Article

An Intersection of Women's and Perinatal Health: The Role of Chronic Conditions

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Abstract This paper has three objectives: 1) to review data on the prevalence of chronic disease among women of reproductive age; 2) to establish that chronic diseases are an important influence on perinatal health; and 3) to emphasize opportunities where women's health and perinatal health can intersect. This involves broadening strategies aimed at improving perinatal health to emphasize a woman's overall health, regardless of childbearing status or plans, and using perinatal health care as a bridge to ongoing care for women. These issues are discussed in the context of a continuum often used to organize perinatal health interventions.

Perinatal health encompasses both the health of the mother and the fetus/infant. Strategies aimed at improving perinatal health, however, have emphasized prenatal care and have only recently focused on women's preconceptional health in the period before a woman becomes pregnant.[1] Moreover, the delivery of clinical services in this country, emphasizing specialization and varying significantly with respect to insurance coverage and provider payment arrangements, is widely acknowledged to be fragmented. In particular, insurance coverage policies, programs, and access to care are frequently determined by pregnancy status and/or disability status. This paper has three objectives: 1) to review data on the prevalence of chronic disease among women of reproductive age; particularly among low income and minority women; 2) to further document the important influence of preexisting chronic diseases on perinatal health; and 3) to identify opportunities where women's health and perinatal health interventions can intersect more beneficially. This involves broadening strategies aimed at improving perinatal health to emphasize a woman's overall health regardless of childbearing status or plans, and using perinatal health care as a bridge to ongoing care for women.

In this paper, chronic disease is defined as any serious condition that

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requires ongoing medical attention and/or medication. In contrast to most acute conditions, chronic diseases cannot be "cured" by treatment, but persist, and sometimes worsen, over time. The goal of treatment, therefore, is to prevent additional problems and adverse sequelae (including disability) and to assist the patient in managing the condition.

What is meant by "women of childbearing age" or "women of reproductive age", while definable within age parameters (e.g., 15–44 years), also needs to be clarified. These terms are somewhat problematic in that they imply that all women reproduce. What we are striving for is an understanding of the reproductive years as the period of life in which women are capable of reproducing, even if they do not want or intend to. Generally, this is defined as ages 15 to 44 years; conceptually, the period from menarche to menopause is encompassed.

PREVALENCE OF CHRONIC DISEASES

Data from the 1996 National Health Interview Survey (NHIS)[2] provide us with a snapshot of the morbidity experienced by U.S. women of childbearing age (conventionally defined as 15–44 years of age). The prevalence rates for the 10 most common chronic conditions among women less than 45 years of age are described in Table 1. Some of these conditions are associated with less morbidity than others but the treatment for the condition may have an impact on the health of the woman and/or her fetus and infant. Generally, chronic diseases can have wide-ranging effects on a woman's health, from limitation of activity to hospitalization. In 1996, 9.9% of women ages 18–44 years reported at least some limitation of activity caused by chronic conditions.[2] Approximately 2.9% reported they were limited but not in a major activity, 3.9% were limited in amount or kind of major activity, and 3.1% were unable to carry on a major activity. Activity limitation and hospitalizations associated with asthma, hypertension, and diabetes are described in Table 2; these diseases are highlighted both because they are often more severe than most conditions in Table 1 and because there are studies linking these conditions to perinatal outcomes (discussed in the next section of this paper). Particularly noteworthy are the data for women with asthma and diabetes. Approximately one in five women with asthma and one in four women with diabetes have been hospitalized at least once in the preceding year because of their disease.[3]

9.9 percent of women ages 18–44 reported limitation of activity caused by chronic disease

Mental health conditions are often overlooked in discussions of chronic illness. The most common of these conditions is depression. Based on the National Comorbidity Survey (1990–1992), the lifetime prevalence of a major depressive episode among women is 21.3% and the 12-month prevalence was 12.9%.[4] According to Epidemiologic Catchment Area studies (1980–1984), the prevalence of depression in women peaks between ages 18 to 44, coinciding with the childbearing years.[5] Depression clearly has a biologic component and certainly has profound effects on functioning.[6,7] Furthermore, the recognition that depression has a biologic basis has been paralleled by the growing use of pharmacologic treatment. As with other chronic diseases, the disease itself as well as its treatment may adversely affect perinatal outcomes.

The burden of chronic diseases falls disproportionately on two overlapping subpopulations of women: poor women and minority women. Rates of chronic disease are higher for low income and less educated women.[8–10] The negative correlations between family income and the prevalence rates of asthma and hypertension for individuals less than 45 years of age, based on the 1996 NHIS[2], are shown in Table 3.

Chronic diseases disproportionately affect African-American women.[9,11–13] In a study of low-income African-American women of childbearing

Table 1. CHRONIC CONDITIONS AMONG U.S. WOMEN <45 YEARS OF AGE

Chronic Condition	*Prevalence (per 1,000 women <45 years)*
Chronic sinusitis	131.7
Hay fever or allergic rhinitis without asthma	92.1
Deformity or orthopedic impairment	82.9
Asthma	68.1
Migraine headaches	64.1
Chronic bronchitis	51.9
Dermatitis	36.4
Arthritis	35.8
Heart disease	35.5
Diseases of female genital organs	31.9
Hypertension	30.1

Source: National Health Interview Survey, 1996.[2]

age, more than 25% of the women reported a chronic illness (i.e., diabetes, hypertension, asthma, or any condition requiring regular medication).[14] Recent chart reviews conducted at the Johns Hopkins Hospital prenatal clinics looked for a history of asthma. In this population of low-income, predominately African-American pregnant women, a positive history of asthma was recorded for 20.4% (48/235) of women in 1995 and 21.4% (24/112) in 1997. Estimates of disease rates derived from the 1996 NHIS[2] also show an increased risk of asthma and hypertension for blacks <45 years of age (Table 4).

