A Comparative Analysis of Infant Health in the US

Focus Summary

According to the World Health Organization (WHO), maternal and infant health is one of the greatest indicators of the health of a nation (2012).[1] In terms of key indicators for maternal and infant health, specifically infant mortality, the United States lags behind comparable nations with significantly worse birth outcomes (WHO, 2010).[2] The infant mortality rate in the U.S. is about 6 per 1,000 live births, more than double the rate of infant mortality in Sweden, Finland, Norway, Japan, South Korea, and Singapore (CIA, 2017)[3] despite the fact that the U.S. spends a greater proportion of its GDP on healthcare than other comparable nations.[4] The greatest contributing factor to a higher infant mortality in the United States is the high rate of preterm births.[5] In fact, research identified that preterm births replaced infectious disease in 2014 as the most common killer of children under five years old.[6]

According to the Center for Disease Control, approximately 1 in 10 babies born in the U.S. are born prematurely.[7] The rate of preterm births increased from 2014 to 2016 overall for the U.S., including significant increased in 23 states and the District of Columbia.[8] The U.S. ranks among the top ten countries in the world for the number of preterm births, contributing to approximately 2.6% of all preterm births worldwide.[9] While a global survey of preterm birth rates has not been conducted by the World Health Organization since 2010, the thorough examination of preterm births worldwide placed the United States preterm birth rate at a comparable point to that of Turkey, Somalia, and Lesotho. The preterm birth rate in the U.S. far exceeded that of many economically comparable nations including Sweden, Finland, Denmark, Norway, Japan, the United Kingdom and France, even to the point of being almost double the rates present in these comparable countries.[10] Within the U.S., large regional discrepancies between preterm birth rates exist. Preterm birth rates are worst in Louisiana, Mississippi, Alabama, and West Virginia. Within these regions, large racial disparities exist. For example, in Louisiana a black woman is 51% more likely to have a preterm baby than all other women. In Minnesota, though preterm birth rates overall are much lower, racial disparities are still clearly

[1] https://www.who.int/healthinfo/EN_WHS2012_Part3.pdf
[2] https://www.who.int/pmnch/knowledge/publications/preterm_birth_report/en/index3.htm
[3] https://www.cia.gov/library/publications/the-world-factbook/rankorder/2091rank.html
[4] https://www.healthsystemtracker.org/chart-collection/health-spending-u-s-compare-countries/#item-since-1980-the-gap-has-widened-between-u-s-health-spending-and-that-of-other-countries___2018
[5] https://www.cdc.gov/nchs/products/databriefs/db23.htm
[6] https://stm.sciencemag.org/content/6/263/263ed21/tab-pdf
[7] https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pretermbirth.htm
[8] https://www.cdc.gov/nchs/products/databriefs/db312.htm
[9] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30451-0/fulltext#seccestitle150
[10] https://www.who.int/pmnch/knowledge/publications/preterm_birth_report/en/index3.html

evident as American Indian/Alaskan Native women are 58% more likely to have a preterm baby.[11]

To identify public health and policy interventions to improve maternal and infant health, this report focuses on why preterm birth rates are high in the United States. In order to arrive at potential solutions to the preterm birth crisis occurring in the U.S., contributing factors are analyzed and discussed, including maternal age, income, social support, insurance status, pre-existing health, environment, education, and drug use.

Contributing Factors Towards High Preterm Birth Rates in the United States

Topic One: Age of Mothers

Advanced maternal age and high teenage pregnancy rates are associated with negative maternal and infant health outcomes.[12][13] Various studies have cited rising maternal age in particular as a contributing factor to the rising preterm birth rates for the United States. This is because women over forty years old are more likely to have multiple births due to physiological factors and the use of fertility treatments, and multiple births are more likely to be born prior to term.[14][15]

Although the United States has a relatively large number of mothers over the age of forty giving birth, adding up to approximately 11.6 per 1,000 women aged 40-44, the trend does not stand out among comparable countries. Particularly in the United Kingdom, birth rates are increasing most in women aged 40 and over, with over 15 births per 1,000 women aged 40-44.[16] [17] It is also notable that the average age of mothers in the US is lower at 26.4 years old than the European Union average of approximately 29 years old. On the high end of the European countries mothers in Nordic countries and the U.K. range between 28-31 year old.[18][19]

Similarly, though fertility treatment is common in the U.S. as approximately one-third of Americans have either used fertility treatments or know someone who has,[20] the U.S. does not stand out among comparable nations. Other countries such as Denmark, have some of the most liberal policies related to fertility treatments and high rates of use. Yet, Denmark does not experience the same degree of problems with fertility treatments, potentially because the

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[11] https://www.marchofdimes.org/mission/prematurity-reportcard-tv.aspx
[12] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5791955/
[13] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2909926/
[14] https://www.ncbi.nlm.nih.gov/pubmed/9494814
[15] https://pediatrics.aappublications.org/content/111/Supplement_1/1159.abstract
[16] https://www.statista.com/statistics/785920/distribution-of-births-by-age-of-mother-us/
[17] https://www.telegraph.co.uk/news/2018/03/27/older-mothers-rise-over-40s-become-group-rising-conception-rate/
[18] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20170808-1
[19] https://www.cia.gov/library/publications/the-world-factbook/fields/352.html
[20] https://www.pewresearch.org/fact-tank/2018/07/17/a-third-of-u-s-adults-say-they-have-used-fertility-treatments-or-know-someone-who-has/

treatments are less strenuous on a woman's body and better certified for use.[21][22] Indeed though fertility treatments can lead to a higher risk of multiple births which consequently increases the chances for preterm births,[23] research identifies that the greatest risk with fertility treatments are ones that involve the high usage of technology and intervention. [24]

While considering fertility treatments, one may also wonder about the prolonged use of birth control which is common among older mothers. Certain birth control methods are associated with increased preterm birth risk, particularly contraceptives containing the progestin norethisterone. Pregnancies also may be more complicated if they begin while mothers are using intrauterine devices.[25][26] Other research finds that the timing of birth control use matters; a mother using birth control near to when she becomes pregnant or during the beginning of her pregnancy can also increase risks of complications, particularly for low birth weight and preterm birth.[27] Though using contraceptives in the form of female birth control can potentially have negative effects on fetal development, there are also negative effects of unplanned pregnancies for women of all ages and demographics.[28][29] Therefore, decreasing contraceptive use does not seem to be a potential solution to decreasing preterm birth risk, rather comprehensive education of the risks and benefits of different types of contraceptives appears important.

