Life Course Indicator: Repeat Teen Birth

The Life Course Metrics Project

As MCH programs begin to develop new programming guided by a life course framework, measures are needed to determine the success of their approaches. In response to the need for standardized metrics for the life course approach, AMCHP launched a project designed to identify and promote a set of indicators that can be used to measure progress using the life course approach to improve maternal and child health. This project was funded with support from the W.K. Kellogg Foundation.

Using an RFA process, AMCHP selected seven state teams, Florida, Iowa, Louisiana, Massachusetts, Michigan, Nebraska and North Carolina, to propose, screen, select and develop potential life course indicators across four domains: Capacity, Outcomes, Services, and Risk. The first round of indicators, proposed both by the teams and members of the public included 413 indicators for consideration. The teams distilled the 413 proposed indicators down to 104 indicators that were written up according to three data and five life course criteria for final selection.

In June of 2013, state teams selected 59 indicators for the final set. The indicators were put out for public comment in July 2013, and the final set was released in the Fall of 2013.

Basic Indicator Information

Name of indicator: Repeat Teen Birth (LC-53)

Brief description: Percent of teen births that are repeat teen births

Indicator category: Reproductive Life Experiences

Indicator domain: Risk/Outcome

Numerator: Number of repeat live births to females 15-19 years (or other teenage group)

Denominator: Number of live births to females 15-19 years (or other teenage group)

Potential modifiers: Race/ethnicity, age, education, income, nativity, father acknowledgement, geography, rural/urban, residence in foster care

Data source: National Vital Statistics Systems (NVSS) Birth Records

Notes on calculation: None

Similar measures in other indicator sets: HP 2020 Focus area FP-8; CDC Winnable Battle (Decrease teen birth rates by 20 percent)

Life Course Criteria

Introduction

The United States celebrates continued declines in its teen pregnancy rate, however disparities, especially by race and ethnicity, persist. Through the targeted promotion of effective interventions that delay initiation of early sexual activity and increase the effective use of contraceptive methods, the Centers for Disease Control and Prevention (CDC) has deemed continued declines in teen pregnancy as a "Winnable Battle"(1). However, repeat teen birth, within teen childbearing, presents unique challenges (as well as opportunities): according to the CDC, approximately one in five teen births is a repeat teen birth. Adolescents who experience a repeat teen pregnancy are more likely to have been younger at sexual debut, have lower educational expectations, be out of school or not a high school graduate, and unemployed (7,8). These risk factors are magnified by the fact that the repeat teen pregnancy reduces the teen's ability to become self-sufficient and improve her and her children's socioeconomic future.

National, state and community efforts to reduce teen pregnancy can have strong downstream impacts on the health of our nation's adolescents. Programs that target high-risk communities and address the 'whole adolescent' through positive youth development, social empowerment and taking into account interrelated challenges and risk factors have tremendous potential. These programs can help reduce individual risk exposure while steering youth on trajectories for educational attainment and self-fulfillment. While preventing the initial pregnancy is the primary focus of teen pregnancy and repeat pregnancy prevention initiatives, teen pregnancy and parenting support services for youth as well as contraceptive methods initiated immediately postpartum hold promise for teen mothers and fathers. MCH programs and partners have numerous access points to achieve the aims of keeping teen parents on positive trajectories and preventing subsequent teen births.

Implications for equity

In the United States, repeat teen birth rates have been declining since 1990 but disparities still remain (2). According to preliminary 2011 data, the overall proportion of teen births that were repeat teen births in the nation was 18.4 percent. This proportion varied by race and Hispanic origin: 20.9 percent for non-Hispanic Black, 20.8 percent for Hispanic, 19.6 percent for American Indian or Alaska Native, 17.4 percent for Asian or Pacific Islander, and 14.8 percent for non-Hispanic White females (3). An estimated 19 percent of teen mothers (range 12 to 49 percent) experienced a subsequent pregnancy within 12 months and 38 percent (range 28 to 63 percent) experienced a subsequent pregnancy within 24 months (4,5). In 2010, repeat teen childbearing was typically lowest in the Northeast and highest in the South and Southwest (6).

