18_Belize

October 5, 2025

1 How has the relationship between prenatal care coverage and skilled birth attendance evolved in Belize between 1998 and 2016?

1.1 Abstract

Using World Bank World Development Indicators (WDI), this study examines the evolution of maternal health service coverage in Belize between 1998 and 2016, focusing on prenatal care and skilled birth attendance. Over this eighteen-year period, both indicators rose overall, though the trajectory was not linear. After an initial increase up to around 2000, both measures experienced a moderate decline between 2000 and 2005 before resuming steady growth through 2016. By the end of the period, prenatal care and skilled attendance rates had nearly converged, suggesting an increasingly integrated maternal health system. These findings highlight Belize's gradual progress toward universal maternal care and underscore the link between early health interventions and safe delivery outcomes.

1.2 1. Question

How has the relationship between prenatal care coverage and skilled birth attendance evolved in Belize between 1998 and 2016?

- **Prenatal care proxy**: Pregnant women receiving prenatal care (%)
- **Skilled birth proxy**: Births attended by skilled health staff (% of total)

1.3 2. Data

- **Source**: World Bank World Development Indicators (WDI)
- **Indicators**:
  - Pregnant women receiving prenatal care (%)
  - Births attended by skilled health staff (% of total)
- **Coverage**: Belize, 1998–2016
- **Notes**: National-level data only

1.4 3. Method

1. Filtered dataset for Belize.
2. **Selected relevant columns**: Year, Indicator Name, Value.
3. Pivoted prenatal care and skilled birth attendance indicators into separate columns and sorted by year.

4. Produced a dual-axis line graph comparing trends in prenatal care coverage and skilled attendance at birth.

(Analysis is descriptive; no causal inference applied.)

1.5 4. Results

- **Prenatal care (% of pregnant women)**: Increased gradually from 1998 to around 2000, followed by a moderate decline through 2005, then a sustained rise through 2016.
- **Skilled birth attendance (% of total births)**: Followed a nearly identical pattern, with both indicators converging toward similar high levels by 2016.
- **Comparison**: The close alignment of trends suggests that improvements in early maternal care were increasingly matched by skilled support during delivery, reflecting better continuity in health service provision.

(Figure 1. Prenatal Care vs Skilled Birth Attendance in Belize, 1998–2016)

(Table 1. Pivoted dataset)

1.6 5. Interpretation

- Belize's trajectory reflects meaningful progress in maternal health coverage and system coordination.
- The temporary decline between 2000 and 2005 may correspond to health system transitions or data collection gaps, but the subsequent recovery suggests successful re-investment and institutional strengthening.
- The convergence of prenatal and skilled attendance rates indicates a more integrated approach to maternal health, where early care more consistently leads to safe, supervised deliveries.

1.7 6. Limitations

- Analysis relies on national-level data and cannot capture subnational disparities or rural–urban divides.
- Broader determinants such as income, education, and health infrastructure are not included.
- Descriptive analysis limits causal interpretation of health policy effects.

1.8 7. Next Steps / Extensions

- Examine regional differences in prenatal and delivery care outcomes to identify internal equity gaps.
- Link maternal care coverage with maternal mortality and neonatal health indicators.
- Compare Belize's trajectory with other Central American countries to contextualize policy effectiveness.
- Assess the role of international aid, training programs, and community health initiatives in driving maternal health improvements.

[1]:
```
# How has the relationship between prenatal care coverage and skilled birth␣
↪attendance evolved in Belize between 1998 and 2016?

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 = "gender_blz_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 Belize dataset:")
display(df_pivot)

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

# Plot the two indicators
plt.figure(figsize=(10,6))
plt.plot(df_plot["Year"], df_plot["Pregnant women receiving prenatal care (%)"],
         marker='o', linestyle='-', label="Pregnant women receiving prenatal␣
 ↪care (%)")
plt.plot(df_plot["Year"], df_plot["Births attended by skilled health staff (%␣
 ↪of total)"],
         marker='o', linestyle='-', label="Births attended by skilled health␣
 ↪staff (% of total)")

plt.title("Belize: Pregnant women receiving prenatal care (%) vs Births␣
 ↪attended by skilled health staff (% of total) (1998-2016)")
plt.xlabel("Year")
plt.ylabel("Percentage")
plt.legend()
plt.grid(True)
```