On the other spectrum of age linked to birth complications, the lower average age of mothers in the U.S. can be partially attributed to a relatively higher teen birth rate in the U.S. than comparable countries. Among 21 countries analyzed in a study published by the journal of adolescent health, the pregnancy rate among 15 to 19 year olds was the highest in the United States (57 pregnancies per 1,000 females) and the lowest rate was in Switzerland (8 pregnancies per 1,000 females). Rates were for teen pregnancy were also high in some former Soviet countries based on the available information, including Eastern European countries such as Romania, Hungary, and Bulgaria. These countries specifically tend to have worse birth outcomes among European countries despite fewer mothers over the age of forty years old.[30]

There is an interesting connection between pregnancy terminations and teen births. The proportion of teen pregnancies that ended in abortion ranged from 17% in Slovakia to 69% in Sweden. The proportion of pregnancies that ended in live births tended to be higher in countries with high teen pregnancy rates such as Slovakia versus countries with very low teen and unintended pregnancy rates. Thus, a higher number of teen pregnancies resulting in birth are high risk. Pregnancy rates in general, however, and teen pregnancy rates specifically, have declined

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[21] https://www.bbc.com/news/world-europe-45512312
[22] https://www.sciencedirect.com/science/article/pii/0029784495000029
[23] https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/j.1471-0528.2005.00598.
[24] https://academic.oup.com/humrep/article/17/4/945/644624
[25] https://www.ncbi.nlm.nih.gov/pubmed/2531866
[26] https://www.sciencedirect.com/science/article/pii/S0002937809006747
[27] https://www.sciencedirect.com/science/article/pii/S0301211509000748
[28] https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1365-3016.2000.00289.x
[29] https://onlinelibrary.wiley.com/doi/abs/10.1363/4006608
[30] https://www.hhs.gov/ash/oah/adolescent-development/reproductive-health-and-teen-pregnancy/teen-pregnancy-and-childbearing/trends/index.html

on average in the past two decades.[31] Yet teen mothers are still more likely to have pregnancy complications. Therefore, even with declining numbers of teen mothers overall, the high rate compared to other nations is concerning for the state of maternal and child health in the U.S.[32][33][34]

In conclusion, while age the rising age of mothers in the U.S. and other comparable nations is linked to preterm birth, it is not sufficient to explain why preterm births are on the rise. The preterm birth rate in the U.S. is conspicuously high in tandem with high maternal and infant mortality. While the U.S. has failed to lower these rates significantly, other comparable nations with rising maternal ages have achieved lower preterm birth rates and maternal and infant mortality. Some of the difference may be due to higher teenage birth rates in the U.S., but teen birth rates are falling in the U.S. overall, so even high teen birth rates fail to address a comprehensive picture of why vital infant health statistics are problematic in the U.S..

Topic Two: Social Support, Marriage, and Family Planning

Prior to the 2000s era, teenage pregnancy and pregnancy in unmarried women were synonymous because the largest proportion of unmarried mothers were teenagers. Recent decades have shifted the trend significantly. According to the Center for Disease Control, approximately 40% of births are to unmarried mothers, most of whom are in their twenties.[35][36]Births to unmarried mothers have been associated with higher risks for birth outcomes, particularly preterm birth, low infant birth weight, and high infant mortality.[37] In addition, there is a positive association seen within the United States between marriage, financial security, and strong social support.[38] That being said, as trends are changing, more unmarried mothers are cohabiting with a partner, leading to additional social and financial support compared to women who are living alone and preparing to care for their infant independently. Research identifies that modest disparities in pregnancy outcomes within the U.S. in common-law versus traditional marriage relationships have persisted despite the striking rise in common-law unions.[39]

The importance of marital status pregnancy outcomes is largely cultural. The U.S. is hardly alone on the rising proportion of births to unmarried mothers, in particular several comparable countries with superior birth outcomes including Iceland, Sweden, and Norway, have significantly proportions of births to unwed mothers. In a study focused exclusively within

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[31] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4852976/
[32] https://www.ncbi.nlm.nih.gov/pubmed/18578105
[33] https://www.ncbi.nlm.nih.gov/pubmed/18578105
[34] https://www.cdc.gov/teenpregnancy/about/index.htm
[35] https://www.cdc.gov/nchs/fastats/unmarried-childbearing.htm
[36] https://www.cdc.gov/nchs/data/databriefs/db18.pdf
[37] https://www.ncbi.nlm.nih.gov/pubmed/15172868
[38] https://yaleglobal.yale.edu/content/out-wedlock-births-rise-worldwide
[39] https://www.ncbi.nlm.nih.gov/books/NBK11388/

Europe, there was a significantly elevated risk of preterm birth associated with both cohabitation and single motherhood for women living in countries where fewer than 20 percent of births occur outside marriage. In contrast, there is no excess risk associated with marital status when out-of-marriage births are more common.[40]

The importance of marriage to birth outcomes relate largely to additional factors, such as if the marriage is a productive and healthy relationship. If the marriage is physically abusive, worse birth outcomes are likely due to the high stress and physical manifestations of abuse. That being said, without the proper resources, attempting to remove oneself from an abusive relationship has the potential to put more strain on the mother due to financial and social stress.[41] Furthermore, the above research reinforces the importance of social support and the ability for a woman to feel secure while preparing for motherhood. Lack of social support is an independent variable contributing to preterm birth due to increased stress and pressure on a mother's health.[42]

