

Marriage and Birth Rates

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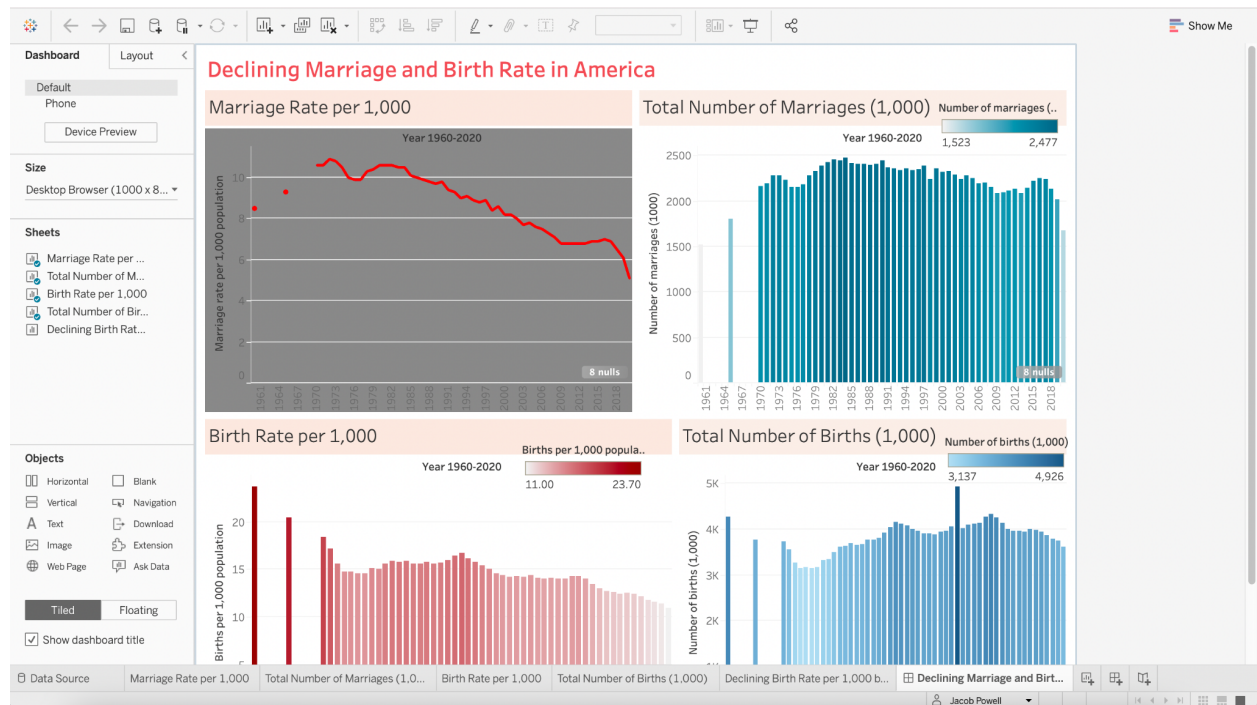


Figure 1: Screenshot of final visualization (seen more clearly in the video and public link)

Introduction

The goal of the visualization was to compare marriage and birth rates. There was a steady decline in marriages since 1980, but the total number of births stayed consistent. This visualization could be used to further represent research around the topic. The data sets that were examined and graphed did not have information about causation but instead are useful insights into the trends of society. These charts are meant to be easy to understand and interpret. The goal was to spark interest in the reasoning behind these changes by bringing the trends into the public eye.

Questions

The problem which our team was trying to solve, was to see whether we could decipher why the marriage rate decreased from 1980 to recent times such as 2019. In our proposal, we stated that we intended to visualize the data with Tableau where we would emphasize when the marriage rate would drastically decline and probable causes. While we weren't able to find the causation of the changes in data, we were able to highlight time periods and make guesses as to what could have occurred such as changes in society. Another aspect of analyzing the data was the birthdates which were alongside our data. While observing our data, it was noticeable that compared to the marriage rate, the total number of births had been very consistent.

Table 79. Live Births, Deaths, Marriages, and Divorces: 1960 to 2020

[4,258 represents 4,258,000. Beginning 1970, excludes births to and deaths of nonresidents of the United States. See Appendix III]

