Population Decline in Clark County: Good or Bad?

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ABSTRACT: This paper reports on the correlation between births, deaths, abortions, unwed birth rates, poverty rates, and unintentional drug overdose deaths in Clark County Ohio. Its discussion of the impact of population decline on county businesses, education, and poverty can not only provide information for making better decisions in the future but also shows the bad effect of past choices deliberately to limit the population in Clark County.

T HE HEADLINE IN A RECENT EDITION of the *Springfield News-Sun* ran: "Clark population lowest since 1962."[1] For 2015, the population there is listed as 135,959, a significant drop from some 160,000 in 1971. Deaths currently exceed births. In 2014 there were 1220 births and 1584 deaths.[2]

The Clark County commissioners recently signed a contract with Planned Parenthood of Southwest Ohio[3] to address the increase in the percentage of births to teen mothers, many of whom are unwed. The percentage of births to unwed mothers during 2015 is 55.5% (using data from the Ohio Department of Health). The contract with Planned Parenthood cites the need to reduce births still further.

This paper will study the correlations between births, deaths, abortions, unwed birth rates, poverty rates, and unintentional drug overdose deaths in Clark County. It will also discuss the impact of population decline on county businesses, education, and poverty. This analysis should allow local office

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[1] Tiffany Latta, "Clark Population Lowest since 1962: Leaders Say Efforts to Re-verse Trend Will Take Time*," Springfield News-Sun* (28 Mar 2016), pp. A1, A8.

[2] Clark County Health Department (CCHD), various email messages to the author from 2010 to 2015. Data on deaths in Clark County by year is, admittedly, more difficult to get from the Ohio Department of Health Ohio Department of Health (ODH), Data and Statistics Link (2016), retrieved from www.odh.ohio.gov.

[3] Emily Heitzman, "Deputy Clerk Clark County Commissioner Authorizes Contract with Planned Parenthood Southwest Ohio Region," *Springfield News-Sun* (8 July 2015).

holders to make better decisions in the future, especially in light of the bad effects of past choices deliberately to limit population in Clark County.

The Situation

Clark County is located in the Southwest section of Ohio.[4] The county seat is Springfield, which is at the geographic center of the county. The surrounding areas consist of farms and housing developments. According to Clark County Ohio Quick Facts from the U.S. Census Bureau, the population estimate for July 1, 2014 is 136,554.[5] Some 17.9% of the population is 65 year or older while 18.2% are under the poverty line.

Planned Parenthood received grants to fund birth control in the county as early as 1978[6] and 1984.[7] During July 2015,[8] January 2016,[9] and February 2016[10] there were discussions between concerned citizens and the Clark County Commissioners about the latest contract with Planned Parenthood to provide more funding for emergency contraceptives for teen agers. Headlines from a recent issue of the *Springfield News-Sun*[11] shows concern about the long-term population decline in the county. Using data from the U.S. Census Bureau, the graphs of population versus year in Figure 1 clearly show that Clark County is in a long period of population decline and that most of this decline is in the city of Springfield.[12] In addition, data from the Clark County Health Department[13] and the Ohio Health Department[14] show that births to mothers in Clark County

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[4] A map showing the counties in Ohio can be found at www.geology.com.

[5] U.S. Census Bureau, 2016 population data, retrieved from http://www.census.gov/.

[6] William E. Norman, "Commission Approves Contract For Family Planning Pro-gram," *Springfield News-Sun* (26 June 1978), p. 10.

[7] Staff, "Agency Receives Grant," *Springfield News-Sun* (21 April 1984), p.13.

[8] Tiffany Y. Latta, "Planned Parenthood Pact Weighed: Commis-sioner Tries to Stop County Contract, Move Is Rejected 2-1," *Springfield News-Sun* (23 July 2015), p. B1, B5.

[9] Tiffany Y. Latta, "Clark Leaders Receive Request: Planned Parenthood Funding Has Divided County Commissioners," *Springfield News-Sun* (21 Jan. 2016), p. B1, B6.

[10] Tiffany Y. Latta, "Clark Leaders Hear Plea on Funding: Planned Parenthood at Center of Remarks at Meeting," *Springfield News-Sun* (18 Feb. 2016), p. A1.

[11] Latta (28 March 2016), op. cit.