Social support for mothers is multifaceted, on a microscale there is social support from family, partner, friends, and acquaintances. There was a significant relationship between mother's scores of family support and her age and education, so that mothers with a high school diploma and higher education had scores which were significantly higher than the others. Also, women whose husbands were smoking or drug abuser had lower support scores. There was a significant relationship between social support and the number of pregnancies and pregnancy complications, so the mothers had more pregnancies, the social support was lower and social support in unwanted pregnancies was significantly lower than the wanted pregnancies.[43]

On a more macro level, the general support for women and mothers is also critical. There is a link between birth complications and women's issues, specifically with the pay gap because it disproportionately affects single mothers and with discrepancies in women's health.[44] Where care is less accessible or of lower quality due to a shortage of practitioners, as seen in certain rural and low income communities within the U.S., women are less likely to be healthy prior to conception, leading to worse outcomes.[45] The U.S. while compared to other similar countries lags behind considerably in key macro factors, most notably for certain communities including AIAN women and African American Women.[46] There are also less generous benefits for parental leave, including paid maternity and paternity care, compared to other global north nations, contributing to financial and general stress for new parents.[47] The right to parental leave is linked with better birth outcomes and pediatric health in general, potentially presenting a cost effective means of improving child well-being.[48] A comparative analysis conducted by the

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[40] https://www.ncbi.nlm.nih.gov/pubmed/12064266
[41] https://onlinelibrary.wiley.com/doi/abs/10.1177/0884217505281906
[42] https://link.springer.com/content/pdf/10.1007%2Fs10995-009-0508-8.pdf
[43] http://ijp.mums.ac.ir/article_4703_9fc40d3fb14a35c0ab5d7da79671c613.pdf
[44] https://www.weforum.org/agenda/2018/11/deadly-delivery-how-childbirth-in-america-is-becoming-more-dangerous/
[45] https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.80.7.814
[46] https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-13-129
[47] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4934583
[48] https://www.sciencedirect.com/science/article/abs/pii/S0167629600000473

University of Notre Dame Law School found that Sweden's parental leave policy in particular has numerous benefits through ensuring mothers and fathers paid time off. The plan reduced parental stress, improving gender equity, reducing postpartum depression and improving infant health.[49]

Moreover, the U.S. stands out among comparable nations due to the number of unplanned pregnancies which occur.[50] Unplanned pregnancies in the U.S. disproportionately affect women with lower levels of education and fewer means of micro and macro forms of social support. Even though more women are unmarried, in Northern and Western Europe there are fewer unplanned pregnancies. Having children out of wedlock is more accepted and there are not the same financial incentives to marry, so there is not as strong of an association between marriage and social support. Out of all the unplanned pregnancies that do happen in Europe, however, the pregnancies are much more likely to end in an abortion.[51]

To increase social support, certain social interventions have been deemed successful, for example several programs designed to connect pregnant woman with a midwife who would call at a designated time to check in on how the mother was doing and if she had any questions.[52] There was also a successful program with calls in addition to other support offered to pregnant teenagers; the program found these teenage women to utilize prenatal care more consistently and were less likely to have a preterm birth than the control group analyzed.[53] Further, to reduce healthcare costs and offer increased comfort to women, group prenatal care has been a recent strategy backed by research.[54][55] While these efforts may vary in adequacy and effectiveness from mother to mother and cannot replace social support offered by family, friends, and broader policy, they offer a sense of social stability that can reduce stress for new mothers and ameliorate some negative birth outcomes.

Topic Three: Stress and Discrimination

Lack of social support is correlated with compounding factors such as educational background and general health, but lack of social support is especially associated with significant levels of stress.[56] Various studies have argued that stress is not a reliable indicator of high risk for birth complications and preterm births due to the varying tolerances of stress on a person to person basis. Research published by the Association of Women's Health, Obstetric and Neonatal Nurses found that perceived stress seemed to be an independent indicator of risk for preterm birth, but perceived stress, pregnancy related distress, and corticotropin-releasing hormone do

[49] https://scholarship.law.nd.edu/ndjicl/vol9/iss2/7/
[50] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4727534
[51] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30029-9/fulltext
[52] https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1111/j.1471-0528.1990.tb01741.x
[53] https://www.sciencedirect.com/science/article/pii/1054139X9500227J
[54] https://www.centeringhealthcare.org/uploads/homepage_hero/Centering-Bib-2017-with-Branding.pdf
[55] https://www.sciencedirect.com/science/article/pii/S175148511930073X
[56] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2921311/

not all appear to be measuring the same phenomenon.[57] The physiological changes within a woman's body due to prolonged, severe, chronic, or strongly perceived stress, however, are notable and arguably related to birth complications including preterm birth. There is increasing clinical and laboratory evidence that relate preterm deliveries to maternal and fetal stress due to activating cells in the fetal membranes and the placenta to produce corticotropin-releasing hormone. Corticotropin-releasing hormone then stimulates prostaglandin production in these tissues to promote early birth.[58] Moreover, maternal stress is linked to proneness to infections including bacterial vaginosis increasing the probability of preterm birth.[5960]

Chronic stress is deeply intertwined with discrimination. Stress was associated with spontaneous preterm birth and low birth weight even after adjustment for maternal demographic and behavioral characteristics. The same study identified that black race continues to be a significant predictor of spontaneous preterm birth, fetal growth restriction, and low birth weight even after adjustment for stress, substance use, and other demographic factors, possibly pointing to the effects of both physiological 'weathering' from persistent chronic discrimination throughout a woman's lifetime in addition to discrimination within healthcare systems.[6162] African Americans risk of preterm birth is increased if they report discrimination or use distancing methods to cope with problems. Stress related risk factors differ for white women and include negative life events and not living with a partner.[63] African American women are less likely to trust medical practitioners and are more likely to have experienced domestic violence.[646566] Policy interventions include doula training and medical training that incorporates cultural competence.[6768]