A repeat teen birth is more likely to occur if the teen mother was younger at sexual debut and first birth, has lower educational expectations, intended her first birth, is living with a husband/partner, did not graduate high school after her first birth, and was unemployed or not enrolled in school after her first birth (7,8). Many of these characteristics are inherently associated with poverty and disinvested communities. Poverty has significant systematic effects on the occurrence and distribution of teen childbearing across populations. Unfavorable community and family socioeconomic influences that may result from poverty and increase the risk of teen pregnancy include exposure to single-parent homes at age 14, low educational attainment of the teen's parent(s), having a mother who gave birth as a teenager, family disorganization, residence in disinvested communities with limited employment opportunities and availability of affordable and comprehensive health care, neighborhood physical disorder, and neighborhood-level income inequality (3,9-17).

Public health impact

In 2010, teen childbearing cost U.S taxpayers approximately $9.4 billion for increased health care, public assistance, and foster care and contributed to lost tax revenue due to lower educational attainment and income among teen mothers and fathers as well as increased incarceration rates among children of teen parents (18,19).

Repeat teen pregnancy reduces the teen's ability to become self-sufficient and improve her and her children's socioeconomic future (20,21). Relative to women with first teen births, women with repeat teen births are less likely to receive prenatal care, complete school, work or maintain economic self-sufficiency, and have school-ready children. Repeat teen mothers are also more likely to have a preterm delivery, receive welfare, and have children with emotional and behavioral problems (4).

Preventing initial pregnancies is critical to reducing subsequent births to teens. Few teen pregnancy prevention programs have been adequately evaluated. In general, the most successful programs that work to reduce the first pregnancy, combine sexuality education with youth development activities and are initiated for adolescents at a young age (6,22). The most successful programs that aim to prevent or delay subsequent births are those that combine services for the adolescent mother and her child and those with follow-up of young mothers for at least two years (e.g. home visits by nurses) (6, 24, 23).

The effectiveness of programs to reduce repeat teen births, directly or indirectly, depends on the type of program or policy intervention. Interventions that target sexual beliefs and behaviors at the individual level (e.g. age at first sex, number of partners, and use of contraception) have greater potential of reducing teen births than those aimed at addressing risk factors at the community (e.g. violence and other forms of community social disorganization) or family (e.g. family structure, dynamics, and education) levels (20). Evaluations of programs that target repeat births have yielded mixed results (4). Those with significant findings had little to modest impact on adolescent sexual and contraceptive behavior in entire study populations or in subgroups (4). Several shortcomings of assessing effectiveness of these programs have been noted including the inability to determine whether observed modest impacts could be sustained over long periods of time, paying little or no attention to community- and family-level socioeconomic predictors of adolescent childbearing, and having no focus on male involvement or inclusion of males in interventions (22, 27).

Greater reductions in teen childbearing are expected to occur with the implementation of health care policies including the expansion of access to Medicaid family planning services and the *Patient Protection and Affordable Care Act* of 2010, which aims to improve access to and quality of health care services in the United States (24,25). For example, some states are currently considering partnerships with their Medicaid offices to enable immediate insertion of postpartum long-acting reversible contraceptives after delivery. South Carolina made such an update to its Medicaid coverage policy in 2012 (26).

Leverage or realign resources

Efforts to reduce repeat teen births have great potential to leverage and realign resources in a variety of sectors including the education, Medicaid, home visiting, and social welfare sectors. High school dropout rates are higher among teen mothers than teenagers without children. By not having a high school diploma or equivalent, teen parents may change their life course trajectory towards unfavorable health and socioeconomic circumstances for themselves and their children. Given the strong association of early sexual intercourse with other risk-taking behaviors, schools have implemented and supported education and service programs such as positive youth development programs (e.g. sex education and workforce development programs) that foster resiliency in youth to help reduce school dropout rates and teen pregnancies (6, 27). In many instances these programs are the result of partnerships between schools, community organizations, and state or community maternal, child, and adolescent health programs.

In the United States, Medicaid covers the cost of more than 66 percent of deliveries among teenagers, which is greater than the percentage among women 20 to 24 years of age (52.8 percent) (28). To help decrease the number of unplanned pregnancies and births paid for by Medicaid, Medicaid agencies provide family planning waivers to states to enable them to serve women otherwise ineligible for Medicaid, many of whom are teenagers. As of 2013, 31 states have obtained federal approval to extend Medicaid eligibility for family planning services to individuals who would otherwise not be eligible (29).

