df_plot["Life expectancy at birth, female (years)"],
```

```
        marker='o', linestyle='-', label="Life expectancy at birth, female␣
 ↪(years)")

plt.title("Finland: Adolescent fertility rate vs Female life expectancy at␣
 ↪birth (1960-2020)")
plt.xlabel("Year")
plt.ylabel("Number")
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.savefig(os.path.join(figures_folder,␣
 ↪"finland_adolescent_fertility_rate_vs_female_life_expectancy_at_birth.png"))
plt.show()

# Save cleaned CSV
df_pivot.to_csv(os.path.join(data_clean_folder,␣
 ↪"finland_adolescent_fertility_rate_vs_female_life_expectancy_at_birth"),␣
 ↪index=False)
```

Pivoted Finland dataset:

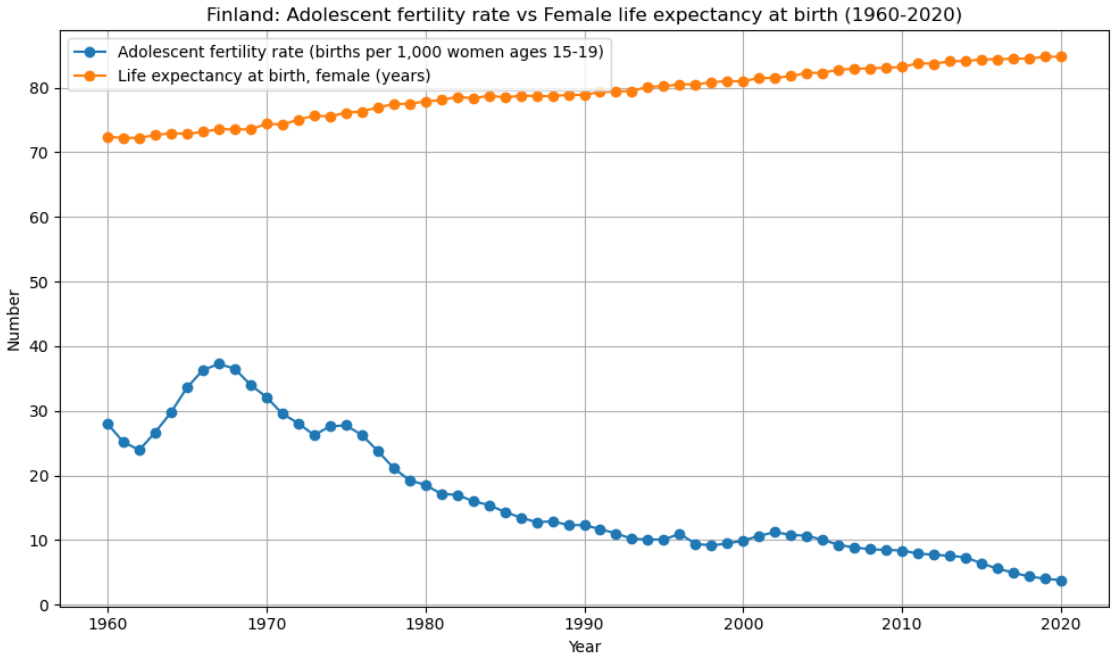
Indicator Name	Year	\
0	1960	
1	1961	
2	1962	
3	1963	
4	1964	
..	…	
56	2016	
57	2017	
58	2018	
59	2019	
60	2020	

Indicator Name	Adolescent fertility rate (births per 1,000 women ages 15-19)	\
0	28.006	
1	25.188	
2	23.944	
3	26.681	
4	29.768	
..	…	
56	5.598	
57	4.957	
58	4.372	
59	4.048	
60	3.799	

Indicator Name	Life expectancy at birth, female (years)

```
0                                                72.40
1                                                72.24
2                                                72.24
3                                                72.68
4                                                72.96
..                                                 ...
56                                               84.40
57                                               84.50
58                                               84.50
59                                               84.80
60                                               84.80

[61 rows x 3 columns]
```



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