[12] U.S. Census Bureau, op. cit.

[13] Clark County Health Department, op. cit.

[14] Ohio Department of Health (2016), op. cit.

are in decline. The primary question for this research is this: Does the continuous decline in births in recent years have a positive or negative correlation with variables such as poverty rate, drug overdose deaths and unwed birth rates? These variables are all considered be indicators of poor physical or economic health in the county.

Method of Collection

Data for this study were collected as follows. Most data were obtained online from the Ohio Department of Health[15] since the numbers of births and deaths for recent years were not easy to obtain from the U.S. Census Bureau. Numbers of births and deaths were obtained from the Clark County Health Department[16] via email correspondence with the author for the period from 1911 to 2014. This data is illustrated in the graph in Figure 2. For some unexplained reason the number of deaths for 1958 and 1960 was unusually high, as seen by the spike in Figure 2. There is presumablyly some kind of error for the number of deaths reported in those two years. The number of births[17] per year for the county were also obtained from the Ohio Department of Health for the period of 1990 to 2015. The actual number of births may be slightly higher since not all residents of Clark County had births in Clark County Hospitals. Births to unwed mothers in Clark County from 1990 to 2015[18] were also obtained from the Ohio Department of Health. The number of births to unwed mothers divided by the total number of births for each year was used to determine the unwed birth rate, that is, the percentage of births to unwed mothers. Data on deaths from 1990 to 2014 in Clark County were harder to get from the Ohio Department of Health than from the Clark County Health Department. Thus the number of deaths per year is based on data from the Clark County Department of Health Data. The number of deaths per year shows that deaths currently exceed births in Clark County. The number of abortions in Clark County from 1991 to 2014 was obtained from the Ohio Department of Health for each year.[19] The poverty rate from 2000-2014 was

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[15] Ibid.
[16] Clark County Health Department, op. cit.
[17] Ohio Department of Health (2016), op. cit.
[18] Ibid.
[19] Ibid.

obtained from *The Ohio Poverty Report February 2016*.[20] The number of unintentional drug overdose deaths was obtained from the *2014 Ohio Drug Overdose Data: General Findings*[21] (see Table I). Clark County regularly exhibits high poverty,[22] a higher number of drug overdose deaths,[23] and a high percentage of births to unmarried women ages 18-54.[24] In fact, in all three of these categories, Clark County is among the highest in Ohio.

Method of Analysis

Graphs of Clark County births and unwed birth rates from 1990 to 2015 suggest an inverse correlation (Figures 3 and 4). The argument often given by birth control advocates such as Planned Parenthood is that decreasing the number of births will have a positive influence on many social issues. But on the basis of these two graphs the author decided to do a statistical analysis to determine the statistical correlation between the variables shown in Table I. The correlation between sets of data is a measure of how well they are related. A common measure of correlation in statistics is the Pearson Correlation Coefficient, which is always between -1 and +1. For a sample of data, this is designated by the letter r. For data sets that are highly correlated the absolute value of the correlation coefficient will be close to one. A plus sign indicates positive correlation and a negative sign indicates negative correlation. A value close to zero indicates little correlation.

Using an Excel® statistical add-in called XSTAT, it was easy to generate a table of Pearson correlation coefficients between variables.[25] The Pearson correlation coefficient output for all combinations of the two variable used for this study are shown in Table II. As noted there, the correlation values in bold

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[20] Ohio Development Services Agency, *The Ohio Poverty Report February 2016*, p.58, retrieved from https://www.development.ohio.gov/files/research/p7005.pdf.

[21] Ohio Department of Health (ODH) *2014 Ohio Drug Overdose Data: General Findings*, retrieved from http://www.healthy.ohio.gov/~/media/Healthy Ohio/ASSETS/Files/injury prevention/2014 *Ohio Final Overdose Report 2*.pdf.

[22] Ohio Development Services Agency, op. cit.

[23] Ohio Department of Health (2014), op. cit.

[24] Health Indicators Warehouse (2016), retrieved from http://www.health indicators. gov/Indicators/Births-unmarried-women-18-54-years-percent_99/Profile/Map? localeID=39&TimeframeID=2014 &dimensionGroup=Total&dimension Value=Total.