Many detrimental socioeconomic, behavioral, and health factors that face teen mothers and their children call for important resources and services that teen mothers may not be able to afford or access. The Maternal Infant, and Early Childhood Home Visiting program, administered by the Health Resources and Services Administration (HRSA) with the Administration for Children and Families (ACF), provides services to priority populations including adolescent teenage mothers and their children to reduce the incidence of repeat pregnancy and birth and adverse health conditions (6,24,30,31). Home visiting, which is available to pregnant women, new mothers, and children (eligibility differs by home visiting program model), attempts to mitigate many consequences of teen births that adversely affect the teen mother and her child.

Children born to teen mothers are more likely to enter foster care and interact with the judicial system than other children. Further, youth who have ever lived in foster care are more likely to engage in risky behaviors that may lead to arrests and teen pregnancies than other individuals. Adolescents who age out of foster care are at increased risk of experiencing

several hardships including homelessness, unemployment, and criminal activity (12). Ongoing partnerships and efforts between the foster care and juvenile justice systems along with the National Campaign to Prevent Teen and Unplanned Pregnancy have been promoted (32).

Predict an individual's health and wellness and/or that of their offspring

Teenage pregnancy and parenting are risk factors for poor medical and psychosocial outcomes for teen mothers, fathers, and their infants (6). As described previously, teen childbearing is associated with other adolescent risk-taking behaviors, calling into importance the integration of teen pregnancy prevention programs with positive youth development opportunities. Males, racial/ethnic minority groups, older teens, individuals who enter puberty early and are more physically developed, teens who abuse alcohol and drugs, and those who were sexually abused are more likely to engage in behaviors that lead to early childbearing than their counterparts (33). Furthermore, teen childbearing also is a risk-factor for further later disruptions in an individual's life course. While many teen mothers are able to complete high school education at a later time, (26,34,35) teens who do no return to school soon after giving birth are at much greater risk of becoming pregnant again within 15 months (26). Teen childbearing also impacts the wellness of teenage fathers. Teen fatherhood is correlated with low educational attainment, limited earnings, substance abuse and trouble with the law. Many do not maintain a long-term relationship with the teenage mother or their child or frequently do not provide most of their child's shelter, food, or clothing (26). Providing and collecting child support is a major issue that frequently involves the legal system.

Some of the mental health consequences of teen childbearing are also of great importance. Depression is a common occurrence for young women who bear children during adolescence (6). Maternal depression has been associated with negative maternal-child interactions and subsequent behavioral abnormalities, such as disruptive behavior in young children, especially young boys (3). In some children, this leads to persistent negative behavior and poor school performance (6,36-39). Children of teen mothers are also more likely to engage in sexual activity early, become teen parents themselves, and have higher than average rates of developmental delay, school failure, and substance abuse (26, 40, 41).

Infants born to teen mothers are at increased risk for adverse outcomes at birth, school age, and adolescence. The outcomes include increased risk of low birth weight (and subsequently increased risk of infant mortality), childhood behavioral problems, and risk-taking behavior during adolescence (6). Infants of adolescent mothers have an increased risk for death from intentional injury (6, 42-44). Children of adolescent mothers may also be at greater risk of unintentional injury, in part due to young mothers being less aware of potential risks or having lower maturity that may influence their perception or decision-making in the face of situations that may result in injury (6,38).

Further, the second-born children of teen mothers are at greater risk for adverse pregnancy outcomes (especially those resulting from short interpregnancy intervals), infant homicide, and poorer behavioral and educational development (as a consequence of limited time and resources) than his or her older sibling (5,45-47). Studies of interpregnancy interval, which is the time from the completion of one pregnancy to the conception of the next, suggest an optimal interval of 18 to 23 months, but it may vary for subgroups of women (48). Interpregnancy intervals of at least 12 months are recommended for women who had a live birth. Short interpregnancy interval has been shown to be associated with preterm delivery, infants who are small for gestational age, early infant death, and congenital malformations (49,50-52). Second and higher-order births during adolescence are associated with lower maternal educational attainment (53,54). In addition, some research suggests that short interpregnancy intervals may have lifetime effects for the child, including poor educational performance for children born after a short interpregnancy interval (55). Rapid repeat pregnancy (a possible consequence of lack of access to postpartum contraception) is associated with negative consequences for educational attainment and employment, among adolescents (53,54). Lack of access to education and employment, especially in early life, are important predictors of poverty. Other research has demonstrated a relationship between income inequality and short interpregnancy intervals in women of all ages (56).