Much like social support, stress comes in micro and macro levels for women of color in the United States. There is interpersonal bias, but also racialized policies such as redlining.[69] Even if these policies are no longer in place in many communities, the history of segregation within the United States has limited access to quality healthcare, education, and housing, which has impacted generations of people and birth outcomes, particularly for African American families.[70] Racial discrepancies are visible in Minneapolis and St. Paul as certain communities with a higher density of African American women report greatly higher preterm birth rates than

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[57] https://www.sciencedirect.com/science/article/abs/pii/S0884217515301246
[58] https://www.sciencedirect.com/science/article/pii/S0002937899707131
[59] https://onlinelibrary.wiley.com/doi/full/10.1046/j.1365-3016.2001.00005.x
[60] https://www.sciencedirect.com/science/article/pii/S0002937805011312
[61] https://www.sciencedirect.com/science/article/pii/S000293789670042X
[62] https://www.sciencedirect.com/science/article/pii/S0002937805002073
[63] https://ajph.aphapublications.org/doi/full/10.2105/AJPH.94.8.1358
[64] https://www.ncbi.nlm.nih.gov/pubmed/16636216?dopt=Abstract
[65] https://www.tandfonline.com/doi/full/10.1080/1091135090298688
[66] https://www.cdc.gov/mmwr/pdf/ss/ss6308.pdf
[67] https://www.commonwealthfund.org/publications/newsletter-article/2018/sep/focus-reducing-racial-disparities-health-care-confronting
[68] https://www.ncbi.nlm.nih.gov/books/NBK220354/
[69] https://www.tandfonline.com/doi/abs/10.1080/13557858.2013.846300
[70] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206968/

highly white areas. African American women in these communities are less likely to have prenatal care later on in their pregnancies, often leading to complications close to birth. The women from the study conducted within Minneapolis and St. Paul were also more likely to be single mothers, have had barriers to education, and from low income backgrounds. Lack of financial and social stability increase stress and have consequential implications on birth outcomes.[71] Across the country, African American women tend to have worse birth outcomes, yet in certain states American Indian/Alaskan Native (AIAN) women tend to have worse birth outcomes than African American mothers, these states include Minnesota and Alaska.[72] The worse birth outcomes for AIAN mothers have been attributed to a variety of factors including historical trauma, distrust of medical providers, cultural misunderstanding by providers, and the high prevalence of substance abuse in tandem with insensitivity about substance abuse from medical providers.[73]

Moreover, immigrant status matters in the United States and in comparable countries abroad. Immigrant mothers in the United States often are not covered by insurance, which presents specific challenges particularly to Latina mothers born abroad. Immigrants in the U.S. are more likely to have low wage jobs and immigrant women of reproductive age are about 70% more likely than U.S. born women to lack health insurance. The barriers to both public and private health insurance mean women may lack access to contraception in addition to preventative and prenatal care. Barriers also prevent women from being screened for illnesses that may be deadly to themselves and their child such as HIV/AIDS, cancer, and additional STIs before and during pregnancy. The correlation between immigrant status and birth outcomes is observed not only in the United States, but other comparable countries as well, including Finland where recent increases in immigration have led to apparent discrepancies in outcomes even with more egalitarian systems of maternal care.[74] Even though immigration may be linked to worse birth outcomes because of stress, trauma, and mothers potentially overworking themselves, barriers to care can be reduced for immigrant mothers through community health centers and low cost outreach programs including mobile reproductive health clinics.[75]

Topic Four: Financial Security, Poverty, and Education

Socioeconomic status is one of the main determinants of health throughout a population. Low socioeconomic status is linked to other contributing factors of poor health including stress, dangerous or polluted neighborhoods, lack of access to quality healthcare facilities, and lower levels of education, including preventative health education.[76] Even with very low income families having access to free healthcare, lower family income is associated with gestational

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[71] https://streets.mn/2015/02/20/the-miracle-of-two-minneapolises-in-prenatal-care/
[72] https://www.marchofdimes.org/mission/prematurity-reportcard-tv.aspx
[73] https://www.wilder.org/sites/default/files/imports/TwinCitiesHealthyStart_FinalReport_1-15.pdf
[74] https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-9-84
[75] https://www.reproductiverights.org/sites/crr.civicactions.net/files/documents/CERD_Shadow_US_6.30.14_Web.pdf
[76] https://www.healthaffairs.org/doi/full/10.1377/hlthaff.21.2.60

diabetes, low birth weight, preterm births, and postneonatal death.[77] Women of higher socioeconomic status are more likely to seek out gynecological care.[78] The wealth gap in health largely reflects racial disparities, as the average savings per white family is significantly more than the average savings for black and Latinx families in particular.[79] The wealth gap leads to economic downturns being particularly hard on black and less educated mothers, thus harming birth outcomes.[80]

