

Life Course Indicator: Mother's Education Level at 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: Mother's Education Level at Birth (LC-21)

Brief description: Percent of births by maternal education levels (<high school, high school, and some college)

Indicator category: Economic Experiences

Indicator domain: Risk/Outcome

Numerator: Number of women delivering a live birth with <high school, high school, and some college

Denominator: All live births

Potential modifiers: Race, ethnicity, sex, age, SES, marital status, geographic location

Data source: National Vital Statistics System (NVSS) Records

Notes on calculation: Women who have an eighth grade or less education level and ninth through 12th grade but no diploma will be placed into the "less than high school" category. Those who are high school graduates or completed a GED, some college credit but no degree will be in the "high school" category. Those with Associate degrees (e.g. AA, AS) or higher will be in the "greater than high school" category. The numerator will consist of the number of births at each of the noted education levels and the denominator for each will be total live births. When using the NVSS Public Use File, Mother's Education is located in the data file at column 155 with variable name MEDUC; this data is included in the public use file only for states and jurisdictions that have implemented the 2003 revision of the birth certificate.

Similar measures in other indicator sets: Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Benchmark Area Improvements in Family Economic Self-Sufficiency: Employment or education of participating adults

Life Course Criteria

Introduction

Socioeconomic inequalities throughout the life course may be partially accounted for by parental socioeconomic position (SEP) at time of birth and throughout early childhood. Maternal education specifically is a common proxy for parental socioeconomic position. A pioneering paper in 1979 considered demographic data to examine the role of education in child mortality. The paper argued that children of mothers who are more educated experience lower mortality than do children of mothers who are less educated (23). Subsequent analyses and demographic studies have demonstrated various associations between maternal education and markers of child health. Maternal education has been shown to have a statistically significant association with infant mortality, children's immunization status, and height-for-age (17). Functioning as both a proxy for SEP and for mothers' awareness and knowledge of healthy behaviors, maternal education may influence nutritional choices during pregnancy, which might affect birth weight, infant mortality, and height-for-age measures (18).

Maternal education at birth is a life course in a few ways. First, an increase in education at any point in a mother's life is likely to be beneficial for the betterment of the mother and her family. Having higher levels of education will help mothers make informed decisions about their child's health, education and nutrition. Second, maternal education at the time of birth may also be a marker for adversity in her own life, e.g., with early onset psychopathology (6) and early abuse (9) linked to the risk of teen pregnancy.

Implications for equity

Social conditions such as education, occupation, income and socioeconomic status are all influenced by maternal education level. Higher individual educational achievement often leads to higher earning potential (5). Higher educational achievement in individuals and across a population is associated with safer housing, food security, and access to medical care and more opportunities for education (2-4). Education likely conveys an increase in knowledge and skills that may make an individual more receptive to health information, able to process complex topics, and make health-related choices based upon current and future circumstances. Maternal education specifically is hypothesized to lead to changes in maternal behavior that result in better health outcomes in childhood (8).

Significant disparities persist in educational attainment between racial and ethnic groups. For example, population groups across the United States experience different rates of high school graduation: trend analysis of data from the past forty years shows non-Hispanic Black and Hispanic populations have lower completion (graduation) rates than other racial/ethnic populations. In 2009, among 18-24 year olds not currently enrolled in high school, Asian/Pacific Islander (95.9) and Whites (93.8) had completion rates of more than 90 percent. For the same year, Blacks (87.1), American Indians/Alaska Natives (82.4), and Hispanics (76.8) had rates below 90 percent (30) (See life course indicators narratives for LC-20: High School Graduation Rate and LC-57: Fourth Grade Proficiency).

Educational attainment is also a "protective" factor for overall health (31). There is a well known and persistent association between education and health (25-27). This relationship has been observed in many geographies and time periods, and for a wide variety of health measures. As a protective factor, educational attainment has implications for equity because it may contribute to resilience against additional social risk factors; in the case of maternal education at birth, this resilience benefits the mother, child, and family.

