Setting a Goal to Reduce Teen Births in Milwaukee by 2015

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ABSTRACT

Introduction: Although teen birth rates have declined significantly since 1991, teen pregnancy remains a significant public health problem in Milwaukee, Wis. Using historical teen birth data trends, this study sets a birth rate reduction goal by the year 2015 for Milwaukee teenagers between the ages of 15 and 17.

Methods: Birth counts and birth rates for teenagers between the ages of 15 and 17 were obtained from the Wisconsin Interactive Statistics on Health (WISH). Trend analyses were performed on teen birth rate data gathered between 1991 and 2006 in an effort to forecast and set a birth rate goal for the year 2015.

Results/Discussion: Trend analyses yielded a predicted birth rate projection of 35.9 (*Adjusted R²*=.95, *P*<.001) births per 1000 females. Using the exponential function estimate as well as national and state goals, Milwaukee community leaders set a feasible goal of 30 births per 1000 teens aged 15-17 years for the year 2015, which represents a 46% reduction of the 2006 rate of 55/1000.

INTRODUCTION

Teen pregnancy presents increased risks to both mother and child, including preterm delivery, low birth weight, neonatal mortality,[1] anemia, pregnancy-induced hypertension, and intra-uterine growth retardation.[2] Babies born to teens are at a higher risk of poor academic achievement, behavioral problems later in life,[3] dropping out of school, unemployment, early parenthood, and violent offenses.[4] The National Campaign to Prevent Teen and Unplanned Pregnancy (NCPTUP) estimated that in 2004, $9.1 billion in public funding went toward the costs associated with teenage childbearing, including increased public sector health care costs, child welfare costs, costs for state prison systems, and lost revenue due to lower taxes paid by children of teen mothers over their own adult lifetimes.[5] Further, teens themselves recognize that teen childbearing burdens their relationships, their vocations, and their own development.[6]

Teen births (age ≤19) account for 16.8% of all Milwaukee births compared to 8.6% of Wisconsin births and 10.2% of US births.[7] Milwaukee teens face rates of risk for preterm delivery, low birth weight, and neonatal mortality that are similar to national rates.[8] Recognizing this issue, the United Way of Greater Milwaukee and its community partners convened a community-wide planning initiative to examine the issue of teen pregnancy in Milwaukee and to make recommendations for future action. In 2006, they released *If truth be told…teen pregnancy, public health and the cycle of poverty*,[7] along with a community-wide call to action. Considerable and sustained efforts have focused on implementing these recommendations, with a specific focus on younger teens. An annual report of birth rates among 15 to 17 year olds showed progress, but until this project, a target goal had not been set. National public health goals concerning teen reproductive health focus on behaviors such as condom use, sexual activity, and teen pregnancy rates. These include the national Healthy People 2010 goal of reducing teen pregnancies among 15 to 17 year olds to 43 per 1000 by the year 2010.[8] Because Wisconsin state law prohibits reporting local-level abortion data, calculating a city-level teen pregnancy rate is not possible. The goal of this project was to set a feasible goal for teen birth reduction in Milwaukee for teens aged 15-17 years old.

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METHODS

We analyzed live birth data from the Wisconsin Interactive Statistics on Health (WISH) data query system,[9] a publicly available website maintained by the Wisconsin Department of Health Services (DHS) that allows individuals to query birth certificate data using specific parameters. For this analysis, we examined 1991-2006 birth data by maternal age group (15-17 years) using decennial census data to calculate rates (number of live births per 1000 females). Because of the small and variable number of births to teens <15 years, we excluded these births from the numerator for this trend analysis. We then used a combination of decennial census (1990-2000) and the US Census American Community Survey (ACS)[10] (2001-2006) to recalculate the rates. ACS data were first reported for Milwaukee beginning in 2002 and were thought to be a more accurate reflection of the actual teen population. ACS data are also the denominator used to calculate annual city-level rates that will measure future progress in meeting the goal. Annual population estimates are also used by the State of Wisconsin and the Centers for Disease Control and Prevention (CDC) for reporting intercensal rates.