Compared to other nations the United States has a particularly high gini coefficient, a number used to calculate inequality within a population.[81] While the gini coefficient is important to consider for the general well-being and stability of a nation, inequality doesn't always relate to poverty or health outcomes directly. Countries with low levels of inequality may have high levels of poverty and worse health outcomes, for example, the Slovak Republic has a low gini coefficient, but most people tend to be low income. On the other hand, New Zealand, a relatively wealthy country has a relatively high gini coefficient, though a much smaller proportion of people in poverty than the United States.[82] What is problematic within the United States is a high gini coefficient in tandem with a high proportion of people in poverty.[83] Poverty is largely determined along racial and educational lines and not only harmful for health, but harmful for the U.S. economy.[84] Large inequalities in the poorest individuals in a country limit its potential for growth, as the growth of a country relies on human capital and the generation of new ideas. The greatest growth cannot be achieved when an entire segment of the population is held back and limited by restricted opportunities particularly when it comes to attaining education, living a healthy life, and amassing wealth to provide security and invest into ideas and future generations.[85] Moreover, the health and wealth link is not only leading to disparities, but policies that don't address the roots of health inequality. Rather than preventing diseases among the nations poorest individuals, often the poorest individuals find themselves with in the lowest quality hospitals or without the means to seek comprehensive care or have their questions answered. Research has found that increased health spending does not necessarily ameliorate the problem, because often additional spending does not truly prevent the health issues critical to the poorest individuals in a population.[86] A cyclical pattern of chronic disease has emerged where generations are affected, a large problem within the Medicaid system.[87] In order to get out ahead

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[77] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1963370/

[78] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4531892/

[79] https://www.forbes.com/sites/brianthompson1/2018/02/18/the-racial-wealth-gap-addressing-americas-most-pressing-epidemic/#3b08f4ef7a48

[80] http://www.diversitydatakids.org/data/library/86/birth-outcomes-and-unemploy-paper

[81] https://data.oecd.org/inequality/income-inequality.htm

[82] https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html

[83] https://www.usnews.com/news/healthiest-communities/articles/2018-09-12/poverty-in-america-new-census-data-paint-an-unpleasant-picture

[84] https://inequality.org/facts/racial-inequality/

[85] https://www.oecd-ilibrary.org/social-issues-migration-health/trends-in-income-inequality-and-its-impact-on-economic-growth_5jxrjncwxv6j-en

[86] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4695950/

[87] http://www.ncsl.org/documents/health/ChronicDTK13.pdf

of the rampant Medicaid spending so as to provide for future generations, it is necessary not only to focus on preventative care and prenatal care, but also to focus on policies that support wealth accumulation among the nation's poorest individuals.

Furthermore, maternal education level has been shown to be one of the strongest predictors of preterm birth among socioeconomic measures.[88][89] Pregnant women with low education levels have almost two times the risk of preterm births than highly educated women. The increased risk is related in part to pregnancy characteristics, indicators of psychosocial well-being and lifestyle habits including likelihood to partake in higher risk behaviors and have unintended pregnancies.[90] The trend between education and birth outcomes was not only observed within the United States, but also other comparable countries.[91] Low paternal education also is associated with worse birth outcomes and preterm birth particularly, as paternal education reflects social and/or economic factors potentially not visible from maternal education and income level alone. The effect of paternal education was particularly consequential for single mothers who lived alone.[92] Maternal education may be becoming less protective of preterm births, potentially because of the large financial burden that higher education places on students with advanced degrees,[93] yet it is still clear that though it may not be helpful for every mother and father to have PhDs, it is helpful to have completed high school and have some education afterwards. It is also crucial that sexual education is comprehensive, particularly in areas underserved medically. Often there is a connection between areas underserved educationally and medically, leading to birth complications.[94][95]

Topic Five: Environmental Factors

Research identifies heavy exposure to air pollution as an independent factor contributing to preterm birth and low birth weight.[96][97] Air pollution is especially harmful when the exposure was in the first trimester of pregnancy. Because exposure to toxic pollutants including air pollution and general smoke including smoke from drug use is so critical in the first trimester of pregnancy, there is added risk to women who have unplanned pregnancies and either identify they are pregnant later than expected or who don't have the time or means to prepare for pregnancy and reduce toxin exposure in the first trimester.[98] There is also a distinct connection between socioeconomic security and exposure to pollutants. Certain neighborhoods near factories or highly concentrated highways have risks that cannot be avoided, yet these

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[88] International Journal of Epidemiology 2008;37:1109–1120 doi:10.1093/ije/dyn112
[89] https://academic.oup.com/ije/article/37/5/1109/870032
[90] https://fn.bmj.com/content/94/1/F28.short
[91] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-3016.2008.00977.x
[92] https://link.springer.com/article/10.1007/s10995-009-0559-x
[93] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3482027/
[94] https://www.ncbi.nlm.nih.gov/pubmed/18562446
[95] https://www.guttmacher.org/state-policy/explore/sex-and-hiv-education
[96] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3753013/
[97] https://ehp.niehs.nih.gov/doi/abs/10.1289/ehp.6617
[98] https://academic.oup.com/aje/article/166/9/1045/88636

neighborhoods tend to be populated by communities who do not have the socioeconomic means to move elsewhere.[99][100] Therefore, environmental concerns could be a contributing factor to the vast disparities between people of different socioeconomic statuses and racial disparities due to the long history of segregation policies within the U.S. concentrating African American families in neighborhoods that do not have the same access to resources and tend to have more exposure to toxins. Moreover, it is not merely air pollution that can contribute to poor birth outcomes. Water pollution also contributes to pregnancy complications. Research that analyzed the connection between the water pollution crisis in Flint Michigan and birth outcomes saw a significant increase in babies born prematurely and with a low birth weight.[101]

Another factor linked between a mother's environment and her pre-existing health is access to healthy food and her subsequent nutrition.[102][103] A comparison of census data found that pregnant women living in proximity to a supermarket with fresh produce and other healthy food had significantly fewer low birth weight births than other pregnant women regardless of income level.[104] Furthermore, additional research found that positive responses to a brief series of questions designed to measure food insecurity were associated with increased risks of certain birth defects, even after consideration of the potential confounding or modifying effects of maternal race-ethnicity, education, BMI, intake of folic acid-containing supplements, dietary intake of folate and energy, neighborhood crime, and stressful life events.[105] It is important to note that while access to food is critical, it is not only food insecurity, but the quality of nutrition that affects birth outcomes. What and how food is produced can have a significant influence on human nutrition and the environment, which are key for healthy human reproduction. The US food production focuses on large volumes of food for low consumer costs, but the food is often low in nutritional value and high in calories. Specifically, the heavy use of fossil fuels for food production and chemical use through pesticides, fertilizers, and packaging can harm human health, in addition to hormones and antibiotics in food that especially affect reproductive health.[106]