Communities with strong education systems and high educational attainment tend to have greater social capital. Social capital is the collection of features of social organization – such as civic participation, norms of reciprocity, and trust in others – that help facilitate cooperation for mutual benefit (36). As such, social capital is a collective resource that benefits communities and can be distinguished from the individual health effects of social networks and support (37). . The World Bank summarizes the fundamental ways social capital is produced through education as:

- development and practice of social capacity skills such as participation and reciprocity
- provisions of forums for community activity
- delivery of civic education to learn how to participate responsibly in their society
- contribute or promote overall societal cohesion and strengthened citizenship when children of all socio-economic backgrounds are enrolled in the public education system (24)

Public health impact

As education is directly linked to family socioeconomic situation, which in itself is a determinant of child health, increases in maternal education benefit not only the child but the family as a whole. Mothers who are more educated spend more time in engaging child activities and adjust the type and level of care according to the child's age, more so than mothers who are less educated (12). This in turn leads to children performing better in schools and improving educational achievement.

Achieving higher levels of education is associated with increased social support among women and has been documented to enhance parenting skills. The greater the education level, the stronger social ties a person has, which is associated with more positive health outcomes (13). For example, strong social networks help women to combat psychosocial pressures such as depression and hopelessness (3). With regard to parenting, mothers who are more educated spend significantly more time in four parenting activities across child age subgroups (1) basic care, i.e. feeding, bathing, and physical care; (2) play, games, art, and make believe; (3) teaching, reading and helping with homework; and (4) management of the child's life outside the home environment (12). These four activities are considered investments in the child's future for further child educational attainment, social mobility, and future success. Additional evidence of a wider public health impact is found in the link between maternal education and increases in childhood immunization, both an increased likelihood of utilizing immunizations and an increase in following the proscribed schedule(9). Increasing the number of children immunized every year is one of the greatest public health advantages resulting from improving maternal education. Through this lens, focusing on improving the education of girls and women can be considered an investment in current and future generations with regard to closing achievement gaps and improving earning potential and socioeconomic position, as well as accruing significant societal benefits.

Leverage or realign resources

In order to successfully increase the level of maternal education prior to pregnancy, broad investments in the education and advancement of young women and girls are required. These investments would reinforce a growing understanding of the continued empowerment of women's voices and priorities across health and social issues, signified in part by the establishment of the White House Council on Women and Girls.

In addition to improving the educational outcomes of women in the preconception period, opportunities exist to improve and support the educational attainment of new parents for the benefit of that child and future children. Parents of young children account for around a quarter of undergraduate students, and half of those parents are single parents. Providing these parents with day care options in order to finish degree programs is vital for them to be able to attend class with minimum interruption (7). Other interventions can be used to encourage mothers to finish high school degrees, such as offering smaller class sizes where children can be in the classroom, collaborating with community groups to provide support, and offering counseling and other mental health support activities. Additional classes could be tailored to the child care and family health needs of the mothers to instruct them on topics such as childhood nutrition and proper immunization schedules.

Education is a powerful predictor of health, but the public health field has very little control over increasing educational performance. This indicator has the potential to leverage or realign resources as multiple potential partners, including many non-traditional public health partners, have a vested interest in improving educational outcomes. Some examples of potential new or strengthened partnerships include:

- New or strengthened partnerships with public school systems as completion rates are national performance measures for schools
- New or strengthened partnerships between family planning and contraceptive services and educational programs
- New or strengthened partnerships with business, commerce and union associations as employers need employees who are well trained.
- New or strengthened partnerships with justice system stakeholders as there is a strong correlation between education and involvement in the justice system, and this indicator could open new avenues for collaborative public policy and strategies.

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

Increasing the educational level of mothers would have a significant impact on their health as well as the health and well-being of their children. The connection between education and health spans almost all health conditions including general health status, and particular acute, chronic, or disabling health conditions. Educational attainment is also a strong predictor of overall life expectancy (28-29).

In addition, maternal education attainment has been linked to various child health outcomes. Baughcum et al, showed that the lower the educational attainment of the mother the greater the prevalence of maternal obesity, and in turn, preschool aged children of mothers who are obese were more likely to be overweight (1). Also mothers who are obese were less likely to recognize their children as being overweight. They hypothesized that this may be due to a lack of awareness of the health risks associated with obesity. Guryan et al. hypothesized that educated parents consider time spent with children as an investment in their future (10). As such, children of mothers who are educated may develop faster language growth (14) and educational growth (12). The greater the education level, the stronger social ties a person has, which is associated with more positive health outcomes (19).