Data Criteria

Data availability

Data on teenage births are collected annually for the 50 states and the District of Columbia. This data are also available at the city and county levels. The National Vital Statistics System is an intergovernmental sharing of data whose

relationships, standards, and procedures form the mechanism by which the National Center for Health Statistics (NCHS) collects and disseminates the nation's official vital statistics. Vital event data are collected and maintained by the jurisdictions that have legal responsibility for registering vital events; these entities provide the data via contracts to NCHS. Vital events include births, deaths, marriages, divorces, and fetal deaths. In the United States, legal authority for the registration of these events resides individually with the 50 states, two cities (Washington, DC, and New York City), and five territories (Puerto Rico, the Virgin Islands, Guam, American Samoa and the Commonwealth of the Northern Mariana Islands).

Vital Statistics data are available online in downloadable public use files, through pre-built tables in VitalStats, and through the ad-hoc query system CDC WONDER (Wide-ranging Online Data for Epidemiologic Research). Birth certificate data are available in WONDER for 1995-2010, and death certificate data by underlying cause of death (detailed mortality) are available for 1999-2010.

Data quality

Standard forms for the collection of the data and model procedures for the uniform registration of the events are developed and recommended for State use through cooperative activities of the states and NCHS. As reported in the NCHS publication U.S. Vital Statistics System, Major Activities and Developments, 1950-1995, efforts to improve the quality and usefulness of vital statistics data are ongoing. NCHS uses techniques such as testing for completeness and accuracy of data, querying incomplete or inconsistent entries on records, updating classifications, improving timeliness and usefulness of data, and keeping pace with evolving technology and changing needs for data. Work with state partners to improve the timeliness of vital event reporting is ongoing, and NCHS is working closely with National Association of Public Health Statistics and Information Systems and the Social Security Administration to modernize the processes through which vital statistics are produced in the United States, including implementation of the 2003 revised certificates.

According to the National Vital Statistics Report Births: Final Data for 2011, 36 states, the District of Columbia, and two territories implemented the revised birth certificate as of Jan. 1, 2011. The jurisdictions implementing the revisions represent 83 percent of all 2011 U.S. births. The revised reporting areas are: California, Colorado, Delaware, the District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York (including New York City), North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, Wisconsin, Wyoming, Puerto Rico and the Northern Marianas. Two states, Massachusetts and Minnesota, and one territory, Guam, implemented the revised birth certificate in 2011, but after Jan. 1.

Both the numerator (number of repeat live births to teenage females) and denominator (number of live births to teenage females) of this indicator are derived from birth certificate records. An Indiana study reported high agreeability of the number of previous live births (Kappa=0.935) and maternal age (Kappa=0.994) between birth certificates and medical records (57). For these two variables, sensitivity, specificity, and positive predictive value were noted as “not applicable.” Overall, the percent of repeat teen live births is an accurate measure.

Simplicity of indicator

The level of complexity in calculating and explaining this indicator is low. Repeat birth estimates are more often reported as percentages of live births to females aged 15 to 19 years than as rates (i.e. number of repeat births per 1,000 females aged 15 to 19 years). Data weighting, indexing, or adjustments are not required and the statistical formula is simple. Names and formula for this indicator may vary according to agency, organization, or group. For example, the Annie E. Casey Foundation (kidscount.org) defines this indicator as “Teen births to women who were already mothers” or “Births that were second or higher order births to mothers who were under the age of 20 at the time of the birth.” Other measures of repeat teen pregnancy may exist. Nonetheless, this measure can be easily explained.

References

(1) Centers for Disease Control and Prevention. (2014). Winnable Battes. http://www.cdc.gov/winnablebattles/

(2) Kost, K., Henshaw, S. & Carlin, L. (2010). U.S. teenage pregnancies, births and abortions: National and state trends and trends by race and ethnicity. Available: http://www.guttmacher.org/pubs/USTPtrends.pdf. Accessed: January 31, 2013.

(3) Hamilton, B. E., Martin, J. A., Ventura, S. J. (2012). Preliminary data for 2011. National vital statistics reports, 61(5). Hyattsville, MD: National Center for Health Statistics. Available: http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_05.pdf. Accessed: Feb. 20, 2013

(4) Elfenbein, D. S. & Felice, M. E. (2003). Adolescent pregnancy. The Pediatric Clinics of North America, 50, 781-800.

(5) Meade, C. S. & Ickovics, J. R. (2005). Systematic review of sexual risk among pregnant and mothering teens in the USA: pregnancy as an opportunity for integrated prevention of STD and repeat pregnancy. Social Science & Medicine, 60, 661-678.