Trend analyses were performed using 1991-2006 teen birth rates for 15 to 17 year old females to develop a feasible birth rate reduction goal by 2015. Trend analyses are 1 method of regression analysis. The dependent variable was the birth rate of the 15 to 17 year old age group forecasted through 2015, and the dependent variable was time (year). The regression equation was developed from time-series data. We visually compared the observed data pattern to each of the 3 trends (logarithmic, polynomial, and exponential) and calculated the coefficient of determination R^2 adjusting for the potential of year-to-year autocorrelation of data.[11-12] (A logarithmic trendline is a best-fit curved line used when the rate of change in the data increases or decreases quickly and then levels out. A polynomial trendline is a curved line that is best used for nonlinear data. An exponential trendline is a curved line used when data values change continuously.) We then compared our forecasted results with the national trend and other states' teen-birth rate goals reported by the NCPTUP.[13] Using these sources, we worked with the City of Milwaukee Health Department and other community stakeholders to develop a statistically based and programmatically feasible goal of reducing teen births in Milwaukee.

RESULTS

A total of 3823 births to teens aged 15-17 years were analyzed. Figure 1 displays birth rates from 1991 to 2006 compared to national trends.[14-16] Milwaukee teen birth rates fell between 1991 and 2004, from 95.8 births per 1000 females aged 15-17 years in 1991 to 54.4 in 2004, rose 3.7% to 56.5 in 2005, and fell 0.7% to 55.4 in 2006. Birth rates among the 15 to 17 year olds age group significantly decreased during 1991-2006 (P<.001). These trends mirror national trends. The national average birth rate for 15 to 17 year olds declined 42% from its peak at 38.6 in 1991 to 22.4 in 2003.[14-16]

Adjusting for autocorrelation, coefficients of determination were as follows: *logarithmic y*=-17.609ln(x) + 109.85, *adjusted R²*=.76, *P*<.001; *exponential y*=108.4e - 0.0442x, *adjusted R²*=.95, *P*<.001; and *polynomial y*=-0.0525x2 - 2.369x + 101.14, *adjusted R²*=.94, *P*<.001. A comparison of coefficients showed that, although all coefficients were statistically significant, the best-fitting line was the exponential trendline (*adjusted R²*=.95). Using the exponential line as the best-fitting trendline, we forecasted a teen birth rate of 35.9 births per 1000 teens aged 15-17 by the year 2015 (Figure 2).

The national birth rate for teens aged 15-19 years decreased by 35% between 1991 and 2005, from 61.8 to 40.5, then increased 3% between 2005 and 2006.[17] In 1996, NCPTUP set a goal to reduce the teen pregnancy rate by one-third over 10 years, and has now set a goal of reducing the teen pregnancy rate by another one-third between 2006 and 2015.[13] Table 1 shows examples of other state goals to reduce teen pregnancy.[12] Taking into account the forecasted birth rate from the exponential trendline, the national birth rate trend, other states' teen birth rate goals, and community stakeholder input, a goal of 30 births per 1000 teens aged 15-17 years by the year 2015 was set.

DISCUSSION

For this project we used local data and statistical methods as well as national teen pregnancy reduction models to forecast a 2015 goal to reduce births to young teens in Milwaukee. We examined the trending of birth rates for 15 to 17 year olds in Milwaukee. Since the early 1990s, teen birth rates have declined in Milwaukee; however, they remain higher than national rates.

When we examined more closely young teen (aged 15-17 years) birth rates between 1991 and 2006, we observed a slight (3.7%) rise in 2005. This rise persisted in 2006, with only a very small decrease (0.7%). Although it is too early to know if this slight

(3.7% from 2004 to 2005) rise in teen birth rates is the beginning of a trend, it does suggest a need for close monitoring in the coming years. A similar 3% rise between 2005 and 2006 was observed on a national level.[14]