[25] Beverly Dretzke, Ron Larson, and Betsy Faber, *Custom Excel Manual for Elementary Statistics: Picturing the World*, 6th edition, Pearson, Ch. 9.

are different from 0 with a significance level α = 0.05.

The XLSTAT software also generated statistical p-values, coefficients of determination (r^2) and scatter plots for all the possible pairs of variables. This additional information is not printed in this paper since there are a total of sixty-four total data values and scatter plots for the eight variables considered in this paper. Stand-alone Excel® was used to get a visual representation of correlations using scatter plots as shown in Figures 5-7. Figure 5 shows the correlation between births and percent unwed births, Figure 6 shows the correlations between births and poverty percent, and Figure 7 shows the correlation between births and deaths from drug overdose.

Results and Discussion

As seen in Table II, the correlation between births and unwed birth percent is r = -0.899. This is a high negative correlation. As the births decreased, the unwed birth percentage increased during the period of study. This result is opposite of what would be expected from the arguments by Planned Parenthood that decreasing the number of births will help reduce the percentage of unwed births. This conclusion is also supported by the regression line shown in figure 5 where the coefficient of determination $r^2 = 0.8003$. We can model the relationship between births and unwed births as a linear equation with a negative slope.

The correlation between births and abortions is r = +0.759, a fairly high positive correlation. That is to say, as the number of births decreases, the number of abortions decrease. This relationship could also be the result of a reduced number of pregnancies. This can be represented by a linear equation with a positive slope.

The correlation between births and the poverty rate is a high negative correlation of r = -0.809. That is, as the number of births decreased, the poverty rate actually increased. Alternatively, we can say that as the number of births increases, the poverty rate goes downward. This is also seen in the regression line shown in figure 6 where the coefficient of determination $r^2 = 0.6545$ and we can model the relationship between births and poverty rate as a linear equation with a negative slope.

The correlation between births and drug overdose deaths is r = -0.769. Again, this is a fairly high negative correlation. That is, as the number of births increase, the drug overdose deaths decrease; alternatively, as births decrease, the drug overdose deaths increase. Again, this is contrary to the logic urged by

proponents of birth control. This is also seen in the regression line shown in Figure 7 where the coefficient of determination $r^2 = 0.5921$, and we can model the relationship between births and poverty rate as a linear equation with a negative slope.

Since the closer the absolute value of r or the value of r^2 is to one, the stronger the correlation. For the three pairs of variables with negative correlation, we see that the strongest correlation is between births and percent of unwed births. This correlation only shows an association between variables and does not prove cause and effect.

The associations between the variables studied in Clark County do not appear to justify the reasons cited by Planned Parenthood to ask for more funds to reduce births.[26] Even though recent Ohio laws limit such funding, there are Clark County officials who want active participation in birth decisions by Planned Parenthood.[27]

More studies can be based on the collected data. We can also analyze the variables using Analysis of Variance (ANOVA), Multiple Regression or Principal Component Analysis (PCA). Data could be expanded to include specific states or the entire United States. Obtaining data for the variables for a greater number of years is also desirable. Using additional variables such as teen pregnancy rates and economic measures may result in some more interesting correlations.

General Observations in Clark County

Several observations can be made about Clark County after population decline. The current hope is that population decline is slowing.[28] Clark County currently has an aging population. The percentage of population 65 and older in 2015 is 18.33%, which is above the average of 15% for Ohio.[29] According to Clark County Commissioner John Detrick, "Having a large senior

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[26] Clark County Commissioners Minutes (17 Feb. 2016), Journal 94, pp. 42-44.

[27] Will Garbe, "New Ohio Law Limits Funding for Planned Parenthood Partnership: Clark Official Says Group Can Still Participate in Health Task Force," *Springfield News-Sun* (23 May 2016), p. A1, A6.

[28] Kaie Wedell, "City Population Falls But Losses Slowed: Springfield Needs to Show Growth to Attract Jobs, County Official Says," *Springfield News-Sun* (19 May 2016), p. A1, A6.