(6) Schelar, E., Franzetta, K., Manlove, J. (2007). Repeat teen childbearing: differences across states and by race and ethnicity. Research brief number: 2007-23. Washington, DC: Child Trends. Available: http://www.childtrends.org/Files/Child_Trends-2007_10_25_RB_Repeat.pdf. Accessed: Feb. 14, 2013.

(7) Klerman, L. V. (2004). Another chance: Preventing additional births to teen mothers. Washington, DC. The National Campaign to Prevent Teen Pregnancy. Available: http://www.thenationalcampaign.org/resources/pdf/pubs/AnotherChance_FINAL.pdf. Accessed: Feb. 20, 2013.

(8) Manlove, J., Mariner, C., & Papillo, A. R. (2000). Subsequent fertility among teen mothers: Longitudinal analyses of recent national data. Journal of Marriage and Family, 62(2), 430-448.

(9) Maynard, R. & Rangarajan, A. (1994). Contraceptive use and repeat pregnancies among welfare-dependent teenage mothers. Family Planning Perspectives, 26, 198-205.

(10) Salihu, H. M., August, E. M., Jeffers, D. F., et al. (2011). Effectiveness of a federal Healthy Start program in reducing primary and repeat teen pregnancies: our experience over the decade. Journal of Pediatric and Adolescent Gynecology, 24, 153-160.

(11) Buston, K., Williamson, L., & Hart, G. (2007). Young women under 16 years with experience of sexual intercourse: Who becomes pregnant? Journal of Epidemiology & Community Health, 61, 221-225.

(12) Raneri, L. G. & Wiemann, C. M. (2007). Social ecological predictors of repeat adolescent pregnancy. Perspectives on Sexual and Reproductive Health, 39, 39-47.

(13) Kirby, D. (1997). No easy answers. Research findings on programs to reduce teen pregnancy. Washington, DC: The National Campaign to Prevent Teen Pregnancy.

(14) Tamburlini, G. (2004). Promoting equity in health. Health Policy and Development, 2(3), 186-191.

(15) Martinez, G., Copen, C. E., & Abma, J. C. (2011). *Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, 2006-2010 National Survey of Family Growth*: National Center for Health Statistics. Vital and Health Statistics 23(31). Available http://www.cdc.gov/nchs/data/series/sr_23/sr23_031.pdf. Accessed: Feb. 14, 2013.

(16) Penman-Aguilar, A., Carter, M., Snead, M. C., Kourtis, A. P. (2013). Socioeconomic disadvantage as a social determinant of teen childbearing in the U.S. Public Health Reports, Supplement, 128, 5-22.

(17) Moore, K. A., Sugland, B. W., Blumenthal, C., Glei, D., Snyder, N. (1995). Adolescent Pregnancy Prevention Programs: Interventions and Evaluations. Washington, DC. Available: http://www.childtrends.org/Files//Child_Trends-1995_01_01_ES_AdolPregPrevProg.pdf. Accessed: Feb. 15, 2013.

(18) National Campaign to Prevent Teen and Unplanned Pregnancy (2014). Counting it up: The public costs of teen childbearing. Available: https://thenationalcampaign.org/resource/public-costs-teen-childbearing-united-states. Accessed: Aug. 22, 2014..

(19) American College of Obstetrics and Gynecologists (2007). Strategies for adolescent pregnancy prevention. Washington, DC. Available: http://www.acog.org/~/media/Departments/Adolescent%20Health%20Care/StrategiesForAdolescentPregnancyPrevention.pdf. Accessed: Feb. 6, 2013.

(20) National Campaign to Prevent Unplanned and Teen Pregnancy (2004). Science Says: Another chance: Preventing additional births to teen Mothers, no.10. Available: http://www.thenationalcampaign.org/resources/pdf/SS/SS10_AnotherChance.pdf. Accessed: Feb. 6, 2013.

(21) Centers for Disease Control and Prevention (2011). At A Glance 2011. Teen Pregnancy: Improving the Lives of Young People and Strengthening Communities by Reducing Teen Pregnancy. Available: http://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2011/Teen-Pregnancy-AAG-2011_508.pdf. Accessed: Feb. 6, 2013.

(22) Manlove, J., Terry-Humen, E., Romano Papillo, A., et al. (2002). Preventing teenage pregnancy, child-bearing, and sexually transmitted disease: what the research show. American Teen Series Research Brief. Washington, DC: Child Trends.