We identified 3 different potential birth rate projections for 2015, and the best-fitting trendline (exponential) suggested a goal of 35.9 births per 1000 teens aged 15-17 by the year 2015. We compared this data with national data and other states' teen birth rate goals. Community leaders took into account this data, the high level of community engagement, political will, and local efforts to reduce teen births to set a feasible yet challenging goal of reducing Milwaukee's birth rate to 30 births per 1000 teens aged 15-17 by the year 2015, representing a 46% reduction in teen births over the next 7 years. The City of Milwaukee Health Department recently reported progress toward this goal when they announced a 2007 birth rate of 50.0 per 1000 teens aged 15-17, a 10% drop from 2006's birth rate of 55.4.[18]

It is important to note that children born to teen mothers during the peak in teen birth rates in the 1990s are also at higher risk of teen pregnancy.[4] Without effective pregnancy prevention interventions, birth rates may again rise as these children become teens themselves. Future analysis of Milwaukee birth rates should consider the impact of socioeconomic status, race, and ethnicity. In 2006, the risk ratio on a broad array of health outcomes was found to be much higher for groups with lower socioeconomic status versus groups with higher socioeconomic status.[19-20] Even the highest socioeconomic status groups in Milwaukee fared worse on several health outcomes than the rest of Wisconsin.[19-20]

Although not part of these analyses, births to teens under the age of 15 years warrant further exploration. In Milwaukee, between 2000 and 2006, an average of 53.3 births per year (±5.68 SD=8-63) were to teens under age 15 years.[9] Limited data exists on a national and state level for this age group. Further analyses of these births in Milwaukee, especially to determine how these numbers relate to the population of teens <15 years, will give us a sense of whether or not these numbers are trending upward or downward for this especially vulnerable population.

Again, although not part of these analyses, further consideration may also be warranted for teens aged 18-19. The birth rate trend for teens aged 18-19 during the period of 1991-2006 was similar to the trend
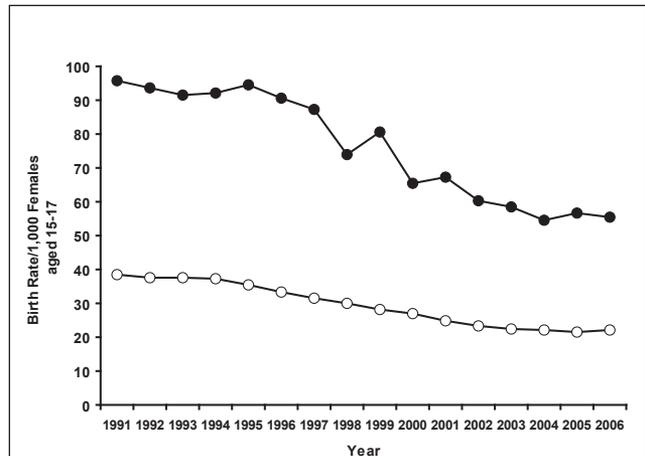

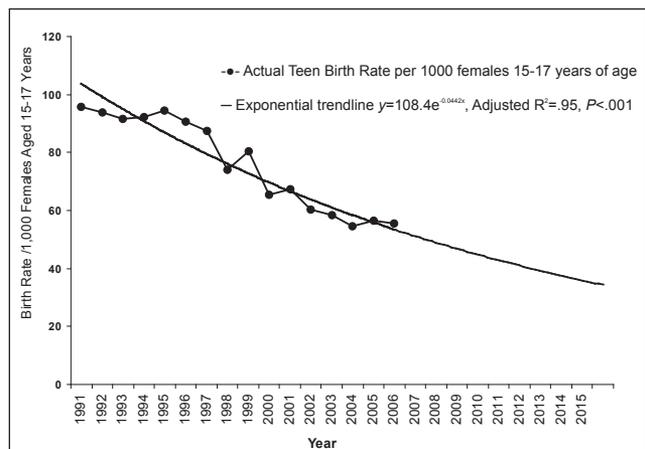**Figure 1.** Birth rates for 15 to 17 year olds (1991-2006) nationwide and in the city of Milwaukee.