[29] Katie Wedell, "Census: Region Aging, Becoming More Diverse: Clark County Has One of the Highest Shares of Senior Citizens," *Springfield News-Sun* (24 June 2016), p. Al, A8.

population is a concern, because seniors use county and municipal services but contribute less in tax revenue. Retired individuals don't pay income tax and low-income or disabled senior citizens can qualify for the homestead exemption to reduce property tax bills. There also is a challenge in attracting businesses with an older labor force."[30]

In 1971, the county had five Catholic churches, five pastors. It now has just four Catholic churches and two pastors. The number of Catholic schools has been reduced from five to one. After 1971 the retail stores in a thriving downtown disappeared. Many funds are being spent to try to revitalize downtown Springfield. Long ago, Springfield was the center of magazine publishing (Crowell-Coller was a major publisher in town) and a boom town with much manufacturing. The Springfield Mall, built in 1971, has seen the closure of many stores, including J.C. Penny's, Elder Berman, and Macy's. Only one box store (Sears) is left. Clark County has fewer public schools and students. New school buildings have been erected, but some do not have students. Instead of two high schools in Springfield there is now only one. Many expenditures have been made to try to revitalize the city of Springfield. Much discussion focuses on increasing job opportunities, but little discussion or decisions are based on the negative impact of declining births.

Conclusions

Population decline in Clark County is not good. Based on data from 1990 to 2015 that show declining births, Clark County saw an increase in poverty level, an increase in drug overdose deaths, and an increase in unwed birth rates. The statistical result is that the negative correlation values between births and poverty level, births and drug overdose deaths, and birth rates and unwed birth rates differ from zero with a significance level $\alpha = 0.05$. Thus, it is not a small surprise that many neighbors in our county are headed up by single-parent households. Also based on data from 1990 to 2015, it is wrong to conclude that a decrease in births will decrease unwed birth percentage, poverty, and drug overdose deaths. The next question is what other social and economic factor suffer a negative impact from a decline in the number of births? Is this negative correlation between births and social and economic factors a common trend among other counties in Ohio and the United States?

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[30] Ibid.

Table 1: Data in Spreadsheet

Year	Births (CCHD)	Births (ODH)	UnWed Births (ODH)	%UnwedBirths (ODH)	Deaths (CCHD)	Abortions (ODH)	Poverty	Drug Over dose
1990	2054	2119	979	32.04%	1425			
1991	2085	2116	731	34.66%	1400	333		
1992	2041	2064	738	36.76%	1453	207		
1993	2008	2016	781	38.74%	1509	377		
1994	2009	2004	775	38.67%	1549	384		
1995	1871	1869	732	39.17%	1520	357		
1996	1855	1861	753	40.46%	1546	395		
1997	1851	1922	792	41.21%	1485	345		
1998	1907	1919	822	42.83%	1440	345		
1999	2059	2012	836	41.55%	1593	319		
2000	1939	1928	831	43.10%	1579	357	10.6	
2001	1878	1880	830	44.15%	1578	342	10.8	
2002	1756	1828	816	44.64%	1551	300	11.2	
2003	1632	1707	863	40.29%	1740	301	11.3	11
2004	1559	1717	834	48.57%	1537	279	12.8	25
2005	1674	1775	860	48.46%	1644	282	15	15
2006	1634	1804	916	50.70%	1494	263	14.2	18
2007	1665	1905	996	52.20%	1609	219	15.5	20
2008	1528	1800	1008	56.00%	1527	245	13.8	19
2009	1459	1717	971	56.66%	1499	198	15.3	19
2010	1270	1600	808	52.86%	1513	232	20	19
2011	1324	1520	919	56.73%	1505	202	15.1	34
2012	1306	1587	901	56.77%	1594	191	19.9	36
2013	1255	1561	860	55.09%	1553	182	18.2	28
2014	1220	1594	858	53.83%	1563	152	18.2	38
2015		1620	899	55.49%				
Totals								
Notes: Soure of data is Ohio Department of Health Web Site								
Last Data Summary is 2010								
ODH Data Warehouse Numbers Used for 2006-2015								
****2015 Data is Preliminary as of 1.31.16								