The type of nutrition available to low-income communities is limited in multiple ways, in addition, it is not easy for women to change diet habits within the short span of identifying that they are pregnant. One study looked at a sample of African American mothers in Southern states, despite the good intentions of low-income, overweight/obese, African-American mothers to improve diet quality during pregnancy, multiple factors worked together as barriers to healthy eating. These included cost, palatability, and food availability, along with several factors unique

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[99] https://ehjournal.biomedcentral.com/articles/10.1186/1476-069X-7-60
[100] https://ehp.niehs.nih.gov/doi/full/10.1289/ehp.8930
[101] https://www.ncbi.nlm.nih.gov/pubmed/29109518
[102] https://www.sciencedaily.com/releases/2014/03/140304210159.htm
[103] https://journals.lww.com/nutritiontodayonline/Abstract/2015/09000/Maternal_Nutrition_and_Pregnancy_Outcome_A_Look.4.aspx
[104] https://www.sciencedirect.com/science/article/abs/pii/S1353829207000718
[105] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2063452/
[106] https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2010.1255

to pregnancy: fatigue/sleepiness, family pressure to eat, and feelings that baby could not be deprived. Most mothers wanted to eat healthy food to ensure their babies have adequate nutrients, but lacked knowledge about what healthy eating during pregnancy looked like and routinely made nutrient poor food choices as a result. Additionally, living in multigenerational households and sharing resources including food stamps and WIC benefits limited mothers' control over food choices..[107] Another study found that pregnant women who were less physically active, smokers, more anxious, or lacking family support had lower diet quality on average. Likewise, the study notes above did not identify the presence of fast-food restaurants, convenience stores, and grocery stores within close proximity of participants' homes to be associated with diet quality after controlling for personal variables.[108] While the findings conflict with previous studies it is important to note that socioeconomic status may not account entirely for living in a 'food desert' area in terms of increased risk for adverse birth outcomes, it can make up for some of the discrepancy. People who don't have close access to healthy food, but have the means to drive to a supermarket a rather far distance away and pay for fresh fruits and vegetables are still better off than people who have no means to get to a healthy supermarket or pay for the nutritious food supplied there.[109]

In terms of food security, food stamps and WIC have advantages and disadvantages. Though programs may potentially limit a woman's ability to buy a variety of nutritious foods one study found that pregnancies exposed to FSP three months prior to birth yielded deliveries with increased birth weight. It also found small improvements in neonatal mortality.[110] In order to address food access, other countries have a variety of interventions. Sweden tends to aid those with food insecurity through financial means rather than food distribution services, yet there are programs focused on food for children and the elderly.[111] In the United Kingdom, there is a program called healthy start which provides certain families some food vouchers to buy fruits and vegetables, yet there is not as comprehensive of a program as food stamps in the U.S. and the U.K. remains with a higher estimated proportion of people are severely food insecure than the U.S..[112]

Topic Six: Prior Health including Drug Use, Obesity, and Pre-existing Conditions

One possible explanation for why prenatal care intervention programs tend to be insufficient in mitigating worse birth outcomes relates to the pre-existing health of mothers. Many factors impact a woman's reproductive health and these factors are impacted throughout a woman's life far prior to when a woman becomes pregnant.[113] Thus, with unplanned pregnancies

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[107] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3782301/
[108] https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2010.1255
[109] https://www.sciencedirect.com/science/article/abs/pii/S1499404613004752
[110] https://www.mitpressjournals.org/doi/abs/10.1162/REST_a_00089
[111] https://www.gao.gov/products/RCED-88-181BR
[112] https://www.healthystart.nhs.uk/healthy-start-vouchers/do-i-qualify/
[113] https://journals.lww.com/greenjournal/Fulltext/2017/12000/Disparities_in_Chronic_Conditions_Among_Women.19.aspx

specifically a woman does not have time to prepare her health or perhaps the means to do so. One crucial consideration related to the pre-existing health of a mother is drug use. While comparable countries, particularly countries in Europe, tend to have a bad rap for heavy alcohol consumption and social smoking, drug use disorders are actually more prevalent in the United States.[114] This includes addictions to hard drugs in addition to tobacco products and alcohol. One example is the recent crisis witnesses within the United States with opioid dependency.[115] Furthermore, there are barriers to women receiving care when pregnant. Recent research suggests that if policies considered threatening by substance-using women discourage them from seeking comprehensive medical treatment during their pregnancies. The implications of the findings are discussed, particularly the need for further expansion of treatment programs and social services to meet the needs of substance-using women.[116] It is also important to note that the recent opioid epidemic has placed women not only in positions of worse birth outcomes, but in compounding negative situations that further harm pregnancy and mothers' well-being. Opioid use in the context of the studies evaluates includes use of opioid medication under a prescriber's care, the misuse of opioid prescription medication, and the use of heroin during pregnancy. The social circumstances associated with illicit drug use put a pregnant woman, particularly a low-income pregnant woman, at risk of engaging in activities such as prostitution, theft, and violence. These activities often expose women to sexually transmitted infections and violence. Legal responses to opioid use put pregnant women at greater risk for loss of child custody, financial consequences due to legal fees and fines, or imprisonment. A woman's general health is harmed and often her nutrition and obstetric care is lacking. The issue of opioid use during pregnancy is a serious issue within the United States, but is accentuated within communities of American Indian/Alaskan Native women.[117]