Figure 2. Birth rate trends for teens 15-17 years of age.

of 15 to 17 year olds, (*range*=105.89-140.56 per 1000; *Pearson's r*=.76; *P*<.001). This significant correlation suggests that monitoring of teens as they turn 18 may also be important. Despite being of legal age, these teens remain at higher risk of poor outcomes related to teen pregnancy.[1-6]

Some limitations of this analysis are that this goal is based on intercensal population estimates found in the ACS. This analysis also only examines live births, not stillbirths and/or pregnancy data that would include spontaneous abortion or induced terminations. This data is not reported at the local level in Wisconsin. Since teenagers undergoing induced abortion have been found to be at higher risk of negative birth outcomes later in life,[21] it would be important to address the number of teen pregnancies that end in abortions. DHS received reports of 520 induced terminations in 2007 for Milwaukee County teens aged 15-19.[22] Another

Table 1. State Goals to Reduce Teen Pregnancy and Birth Rates[12]

State	Goal
California	Reduce the teen birth rate to 18.9/1000 for 15 to 17 year olds and to 32/1000 for 15 to 19 year olds (a 14% reduction) by 2015.
Delaware	Reduce the teen birth rate from 46.9/1000 to 45.6/1000 for 15 to 19 year olds (a 3% reduction) and for 15 to 17 year olds from 27.2/1000 to 25.1/1000 (an 8% reduction) by 2015.
Florida	Reduce the teen birth rate (15 to 19 year olds) from 41.6/1000 to 26.3/1000 (a 37% reduction) by 2010.
Kentucky	Reduce the teen birth rate for 15 to 17 year olds from 31.9/1000 to 20/1000 (a 37% reduction) by 2010.
Missouri	Reduce the teen pregnancy rate (15 to 17 year olds) from 21.1/1000 in 2004 to 11.1/1000 (a 47% reduction) in 2010 and reduce the teen birth rate (15 to 17 year olds) from 19.1/1000 in 2004 to 8.7/1000 (a 54% reduction) by 2010.
New York	Reduce the teen pregnancy rate (15 to 17 year olds) from 60/1000 in 1998 to 32/1000 (a 47% reduction) in 2007.

Note: The national goal is to reduce the pregnancy rate by 30% between 2006 and 2015.

potential area that needs monitoring by Milwaukee public health officials is the trend of second births to teenage mothers, as this can also represent a higher risk of preterm birth and low birth weight, especially in combination with other risk factors.[23]

CONCLUSIONS

The authors, in conjunction with community leaders, recommended setting a 2015 goal of 30 births per 1000 teens aged 15-17 years, representing a 46% reduction from the current rate of 55.4 births per 1000 for teens aged 15-17. To achieve this goal in Milwaukee, it will be essential to: (1) continue to monitor and document ongoing and new programs and policies addressing teen pregnancy; (2) address major gaps in current programs and policies to decrease teen births; (3) continue implementing and expanding evidence-based programs; (4) continue monitoring trends; and (5) integrate rigorous scientific research and evaluation as appropriate to evaluate the overall impact of programs and policies to decrease teen births.

Teen pregnancy is a critical public health issue that has far-reaching effects on families, babies, the public and private sectors, and society. By taking a data-informed approach to planning interventions, we can work to reduce teen pregnancies and births in a systematic manner.