(23) Olds, D. L., Henderson, C. R. Kitzman, H. J., et al. (1999). Prenatal and infancy home visitation by nurses: Recent findings. The Future of Children, 9(1), 44-65.

(24) Thomas, A. (2012). Policy Solutions for Preventing Unplanned Pregnancy. Washington, DC. Available: http://www.brookings.edu/reports/2012/03_unplanned_pregnancy_thomas.aspx. Accessed: Feb. 14, 2013.

(25) English, A. (2010). The Patient Protection and Affordable Care Act of 2010: How does it help adolescents and young adults? : Center for Adolescent Health & the Law, National Adolescent Health Information and Innovation Center. Available: http://nahic.ucsf.edu/wp-content/uploads/2011/02/HCR_Issue_Brief_Aug2010_Final_Aug31.pdf. Accessed: Feb. 14, 2013.

(26) South Carolina Department of Health and Human Services (2012). Medicaid Bulletin: Long Acting Birth Control Device Provided in Hospital Setting. Columbia, South Carolina. Available: https://www.scdhhs.gov/sites/default/files/BirthControlDevices.pdf. Accessed Aug. 22, 2014.

(27) National Conference of State Legislatures(2009). Teen pregnancy prevention; Making a difference for at-risk populations. Washington, DC. Available: http://www.ncsl.org/documents/health/teenpregnancy09.pdf. Accessed: Feb. 6, 2013.

(28) Gavin, N. I., Kuo, M., Adams, E. K., Ayadi, M. F., Gilbert, B. C. (2005). Medicaid service use and program costs for pregnant teens. Expert Reviews of Pharmacoeconomics & Outcomes Research.

(29) Guttmacher Institute(2013). State policies in brief: Medicaid family planning eligibility expansions. Available: http://www.guttmacher.org/statecenter/spibs/spib_SMFPE.pdf. Accessed: Feb. 6, 2013.

(30) Health Resources and Services Administration. Maternal, Infant, and Early Childhood Home Visiting Program. Available: http://mchb.hrsa.gov/programs/homevisiting/. Accessed: Feb. 25, 2013.

(31) Advocates for Youth (2009). Science and success: Programs that work to prevent subsequent pregnancy among adolescent mothers. Washington, DC. Available: http://www.advocatesforyouth.org/storage/advfy/documents/sspregnancies.pdf. Accessed: Feb. 6, 2013.

(32) The National Campaign to Prevent Teen and Unplanned Pregnancy (2009). Critical judgment: How juvenile and family court judges can help prevent teen and unplanned pregnancy. Washington, DC. Available: http://www.thenationalcampaign.org/fostercare/resources_pubs.aspx. Accessed: Feb. 6, 2013.

(33) Manlove, J., Terry-Humen, E., Romano Papillo, A., et al. (2002). Preventing teenage pregnancy, child-bearing, and sexually transmitted disease: what the research shows. American Teen Series Research Brief. Washington, DC: Child Trends. Available: http://www.childtrends.org/files/k1brief.pdf. Accessed: Mar. 4, 2013.

(34) Klepinger, D. H., Lundberg, S., & Plotnick, R. D. (1995). Adolescent fertility and the educational attainment of young women. Family Planning Perspectives, 27(1), 23-28.

(35) Hofferth, S. L., Reid, L., & Mott, F. L. (2001). The effects of early childbearing on schooling over time. Family Planning Perspectives, 33(6), 259-267.

(36) Leadbeater, B. J., Bishop, S. J., & Raver, C. C. (1996). Quality of mother-toddler interactions, maternal depressive symptoms, and behavior problems in preschoolers of adolescent mothers. Developmental Psychology, 32(2), 280-288.

(37) Spicker, S. J., Larson, N. C., Lewis, S. M., et al. (1999). Developmental trajectories of disruptive behavior problems in preschool children of adolescent mothers. Child Development, 70(2), 443-458.

(38) Hubbs-Tait, L., Osofsky, J. D., Hann, D. M., et al. Predicting behavior problems and social competence in children of adolescent mothers (1994). Family Relations, 43, 439-446.

(39) Hubbs-Tait, L., Hughes, K. P., Culp, A. M., et al. (1996). Children of adolescent mothers: attachment representation, maternal depression, and later behavior problems. American Journal of Orthopsychiatry, 66(3), 416-426.