Data Criteria

Data availability

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 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 (Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research). As noted below in data quality, some states have not implemented the 2003 birth certificate revision. This has implications for availability of maternal education data in the public use data files and the CDC WONDER system. Beginning in 2011, education data for states using the unrevised (1989) birth certificate forma, education data are no longer included in the public use file because these data elements are not comparable across years (33). In the CDC WONDER system, education data have been recoded to "Excluded" for births to mothers residing in a reporting area that used the 1989 U.S. Standard Certificate of Live Birth in the specified data year (34). All reporting areas collect information on Education, but information from the 2003 revision of the birth certificate is not comparable to the information based on the earlier certificate. The following reporting areas have Education and Prenatal Care data coded to "Excluded": Alabama, 2007-2011; Alaska 2007-2011; Arizona 2007-2011; Arkansas 2007-2011; Connecticut 2007-2011; District of Columbia 2007-2009; Georgia 2007; Hawaii 2007-2011; Illinois 2007-2009; Louisiana 2007-2010; Maine 2007-2011; Maryland 2007-2009; Massachusetts 2007-2011; Michigan 2007; Minnesota 2007-2011; Mississippi 2007-2011; Missouri 2007-2009; Montana 2007; Nevada 2007-2009; New Jersey 2007-2011; New Mexico 2007; New York City 2007; North Carolina 2007-2010; Oklahoma 2007-2009; Oregon 2007; Rhode Island 2007-2011; Utah 2007-2008; Virginia 2007-2011; West Virginia 2007-2011; Wisconsin 2007-2010.

National estimates of maternal education generated from NVSS data are therefore representative of only those states implementing the 2003 revision of the birth certificate in that data year; for 2011 this is 83 percent of all births and for 2012 this is 86 percent. Those with access to their own jurisdiction's birth certificate data can generate estimates for maternal education regardless of whether that jurisdiction's data are included in the NVSS. However, it may not be appropriate to compare data with the national estimate given the differences in how the data are collected.

Data must be downloaded from CDC vital statistics and then imported into data analysis software. Protocols and procedures of obtaining and analyzing data are on the CDC website. CDC Vital Statistics Birth Data Files, 2003 Revised Live Birth Certificate (all states are required to be using the revised certificate by Jan. 1, 2014), http://www.cdc.gov/nchs/nvss/vital_certificate_revisions.htm.

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 2012*, thirty-eight states, DC, and three territories implemented the revised birth certificate as of January 1, 2012 (32). The jurisdictions implementing the revisions represent 86 percent of all 2012 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, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, Wisconsin, Wyoming, Guam, the Northern Marianas and Puerto Rico. Virginia implemented the revised birth certificate in 2012, but after Jan. 1. Educational attainment is a key data item that is not comparable between the 1989 and 2003 birth certificate revisions; data on this element is not included in the National Vital Statistics Reports but can be accessed in the User Guide (33) for revised states.

When using birth certificate data, accuracy and completeness of the data elements being analyzed should be considered; incomplete or inaccurate reporting of data elements can result in information bias. Researchers have found that sensitivity, specificity, and positive and negative predictive values of birth certificate data, as compared to medical record data, vary between teaching and non-teaching hospitals(11). A study by DiGiuseppe and colleagues found that for maternal demographic information (notably not including maternal education) the kappa statistic for agreement between medical records and birth certificate data for patients in all hospitals was 0.868, with nonteaching hospital kappa=0.769 and teaching hospital kappa=0.921. While other studies have not included maternal education among inquiries into data quality, reliability for demographic data has been found to be consistent (15, 16).

Simplicity of indicator

The indicator is easy to calculate once data are obtained. The data will not require any linkage as when the data is obtained from vital records, the indicator will be in the data file. The indicator will contain actual population numbers of live births, therefore weighting or stratifying of data is not necessary. Birth certificates of all live births in a given calendar year must be obtained. As noted in the above sections on availability and quality, states who have not implemented the 2003 revision of the birth certificate do not have data for maternal education included in the nationally available public use data and CDC WONDER. Those using state data, particularly those from jurisdictions that are not implementing the 2003 revision, should note this and use caution in comparing to the national estimate.

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