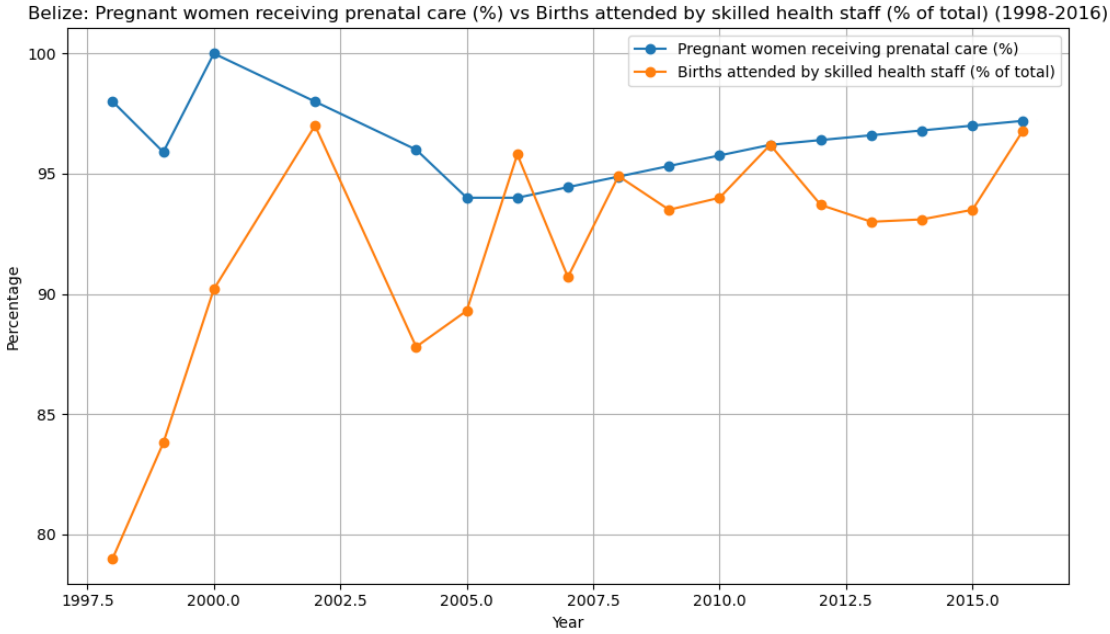
```
plt.tight_layout()
plt.savefig(os.path.join(figures_folder,␣
 ↪"belize_pregnant_women_receiving_prenatal_care_vs_births_attended_by_skilled_health_staff.
 ↪png"))
plt.show()

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

Pivoted Belize dataset:

Indicator Name	Year	Births attended by skilled health staff (% of total)
0	1998	79.0
1	1999	83.8
2	2000	90.2
3	2002	97.0
4	2004	87.8
5	2005	89.3
6	2006	95.8
7	2007	90.7
8	2008	94.9
9	2009	93.5
10	2010	94.0
11	2011	96.2
12	2012	93.7
13	2013	93.0
14	2014	93.1
15	2015	93.5
16	2016	96.8

Indicator Name	Pregnant women receiving prenatal care (%)
0	98.0
1	95.9
2	100.0
3	98.0
4	NaN
5	94.0
6	94.0
7	NaN
8	NaN
9	NaN
10	NaN
11	96.2
12	NaN
13	NaN
14	NaN

15	NaN
16	97.2


Belize: Pregnant women receiving prenatal care (%) vs Births attended by skilled health staff (% of total) (1998-2016)
Pregnant women receiving prenatal care (%)
Births attended by skilled health staff (% of total)
Percentage
Year
100
95
90
85
80
1997.5
2000.0
2002.5
2005.0
2007.5
2010.0
2012.5
2015.0