Year	Number (1,000)					Rate per 1,000 population				
	Births	Deaths		Mar-riages ²	Divorces ³	Births	Deaths		Mar-riages ²	Divorces ³
		Total	Infant ¹				Total	Infant ¹		
1960.....	4,258	1,712	111	1,523	393	23.7	9.5	26.0	8.5	2.2
1965.....	3,760	1,628	93	1,800	479	19.4	9.4	24.7	9.3	2.5
1970.....	3,731	1,921	75	2,159	708	18.4	9.5	20.0	10.6	3.5
1971.....	3,556	1,928	68	2,190	773	17.2	9.3	19.1	10.6	3.7
1972.....	3,258	1,964	60	2,282	845	15.6	9.4	18.5	10.9	4.0
1973.....	3,137	1,973	56	2,284	915	14.8	9.3	17.7	10.8	4.3
1974.....	3,160	1,934	53	2,230	977	14.8	9.1	16.7	10.5	4.6
1975.....	3,144	1,893	51	2,153	1,036	14.6	8.8	16.1	10.0	4.8
1976.....	3,188	1,909	48	2,155	1,083	14.6	8.8	15.2	9.9	5.0
1977.....	3,327	1,900	47	2,178	1,091	15.1	8.6	14.1	9.9	5.0
1978.....	3,333	1,928	46	2,282	1,130	15.0	8.7	13.8	10.3	5.1
1979.....	3,494	1,914	46	2,331	1,181	15.6	8.5	13.1	10.4	5.3
1980.....	3,612	1,990	46	2,390	1,189	15.9	8.8	12.6	10.6	5.2
1981.....	3,629	1,978	43	2,422	1,213	15.8	8.6	11.9	10.6	5.3
1982.....	3,681	1,975	42	2,456	1,170	15.7	8.6	11.5	10.6	5.1
1983.....	3,639	2,019	41	2,446	1,158	15.6	8.6	11.2	10.5	5.0
1984.....	3,669	2,039	40	2,477	1,169	15.6	8.6	10.8	10.5	5.0
1985.....	3,761	2,086	40	2,413	1,190	15.8	8.8	10.6	10.1	5.0
1986.....	3,757	2,105	39	2,407	1,178	15.6	8.8	10.4	10.0	4.9
1987.....	3,809	2,123	38	2,403	1,185	15.7	8.8	10.1	9.9	4.8
1988.....	3,910	2,168	39	2,396	1,167	16.0	8.9	10.0	9.8	4.8
1989.....	4,041	2,150	40	2,403	1,157	16.4	8.7	9.8	9.7	4.7
1990.....	4,158	2,148	38	2,443	1,182	16.7	8.6	9.2	9.8	4.7
1991.....	4,111	2,170	37	2,371	1,187	16.2	8.6	8.9	9.4	4.7
1992.....	4,065	2,176	35	2,362	1,215	15.8	8.5	8.5	9.3	4.8
1993.....	4,000	2,269	33	2,334	1,187	15.4	8.7	8.4	9.0	4.6
1994.....	3,953	2,279	31	2,362	1,191	15.0	8.7	8.0	9.1	4.6
1995.....	3,900	2,312	30	2,336	1,169	14.6	8.7	7.6	8.9	4.4
1996.....	3,891	2,315	28	2,344	1,150	14.4	8.6	7.3	8.8	4.3
1997.....	3,881	2,314	28	2,384	1,163	14.2	8.5	7.2	8.9	4.3
1998.....	3,942	2,337	28	2,244	1,135	14.3	8.5	7.2	8.4	4.2
1999.....	3,959	2,391	28	2,358	(NA)	14.2	8.6	7.1	8.6	4.1
2000.....	4,059	2,403	28	2,315	⁶ 944	14.4	8.5	6.9	8.2	⁶ 4.0
2001.....	4,026	2,416	28	2,326	⁶ 940	14.1	8.5	6.9	8.2	⁶ 4.0
2002.....	4,022	2,443	28	2,290	⁶ 955	14.0	8.5	7.0	8.0	⁶ 3.9
2003.....	4,090	2,448	28	2,245	⁷ 927	14.1	8.4	6.9	7.7	⁷ 3.8
2004.....	4,112	2,398	28	2,279	⁸ 879	14.0	8.2	6.8	7.8	⁸ 3.7
2005.....	4,138	2,448	28	2,249	⁸ 847	14.0	8.3	6.9	7.6	⁸ 3.6
2006.....	4,286	2,426	29	2,193	⁸ 872	14.3	8.1	6.7	7.5	⁸ 3.7
2007.....	4,316	2,424	29	2,197	⁸ 856	14.3	8.0	6.8	7.3	⁸ 3.6
2008.....	4,248	2,472	28	2,157	⁸ 844	14.0	8.1	6.6	7.1	⁸ 3.5
2009.....	4,131	2,437	26	2,080	⁸ 840	13.5	7.9	6.4	6.8	⁸ 3.5
2010.....	3,999	2,468	25	2,096	⁸ 872	13.0	8.0	6.2	6.8	⁸ 3.6
2011.....	3,954	2,515	24	2,118	⁸ 877	12.7	8.1	6.1	6.8	⁸ 3.6
2012.....	3,953	2,543	24	2,131	⁸ 851	12.6	8.1	6.0	6.8	⁸ 3.4
2013.....	3,932	2,597	23	2,081	¹² 832	12.4	8.2	6.0	6.8	¹² 3.3
2014.....	3,988	2,626	23	2,140	¹² 814	12.5	8.2	5.8	6.9	¹² 3.2
2015.....	3,978	2,713	23	2,222	¹² 801	12.4	8.4	5.9	6.9	¹² 3.1
2016.....	3,946	2,744	23	2,251	¹³ 776	12.2	8.5	5.9	7.0	¹³ 3.0
2017.....	3,856	2,814	22	2,236	¹⁴ 787	11.8	8.6	5.8	6.9	¹⁴ 2.9
2018.....	3,792	2,839	21	2,133	¹⁴ 782	11.6	8.7	5.7	6.5	¹⁴ 2.9
2019.....	3,748	2,855	21	2,016	¹⁴ 747	11.4	8.7	5.6	6.1	¹⁴ 2.7
2020.....	3,614	3,384	20	1,677	¹⁴ 631	11.0	10.3	5.4	5.1	¹⁴ 2.3