Further it is highly documented that prior tobacco smoking increases risks of smoking during pregnancy and remains an important cause of poor health among newborn babies. Most pregnant smokers receive their antenatal care in the public sector. State and federal governments funding the public sector have added responsibility to intervene in order to improve birth outcomes.[118][119] The effects of cigarette smoking on gestational length were examined in a prospective study of over 30,000 pregnant women in northern California. Preterm births were 20% more common in women smoking at least one pack of cigarettes per day while controlling for compounding variables including maternal age, education, ethnicity, time prenatal care began, and drinking during pregnancy. The effect was strongest for extremely early births. The results indicate that smoking impacts the labor process in addition to affecting intrauterine

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[114] https://ourworldindata.org/substance-use
[115] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4411781/
[116] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5151516/
[117] https://publichealth.gwu.edu/sites/default/files/downloads/JIWH/Pregnant_Women_and_Substance_Use_updated.pdf
[118] https://onlinelibrary.wiley.com/doi/abs/10.5694/j.1326-5377.2008.tb02141.x
[119] https://jech.bmj.com/content/57/8/606.short

growth.[120]Furthermore, paternal smoking and secondhand smoke factor in to risks for preterm births.[121] Pregnant women who are exposed to secondhand smoke are estimated to be 23% more likely to experience stillbirth and 13% more likely to give birth to a child with a congenital malformation. More research needs to be done on the particular effects of secondhand smoke during specific stages of pregnancy, but it is important to prevent secondhand smoke exposure in women before and during pregnancy.[122] That being stated, women can decrease the chances of birth complications significantly if they personally are smokers and if they quit smoking within the first trimester. Maternal smoking is shown to be most detramentation to fetal growth in the third trimester. Consequently, opportunity exists for smoking cessation interventions that emphasize quitting early and continuing to abstain from smoking throughout the entirety of pregnancy, not just the first and second trimesters.[123][124] Different results were observed with alcohol consumption. Even if binge drinking ceased before the second trimester, risks for preterm birth and other birth complications were still significantly increased.[125] When looking at recreational marijuana use during pregnancy, which is relatively high in the United States, no significant increases in preterm birth rates were observed, however more research must be conducted to fully analyze the risks and/or benefits.[126]

Furthermore, a woman's pre-existing health is much more multifaceted than if she abuses or uses substances. Rather a host of pre-existing health conditions have been linked to preterm births. Biological mechanisms help to explain a visible correlation between inflammatory bowel disease and preterm births.[127] Other infections such as vagnial bacteriosis and periodontis a type of gum disease, are linked to preterm births largely because they may be associated with pre-eclampsia.[128][129][130] Bacterial vaginosis is largely stratified in prevalence based on race, which is important to recognize when analyzing racial discrepancies in outcomes.[131] Chronic hypertension and if a woman has had an abortion in the past have both been linked to preterm births.[132][133] There is also a complicated relationship between a mother's BMI and her risk for preterm birth. Being underweight increases a woman's risk.[134] Being overweight can be slightly protective of preterm birth rates, but can lead to other complications such as gestational diabetes

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120 https://jamanetwork.com/journals/jama/article-abstract/402388
121 https://www.sciencedirect.com/science/article/pii/S0957417410011619
122 https://pediatrics.aappublications.org/content/127/4/734.short
123 https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.84.7.1127
124 https://www.bmj.com/content/338/bmj.b1081.full.pdf+html
125 https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/j.1471-0528.2008.02058.x
126 https://www.dfaf.org/wp-content/uploads/2018/09/Ko-et-al.-2016.pdf
127 https://www.sciencedirect.com/science/article/abs/pii/001650859090617A
128 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1381713/
129 https://pdfs.semanticscholar.org/873a/e5830c4780d73adc835cca522309981f6988.pdf
130 https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1600-051X.2006.01036.x
131 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1381713/
132 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2596352/
133 https://jech.bmj.com/content/62/1/16.short
134 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3154020/

that are linked to preterm births.[135][136] It is notable that the United States rates of diabetes and obesity are very high while compared to comparable nations, though obesity rates are tending to rise globally due to changes in lifestyle and food production.[137][138][139] While some women may be hesitant to exercise during pregnancy, moderate exercise may help pregnancy outcomes and reduce gestational obesity, as maternal obesity is one of the leading preventative risk factors for pregnancy complications overall.[140][141]

Another negative way the United States stands out among comparable nations is the extremely high rate of sexually transmitted infections (STIs).[142] STIs are an independent contributing factor to preterm births.[143] Chlamydia is an especially prominent STI within the U.S. and presents few symptoms. Substantial racial disparities in those affected with chlamydia exist, with prevalence among non-Hispanic blacks 5.6 times the prevalence in non-Hispanic whites.[144] Though STI screenings are a routine part of prenatal care within the first trimester, if a woman does not utilize preterm care within the first trimester of pregnancy it may still affect her risk for preterm birth.[145] Moreover, African American women are least likely to utilize preterm care right away and women in general are less likely to seek treatment for an STI than men, a challenging combination of likelihoods that lead to increased risks.[146] STIs are a serious issue as one study with a random sample attributed 14% of preterm births to chlamydia alone.[147]

Policy Considerations:

The high rate of preterm births in the U.S. is not only baffling due to the high cost of healthcare in the United States, but it also presents a cyclical problem. Having a child that is born prematurely leads to higher costs of healthcare during birth and infancy, costs are raised to approximately $55,000 per birth for premature babies compared to $4,500 for other births.[148] Yet, a disproportionate amount of premature births are occurring for women with low socioeconomic security and/or who are on Medicaid or little to no insurance coverage.[149] Thus,