REFERENCES

1. Chen XK, Wen SW, Fleming N, et al. Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *Int J Epidemiol.* 2007;36(2):368-373.
2. Cunnington AJ. What's so bad about teenage pregnancy? *J Fam Plann Reprod Health Care.* 2001;27(1):36-41.
3. Hofferth SL, Reid L. Early childbearing and children's achievement and behavior over time. *J Perinat Neonatal Nurs.* 2001;15(2):1-17.
4. Jaffee S, Caspi A, Moffitt T, et al. Why are children born to teen mothers at risk for adverse outcomes in young adulthood? results from a 20-year longitudinal study. *Dev Psychopathol.* 2001;13:377-397.
5. Hoffman S. *By the numbers: The public costs of teen childbearing. Washington DC: The national campaign to prevent teen pregnancy.* http://www.thenationalcampaign.org/costs/default.aspx Accessed September 21, 2009.
6. Herman JW. Adolescent perceptions of teen births. *J Obstet Gynecol Neonatal Nurs.* 2008;37(1):42-50.
7. United Way of Greater Milwaukee. *If truth be told…teen pregnancy, public health and the cycle of poverty.* United Way of Greater Milwaukee: Milwaukee, Wisconsin. 2006. http://www.unitedwaymilwaukee.org/DefaultFilePile/Files/KiewegImages/ITBT.pdf Accessed September 21, 2009.
8. Reduce pregnancies among adolescent females. Healthy People 2010. http://www.healthypeople.gov/document/html/objectives/09-07.htm. Accessed September 10, 2009.
9. Wisconsin Deptartment of Health Services, Division of Public Health, Bureau of Health Information and Policy. Wisconsin Interactive Statistics on Health (WISH) data query system. Birth Counts Module. http://dhs.wisconsin.gov/wish/index.htm. Accessed September 10, 2009.
10. US Census Bureau. American Community Survey (ACS). http://factfinder.census.gov/servlet/DatasetMainPageServlet?_program=ACS&_submenuId=&_lang=en&_ts=. Accessed September 10, 2009.
11. Siegel JS, Swanson D. *The Methods and Materials of Demography.* Bingley, United Kingdom: Emerald Group Publishing; 2004:560-569.
12. Smith SK, Tayman J, Swanson DA. *State and Local Population Projections Methodology and Analysis.* New York: Kluwer Academic/Plenum Publishers; 2002.
13. The National Campaign to Prevent Teen and Unplanned Pregnancy. http://www.thenationalcampaign.org/. Accessed September 10, 2009.
14. Hamilton BE, Martin JA, Ventura SJ. Births: preliminary data for 2006. *Natl Vital Stat Rep.* 2007 56(7):1-18. http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_07.pdf. Accessed September 10, 2009.
15. Ventura SJ, Abma JC, Mosher WD, et al. Recent trends in teenage pregnancy in the United States, 1990-2002. National Center for Health Statistics. http://www.cdc.gov/nchs/products/pubs/pubd/hestats/teenpreg1990-2002/teenpreg1990-2002.htm. Accessed September 10, 2009.

16. QuickStats: Pregnancy, Birth, and Abortion Rates for Teenagers Aged 15-17 Years—United States, 1976-2003. *CDC MMWR* 2005;54(04):100. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5404a6.htm. Accessed September 10, 2009.

17. Martin JA, Hamilton BE, Sutton PD, et al. National Vital Statistics Reports Births: Final Data for 2005 DED Vol 56 (6). http://www.cdc.gov/nchs/data/nvsr/nvsr56/nvsr56_06.pdf. Accessed September 10, 2009.

18. City of Milwaukee Health Department. Milwaukee Teen Birth Rate Drops to Lowest Level since 1979. 2008. http://www.ci.mil.wi.us/health. Accessed September 10, 2009.

19. Vila PM, Swain GR, Baumgardner DJ, et al. Health Disparities in Milwaukee by Socioeconomic Status. *WMJ.* 2007;106(7):366-372.

20. Chen H-Y, Baumgardner DJ, Bergstrom JP, Mori N, Swain GR, Cisler RA. Milwaukee Health Report 2009: Health Disparities in Milwaukee by Socioeconomic Status. Center for Urban Population Health: Milwaukee, WI. http://www.cuph.org/mhr/2009-milwaukee-health-report.pdf. Accessed September 10, 2009.

21. Reime B, Schucking BA, Wenzlaff P. Reproductive outcomes in adolescents who had a previous birth or an induced abortion compared to adolescents' first pregnancies. *BMC Pregnancy Childbirth.* 2008;8(4). http://www.pubmedcentral.nih.gov/articlerender.fcgi?tool=pubmed&pubmedid=18237387. Accessed September 10, 2009.

22. Wisconsin Department of Health and Family Services, Division of Public Health, Bureau of Health Information and Policy. *Reported Induced Terminations of Pregnancy in Wisconsin, 2007* (PPH 5360-07). June 2008.

23. Partington SN, Steber DL, Blair KA, Cisler RA. Second births to teenage mothers: risk factors for low birth weight and pre-term birth. *Perspect Sex Reprod Health.* 2009;41(2):101-109.

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