NA Not available. ¹ Infant mortality rate; infants under 1 year, excluding fetal deaths. ² Marriages and marriage rates are by place of occurrence. Beginning 1991, data are provisional. Includes estimates for some States through 1965 and for 1976-1977, and marriage licenses for some states for all years except 1973 and 1975. Beginning 1978, includes nonlicensed marriages in California. ³ Divorces and divorce rates are by place of occurrence. Includes reported annulments and some estimated state figures for all years. Beginning 1991, data are provisional. ⁴ Excludes data for California, Colorado, Indiana, and Louisiana. ⁵ Excludes data for California, Indiana, Louisiana, and Oklahoma. ⁶ Excludes data for California, Indiana, New York City, and Oklahoma. ⁷ Excludes data for California, Hawaii, Indiana, and Louisiana. ⁸ Excludes data for California, Georgia, Hawaii, Indiana, and Louisiana. ⁹ Excludes data for California, Georgia, Hawaii, Indiana, Louisiana, and Minnesota. ¹⁰ Excludes data for Louisiana. ¹¹ Excludes data for Georgia. ¹² Excludes data for California, Georgia, Hawaii, Indiana, and Minnesota. ¹³ Excludes data for California, Georgia, Hawaii, Indiana, Minnesota, and New Mexico. ¹⁴ Excludes data for California, Hawaii, Indiana, Minnesota, and New Mexico.

Source: U.S. National Center for Health Statistics, *Births: Final Data for 2020*, Vol. 70, No. 17, February 2022; and CDC WONDER Online Database, "Multiple Cause of Death, 1999-2020," <wonder.cdc.gov/> and "National Marriage and Divorce Rate Trends," <www.cdc.gov/nchs/nvss/marriage-divorces.htm>; accessed March 2022.

Figure 2: Raw data table

Methods

Jacob had initially presented to us three sets of data. We had chosen to follow through with this data set because we had all agreed that it was the most interesting and had many aspects within it such as the Birth, Marriage, and Death rates from 1960 to 2020. We had all come to an understanding that this would be a good set of data to analyze based on its aspects and because we were interested in the rates in America because we all happen to be Americans as well. seeing as we could interpret and display the meaning behind the data, we found we could make it possible through our visualizations. To begin, we selected our data source, then encoded the data into an Excel file where we imported it to Tableau where the visualizations were being created. For each of the visualizations, we wanted to make a clear and concise understanding of the data without them being able to reference the dataset and spreadsheet. The sections from our data that we encapsulated in our visualizations are the marriage rates along with the birth rate and the total number of marriages with the total number of births. To make our visualization stand out, we incorporated different color schemes within our visualizations to signify that the charts in red represented Rates and the charts in blue represented the Total number of either Marriages or Births.

Results

The goal of the visualization was to create a simplistic set of figures to display information quickly. Our first chart is highlighted in gray because we wanted it to stand out amongst the other charts. This shows the decline in marriage from approximately 1980. It is hard to tell with the missing data points but it also seems there was a rise in marriage from the 1960s until 1980. The bolded red line pops out and draws attention to the trend. This was the first visualization that was meant to be observed and the color pallet exemplifies its importance. The actual figure shows the marriage rate per 1,000 population each year. As previously mentioned, this chart shows a decline in marriage. Interestingly, there is a sharp decline in the year 2019-2020.

The second bar chart, “Total Number of Marriages,” is displayed to the right of the “Marriage Rate” so that people can easily compare the two. The bar chart was chosen due to its ability to quickly represent values compared to a line or other type of chart. A heat map coloring aspect was also applied to bold the years of the largest values. The purpose of this was to create diversity among the image and make it easier for the reader to pick out specific yearly values. It is interesting to note that this chart does not show a clear drop in marriages. There is a clear decline in the total number of marriages, but it is more subtle until 2019-2020 when there is a sharp drop as previously noted. The blue coloring was chosen to correspond with the total number of births below.