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[135] https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2005.074294
[136] https://www.tandfonline.com/doi/abs/10.3109/14767050903258738
[137] https://www.ncbi.nlm.nih.gov/pubmed/22099446
[138] https://www.cdc.gov/obesity/data/prevalence-maps.html
[139] http://www.euro.who.int/__data/assets/pdf_file/0003/243327/Sweden-WHO-Country-Profile.pdf
[140] https://www.sciencedirect.com/science/article/pii/0002937890906046
[141] https://jamanetwork.com/journals/jama/article-abstract/1696099
[142] https://www.sciencedirect.com/science/article/pii/S1084275600900265
[143] https://www.ncbi.nlm.nih.gov/pubmed/19903113
[144] https://www.cdc.gov/std/stats17/default.htm
[145] https://www.acog.org/Patients/FAQs/Routine-Tests-During-Pregnancy?IsMobileSet=false#why
[146] https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.87.3.417
[147] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3115062/
[148] https://www.health.state.mn.us/people/womeninfants/prematurity/
[149] https://www.ncbi.nlm.nih.gov/pubmed/22311578

these high costs are mainly distributed to government spending and the pockets of families that are already struggling financially. Still, premature births can lead to future health complications for the child born too early, including chronic conditions which require high healthcare expenditures and also disproportionately affect people of lower socioeconomic status who rely on Medicaid.[150]

Previous policy strategies have focused mainly on prenatal care as a means of preventative health care aimed to help birth outcomes and align pregnancy and infant health statistics to the rates of comparable countries. While it is of the utmost importance to have a well functioning system of prenatal care including a strategic and complementary relationship between midwives, other nursing professionals and doctors.[151] Involving midwives in particular in maternal and child health policy may improve outcomes as their expertise can lead to better ideas.[152] Early visits within the first trimester of pregnancy for all women and thorough screening for STIs even among women who do not display symptoms, support offered throughout pregnancy that is convenient and available to the mother are crucial. In the U.S. though women tend to have more scheduled gynecological visits during pregnancy, the care tend to begin later, which is problematic as pregnancy interventions are best done early on.[153] It is further necessary to work with practitioners to insure that there are resources to help women who are addicted to substances while pregnant and that these women feel confident in seeking help without criminalization because they will be far more likely to seek out medical care if they are not in danger of legal consequences.[154] Medical professionals must caution against unnecessary C-sections and inducements.[155] Additionally, strengthened efforts against all types of discrimination within preterm care, the birthing process, and after delivery could help to minimize disparities in birth outcomes and likelihood for women of color to seek out care and have lower stress rates.[156] Prenatal care efforts could also be improved by the administration of stress evaluations and a more comprehensive understanding from practitioners as to how perceived stress by the mother can affect fetal development.[157]

That being said, there is more to consider while attempting to reduce preterm birth rates in the United States than merely prenatal and postpartum care. The rampant problem of preterm births cannot be written off as a natural phenomenon due to the rising age of mothers or increased use of fertility treatments as these factors are comparable or less extreme than in comparable countries with lower preterm birth rates, rather it must be acknowledged that the health discrepancies among communities in the United States are not isolated to the nine months

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[150] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4938684/
[151] https://www.ncbi.nlm.nih.gov/pubmed/2212526
[152] http://mothersmonument.org/2015/02/11/sweden-maternal-death/
[153] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1694498/
[154] https://link.springer.com/article/10.1007/s10995-016-2190-y
[155] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2951941/
[156] https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1542-2011.2011.00034.x
[157] https://www.researchgate.net/profile/Fabio_Facchinetti/publication/8338910_Stress_and_preterm_delivery/links/550303b10cf24cee39fd559b.pdf

of pregnancy. The health of mothers must be addressed earlier, and women in general, whether they are planning to bear children in the near future or not must have the ability to achieve health. For if women are healthy, physically and mentally and financially, there will be a higher likelihood of healthy births. A particular challenge in the United States is the high rate of unplanned pregnancies. In order to help women prepare for pregnancy, it is important to consider not only ways to help all women achieve health, but also to factor in ways to potentially decrease the amount of unplanned pregnancies. Possible interventions include streamlining sexual education throughout the United States and working to increase contraceptive availability and family planning services throughout all communities. There is a grave connection not only to sexual education and family planning, but general education. Furthering educational equity throughout the states and communities within states is a contributing factor to reducing the vast discrepancies in birth outcomes. In addition, reducing racial disparities in birth outcomes must be simultaneous to efforts in reducing general inequalities in housing, wealth accumulation, and well-being.

Health care within the United States, not isolated merely to maternal and child health, could potentially be improved by a number of considerations including improved access and cooperation among specialists so as to provide comprehensive and holistic care.[158] If the performance of hospitals is on the basis of outcomes often low income hospitals perform the worst, thus penalizing these hospitals on the basis of their performance could provide worse results as funding decreases. Rather, it is important to focus on incentivizing improvement and maintaining adequate oversight of medical facilities.[159][160] The use of technology to streamline care can also be advantageous.[161] Ultimately, continued research is necessary to determine what healthcare measures and policies are effective and efficient, in addition to increasingly holistic medical care that does not merely provide medications for symptoms, but considers one's comprehensive health to determine a correct diagnosis, further relying on specialists to cooperate and pool knowledge together to determine best practices.[162][163]

Preterm birth rates and birth outcomes are affected by multifaceted compounding factors. A mother's neighborhood, living situation, pre-existing health, education level, financial security, social support, stress level and insurance status all factor in to the health of her and her baby. There appear to be no magic fixes to the extremely high rates of maternal and infant mortality and preterm births. Yet, through further research into the causal relationships between contributing factors to preterm birth and taking steps to address the most pressing issues, both non-governmental organizations and policy makers can work to improve infant mortality in the United States.

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[158] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4193439/#!po=57.4074
[159] https://www.ncbi.nlm.nih.gov/pubmed/20823437
[160] https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2010.1277
[161] https://www.ehalsomyndigheten.se/other-languages/english/
[162] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4173201/
[163] http://www.ncsl.org/research/health/improving-womens-health-2013.aspx