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A New Trend in Human Reproduction - Women in the USA

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Objectives

- Explain how the fertility of a woman is calculated.
- Calculate fertility rates for women of ages 20-29, 30-39, and 40-49.
- Compare fertility rates of women in 2000 to the rates of women in 2016.
- Identify any trends seen from data comparison.
- Show detailed analysis on some probable causes of data results.
- Identify other possible factors to look for in future research.

Introduction

The fertility of a specific woman is affect by numerous factors such as;

- Diet
- Age
- Weight
- Reproductive health
- Use of drugs and alcohol
- Exercise habits.

The effects of age on fertility is significant as the older a woman gets, the lower her fertility rate gets. Women are born with a set amount of egg cells in their body. This number deteriorates with each passing month and menstrual cycle a women progresses through during her entire life.

Methods

The total fertility rate (TFR) of a women is the average number of live-births she can successfully have throughout her child-bearing years. This number is altered based on a woman's geographical location, reproductive health, and many personal factors. A TFR is calculated by summing up the age-specific fertility rates (ASFR) and taking their average.

ASFR equation

$$\frac{\text{Number of live births to women of a specific age}}{\text{Women in the region and of specified age}} \cdot 1000.$$

The first important piece of information to look at is the population of women in the US, seen in Figure 1, where we are looking at the years 2000 and 2016.

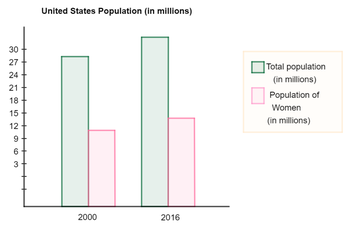


Figure 1: US Population Data

To calculate the ASFR, we must now break up this data into the age ranges we want to specifically look at. For this research, women between the ages of 20-29, 30-39, and 40-49 were broken up into the respective three groupings. There were 19.0 million woman 20-29, 21.6 million were 30-39, and 21.5 million were 40-49 in 2000. In 2016, there were 22.2 million woman of ages 20-29, 21.5 million were 30-39, and 20.5 million were 40-49 years old.

The next piece of important data to note, is the total number of births for each group during the years stated. In 2000, 43,231,000 babies were born to woman of ages 20-29, 40,656,000 babies to 30-39 year-olds, and 11,478,000 babies born to 40-49 year-olds. In 2016, 13,181,000 babies born to the 20-29 y-o, 36,495,000 babies born to 30-39 y-o, and 44,788,000 babies born to 40-49 y-o. From these numbers the ASFRs were calculated, and an interesting trend was surprisingly discovered.

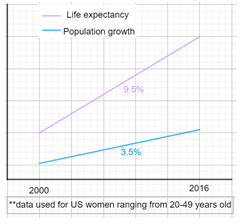
Figure 2: US ASFRs by Year and Age

Results

In Figure 2, a trend is seen that women in 2016 are choosing to have children at older ages compared to the prior year of 2000. These results do not disprove the fact that women are less fertile as they age. Instead, the results tell us that there are many more factors, aside from age, that affect a woman's fertility. These other factors could be anything ranging from, but not limited to; societal pressures, medical advances, improvements of contraceptives, more wide-spread use of contraception, and freedoms of personal choice.

Confounding Factors

The following figures exemplify a few of the possible societal variables that could be causing women to reproduce later in their lives.



US Population Growth and Change in Life Expectancy

The graph above shows the total population growth of women compared to the rise in a woman's life expectancy from 2000 to 2016.

Figure 3 shows that from 2000 to 2016 the value of the dollar dropped by 39%, the cost of raising a child from birth to 18 years-old rose 3%, and the average income of a household rose only 0.6%.

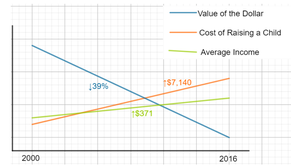


Figure 3: Average Child-Care Costs, Incomes, and Inflation Rate

Future Work To Be Done

Further research needs to be done exploring the many other confounding variables, such as the few others listed in the "Results" section. This will hopefully help to one day come up with an equation approximating the truest fertility rate that can be mathematically calculated.

Glossary

Age-Specific Fertility Rate (ASFR) - the number of live births per 1000 women in a specific age group. Usually in a particular geographical area for a certain time period.
Conceive - to become pregnant.
Egg Cell - female reproductive cell.
Fertility - the ability to conceive a child.
Menstrual Cycle - the process of ovulation and menstruation.
Menstruation - the process in a woman of discharging blood and other materials from the lining of the uterus at intervals of about one lunar month from puberty until menopause, except during pregnancy.

References

- Pic: `https://www.vectorstock.com/royalty-free-vector/silhouette-of-pregnant-woman-with-fetus-in-womb-vector-16315142`
- Web: `https://www.statista.com/statistics/200838/median-household-income-in-the-united-states/`