(40) Committee on Adolescence (1999). American Academy of Pediatrics. Adolescent Pregnancy-Current Trends and Issues: 1998. Pediatrics, 103(2), 516-520.

(41) Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality (2011). The NSDUH Report: Substance use among young mothers. Rockville, MD. Available: http://www.samhsa.gov/data/2k11/WEBSR196YoungMothers/YoungMothersHTML.pdf . Accessed: Feb. 25, 2013.

(42) Siegel, C. D., Graves, P., Maloney, K., et al. (1996). Mortality from intentional and unintentional injury among infants of young mothers in Colorado, 1986 to 1992. Archives of Pediatrics & Adolescent Medicine, 150, 1077-1083.

(43) Stier, D. M., Leventhal, J. M., Berg, A. T., et al. (1993). Are children born to young mothers at increased risk of maltreatment? Pediatrics, 91, 642-643.

(44) Buschholz, E. S. & Korn-Bursztyn, C. (1993). Children of adolescent mothers: are they at increased risk for abuse? Adolescence, 28(110), 361-382.

(45) Cowden, A. J. & Funkhouser, E. (2001). Adolescent pregnancy, infant mortality, and source of payment for birth: Alabama residential live births, 1991 – 1994. Journal of Adolescent Health, 29, 37-45.

(46) Overpeck, M. D., Brenner, R. A., Trumble, A. C., et al. (1998). Risk factors for infant homicide in the United States. New England Journal of Medicine, 339(17), 1211-1216.

(47) Blankston, M. L., Cliver, S. P., Goldenberg, R. L., et al. (1993). Health behavior and outcomes in sequential pregnancies of black and white adolescents. Journal of the American Medical Association, 269(11), 1401-1403.

(48) Zhu, B. P. (2005). Effect of interpregnancy interval on birth outcomes: findings from three recent U.S. studies. International Journal of Gynecology & Obstetrics, 89, S25-S33.

(49) Grisaru-Granovsky, S., Gordon, E.S., Haklai, Z., Samueloff, A., Schimmel, M.M. (2009). Effect of interpregnancy interval on adverse perinatal outcomes--a national study. *Contraception*, 80, 512-8.

(50) Hussaini, K.S., Ritenour, D., Coonrod, D.V. (2012). Interpregnancy intervals and the risk for infant mortality: A case control study of Arizona infants 2003-2007. *Matern Child Health J*, epub ahead of print.

(51)Kwon, S., Lazo-Escalante, M., Villaran, M.V., Li, C.I. (2012). Relationship between interpregnancy interval and birth defects in Washington State. *J Perinatol*, 32, 45-50.

(52) Conde-Agudelo, A., Rosas-Bermudez, A., Kafury-Goeta, A. C. (2006). Birth spacing and risk of adverse perinatal outcomes: A meta-analysis. *JAMA*, 295, 1809–1823.

(53) Polit, D.F., Kahn, J.R. (1986). Early subsequent pregnancy among economically disadvantaged teenage mothers. *American Journal of Public Health*, 76, 167-171.

(54) Furstenberg, F.F., Brooks-Gunn, J., Morgan, S.P. (1987). Adolescent mothers and their children in later life. *Fam Plann Perspect*, 19, 142-51.

(55) Hayes, H., Luchok, K., Martin, A.B., McKeown, R.E., Evans, A. (2006). Short birth intervals and the risk of school unreadiness among a Medicaid population in South Carolina. *Child: Care, Health and Development*, 32, 423–430.

(56) Gold, R., Connell, F. A., Heagerty, P., Bezruchka, S., Davis, R., Lawrence Cawthon, M. (2004). Income inequality and pregnancy spacing. *Social Science and Medicine*, 59, 1117–1126.

(57) Zollinger, T. W., Przybylski, M. J., Gamache, R.E. (2006). Reliability of Indiana birth certificate data compared to medical records. Annals of Epidemiology , 16(1), 1-10.

This publication was supported by a grant from the W.K. Kellogg Foundation. Its contents are solely the responsibility of the author and do not necessarily represent the official views of the W.K. Kellogg Foundation.

To learn more, please contact Caroline Stampfel, senior epidemiologist at cstampfel@amchp.org or (202) 775-0436.

Association of Maternal & Child Health Programs
2030 M Street, NW, Suite 350
Washington, DC 20036
(202) 775-0436 ▪ www.amchp.org