Fig. 1

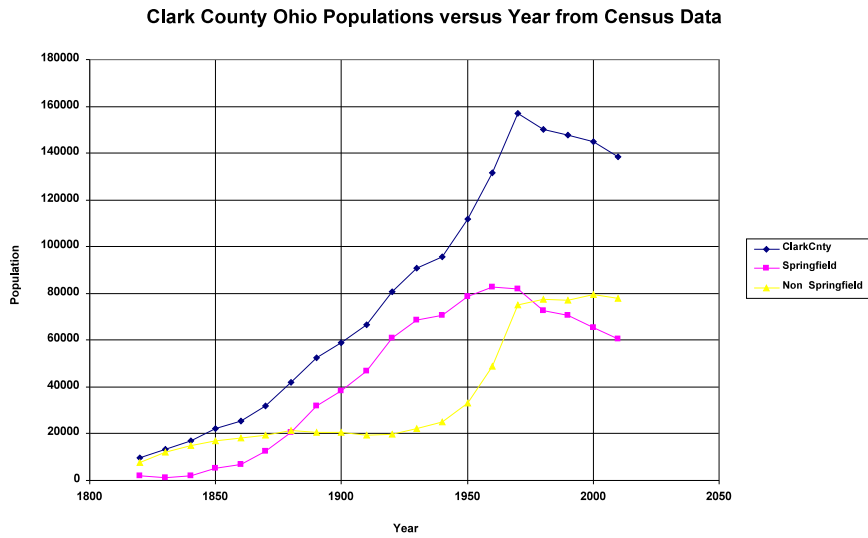**Clark County Ohio Populations versus Year from Census Data**
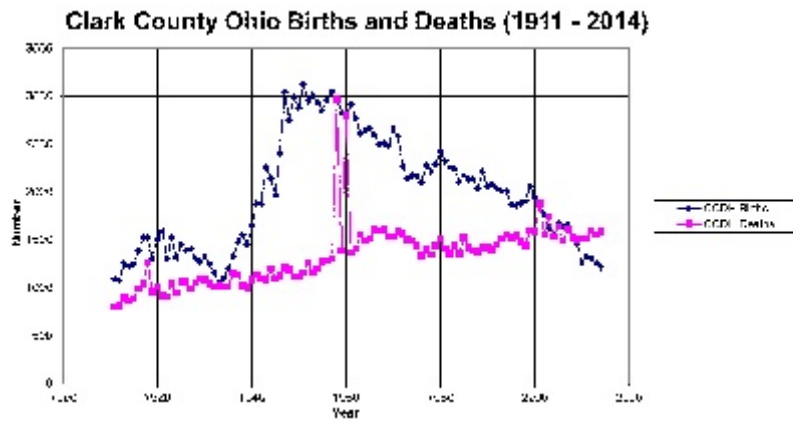

Fig. 2
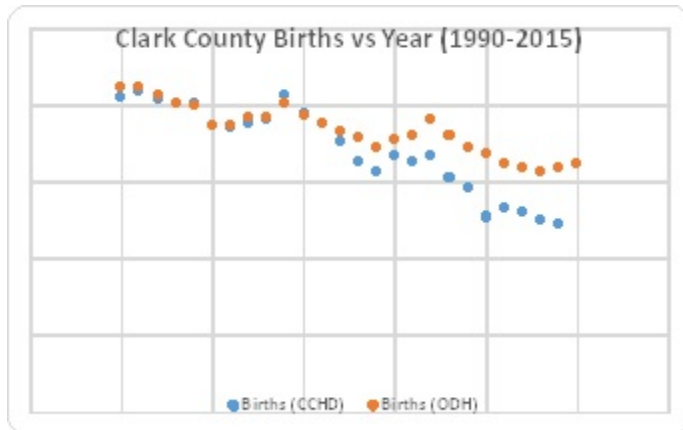
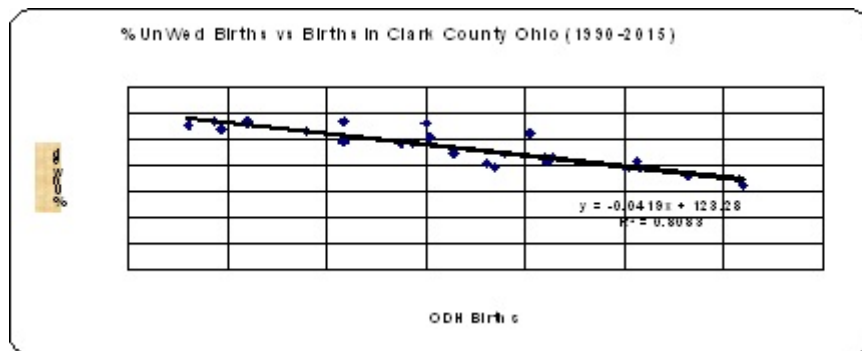Fig. 3. Clark County Births by Year