The next bar graph is the “Birth Rate per 1,000.” The bar graph and heat mapping were utilized in this visualization to best represent the data. The bar graph was chosen over the line chart due to visual preference, deciding that the bar graph was easier to read. It is seen that there was a decrease in births, similarly to marriages. Interestingly, there is a decrease in 2019-2020, but not as sharp of a decrease as compared to marriages. The heat mapping quickly shows the user that the rates are decreasing, due to the shade of red becoming lighter.

The last chart shows the total number of births and can be compared to the birth rate to its left. This chart was made in blue and with heat mapping. With the total number of births, it is seen that there is a rise and fall, but it overall has mainly stayed consistent. As noted before, there is a decrease in 2019-2020, but it does not dip to its lowest point of that time.

Overall, there does not seem to necessarily be a direct correlation between the number of births and the number of marriages. These two pieces of data may have had a stronger link 50 years ago when it was frowned upon to have a child without being married. In today’s more progressive and accepting culture, the connection between these two data points may lose its previous tether. The purpose of creating a storyboard in tableau was to present the two data points together, so they can be compared. While marriage rate and birth rate seem to be similar, the actual numbers between the two are not. It is also important to bring up correlation without causation. While these two sets of data may be related, there needs to be more research done in order to come to a strong conclusion

After compiling these charts, it is important to think about some potential reasons behind these trends. The firm conclusion among the group for the rate decrease in 2019-2020 is due to COVID-19. The graphs clearly show a decrease in both birth rates and marriage rates. There is also a decrease in the total number of marriages and a total number of births. Discussion of reasons behind the gradual decline in marriage and birth rate is more complex. This discussion can take a variety of different stances from discussions about women having greater opportunities in the workforce and society progressing past the traditional, archaic gender roles. This decrease in rates can be thought of from a positive aspect, as it may represent a more equal society where marriage is no longer forced on people. More people may be

choosing to focus on themselves and their careers and not conform to traditional roles if not wanted. There are many hypotheses about why these trends are as they are, but these figures would need to be compared to other data sets in order to come to a strong conclusion.

Across the whole visualization, the user can highlight above the line and see numeric values. This was important to include in an effort to make it easier to read. In addition, for every chart, there are two points of information at the beginning with gaps. We mentioned in our proposal that our data set was not complete. We thought that it was important to include these data points, but it was imperative that it did not look like there was data for years it was missing. This is why in the line chart, for example, the line does not connect in the first years of the data points. This could have been done but would have been misleading to the audience. It is always important to display correct data and not try to fill in gaps with misinformation.

Discussion

To conclude, it can be deduced from analyzing the data utilizing the charts displaying marriage statistics shows that the nationwide trend is a declining marriage rate currently. Although, there was a rise in marriage from the 1960s until 1980. Specifically, the data shows a decline in marriage from approximately 1980 onwards.

Birth rates, on the other hand, show a declining trend that we're currently in. As previously stated, concluded that the reason for the rate decrease in 2019-2020 is due to COVID-19. The graphs clearly show a decrease in both birth rates and marriage rates. It's important to note that although these data sets could be influenced by each other, they aren't fully connected as displayed by the differing statistics on some of the same years. We can also see how pivotal it is to utilize the pre-attentive attributes when presenting our visualizations.

We initially took a brief moment to select the ideal data sets that complimented the visualizations that we had in mind presenting. Another challenge that we faced was the missing data points which is a testament to how data can be incomplete but still useful especially given that we had most of the data required to make a compelling argument. With these findings, we can attempt to consider how the changing societal pressures and norms have fluctuated over time and perhaps how we think about the correlation between marriage rates and birth rates in our nation.

Contribution

In order to create this effective and telling visualization, we had divided the tasks over a meeting call. Jacob Powell began to show us visualizations we could possibly do on his end, while doing that we decided that Jacob would create the visualizations and we would approve of them or provide insight on what could be added or taken away. Then we allocated roles and tasks somewhat based on what each individual worked on for the proposal, like for Gianna. Gianna was familiar with the questions posed and created when doing the proposal so she worked on the Questions and Methods. Justin took on the Introduction and the Results section, and Bryan ended our report and wrote the contribution section

Citations

National Center for Health Statistics (2022). Live Births, Deaths, Marriages, And Divorces: 1960 To 2020 [Selected Years] ProQuest Statistical Abstract of the U.S. 2022 Online Edition. Retrieved from

<https://statabs.proquest.com/sa/docview.html?table-no=79&acc-no=C7095-1.2&year=2022&z=E8DFDAB50F1E9919DE619D47E8B124DCB4F75E2F&accountid=9673>