Fig. 5. Percent unwed births by year
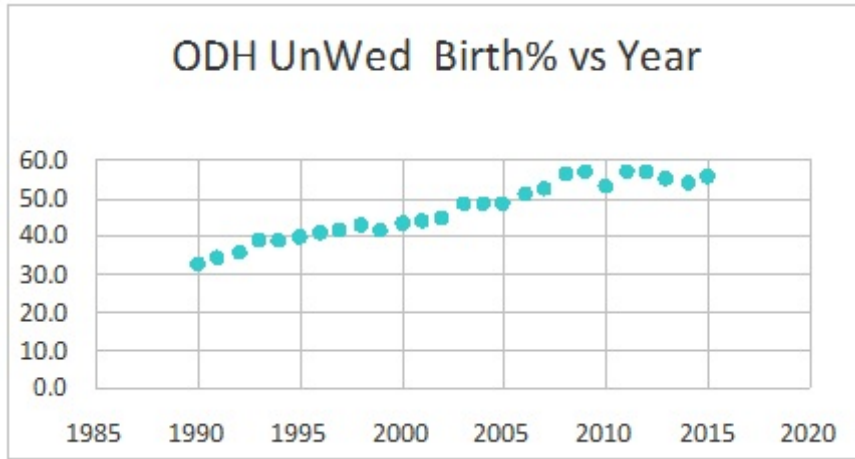
Figure 4 Clark County Percent unwed births by year

Table 2: Pearson Correlation Coefficients

Correlation matrix (Pearson):								
Variables	Births (CCHD)	Births (ODH)	UnWed Births (ODH)	%UnwedBirths (ODH)	Deaths (CCHD)	Abortions (ODH)	Poverty	DrugOverdose
Births (CCHD)	1	0.957	-0.676	-0.921	-0.153	0.864	-0.903	-0.755
Births (ODH)	0.957	1	-0.617	-0.899	-0.265	0.759	-0.809	-0.769
UnWed Births (ODH)	-0.676	-0.617	1	0.894	0.263	-0.692	0.336	-0.189
%UnwedBirths (ODH)	-0.921	-0.899	0.894	1	0.261	-0.853	0.829	0.578
Deaths (CCHD)	-0.153	-0.265	0.263	0.261	1	0.033	-0.462	-0.291
Abortions (ODH)	0.864	0.759	-0.692	-0.853	0.033	1	-0.879	-0.789
Poverty	-0.903	-0.809	0.336	0.829	-0.462	-0.879	1	0.680
DrugOverdose	-0.755	-0.769	-0.189	0.578	-0.291	-0.789	0.680	1
Values in bold are different from 0 with a significance level alpha=0.05								

Fig. 6. Poverty percent versus births
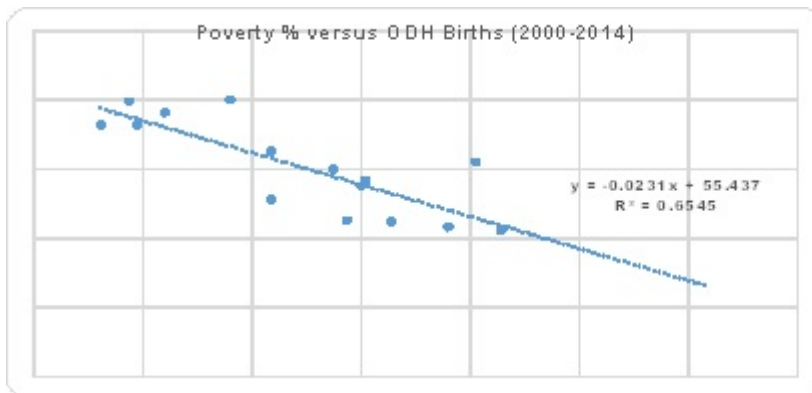

Poverty % versus ODH Births (2000-2014)

$y = -0.0231x + 55.437$
$R^2 = 0.6545$

Fig. 7: Drug overdose deaths versus births