Finally, as more women postpone childbearing into their 30s and 40s, the

As women postpone child bearing . . . the increased prevalence of chronic disease (is important) in pregnancy related care

Table 2. MORBIDITY RELATED TO SELECTED CHRONIC DISEASES AMONG U.S. WOMEN 18–44 YEARS*

Disease	*Limitation of Activity†*	*≥1 Hospitalization in Past Year†*
Asthma	22.2%	21.7%
Diabetes (Type I and II)	35.7%	27.0%
Hypertension	11.7%	8.3%

Source: National Health Interview Survey, 1990–92.[3]
*NHIS data on limitation of activity and hospitalizations by chronic disease have not yet been made available for survey data collected after 1992.
†Related to the specific chronic disease.

Table 3. PREVALENCE OF SELECTED CHRONIC DISEASES BY FAMILY INCOME, U.S. MEN AND WOMEN <45 YEARS*

	Prevalence (per 1,000)	
Disease	*Family Income <$10,000 Per Year*	*Family Income ≥$35,000 Per Year*
Asthma	56.8	39.6
Hypertension	38.5	27.0

Source: National Health Interview Survey, 1996.[2]
*Data not available separately by sex. Stratum-specific data for diabetes do not meet standard of reliability or precision so comparison is not presented.

Table 4. PREVALENCE OF SELECTED CHRONIC DISEASES BY RACE/ETHNICITY, U.S. MEN AND WOMEN <45 YEARS*

	Prevalence (per 1,000)	
Disease	*Blacks*	*Whites*
Asthma	76.6	56.9
Hypertension	47.5	27.6

Source: National Health Interview Survey, 1996.[2]
*Data not available separately by sex. Stratum-specific data for diabetes do not meet standard of reliability or precision so comparison is not presented.

increased prevalence of chronic diseases as women age underscores the potential importance of addressing chronic diseases in the context of pregnancy-related care and services. Between 1975 and 1990, birth rates for women in their thirties increased 63% for women aged 30–34 years, 90% for women 35–39 years, and 29% for women 40–44 years.[15] In 1994, nearly one-quarter of first-time mothers were over 30 years old.[16] By 1997, approximately 13% of all births were to women 35–44 years of age.[15]

DO CHRONIC DISEASES INFLUENCE PERINATAL HEALTH?

For a number of reasons, we expect that chronic diseases would influence perinatal health. Unlike many exposures and complications of pregnancy, a chronic disease affects a woman and her fetus/infant from the time of conception. Chronic diseases as well as the treatment of such diseases often have wide-ranging effects on a woman's health. Unless pregnancy somehow confers special protection to a woman, it is plausible that chronic diseases would also adversely affect maternal and fetal/infant health. Chronic diseases have the potential to adversely affect pregnancy outcomes due to complications of untreated disease (e.g., kidney damage associated with untreated hypertension). Even chronic diseases that are well controlled may adversely affect a single important physiologic function (e.g., respiratory function) and thereby represent a potent risk to the fetus and mother. Treatment itself may have adverse effects. For example, many chronic diseases (e.g., asthma, arthritis, lupus) are treated with steroids and this treatment is associated with an increased susceptibility to infection.[17] Particular treatments may also be teratogenic and therapies may need to be modified for women who are pregnant or at risk for conception. For example, a number of anticonvulsant drugs used to treat epilepsy have been found to increase risk of birth defects (reviewed in ref. 18). Prepregnancy consultation for such patients can allow for selection of an appropriate therapeutic regimen that will be effective in managing the woman's condition both during and prior to pregnancy. Finally, chronic diseases are more prevalent among the very same groups of women who are most at risk for poor perinatal outcomes, namely poor and ethnic minority women. In fact, chronic diseases may be one pathway through which race/ethnicity and socioeconomic status exert an effect on perinatal health.[19]

Chronic diseases are more prevalent among . . . women who are most at risk for poor perinatal outcomes

There is also empirical evidence that chronic disease is associated with poorer fetal and infant outcomes. In studies of pregnant women with specific chronic diseases, a wide range of diseases have been reported to increase the risk of adverse fetal and infant outcomes, such as low birth weight and preterm birth. These illnesses include asthma,[20–22] diabetes,[23] hypertension,[24] and renal disease.[25] There is indirect evidence of an association between adverse infant outcomes and chronic disease. In a study of women who delivered a preterm low-birth-weight infant, Haas and McCormick[26] reported that 29.7% of the

mothers had been hospitalized for a non–pregnancy-related condition, usually a chronic disease, during the 5-year follow-up period.

Cohort studies of pregnancy have rarely examined the role of chronic diseases. An important exception is asthma. Within a cohort of women delivered at Yale–New Haven Hospital, Doucette and Bracken found that mothers who experienced preterm birth were two times as likely to have reported being treated for asthma in the year prior to pregnancy and two times as likely to have had a "respiratory problem" documented in the prenatal chart.[27] In a matched case-control study conducted in Montreal by Kramer and colleagues, physician-diagnosed asthma and reports of asthma symptoms over the prior 12 months were two to three times more common among women experiencing idiopathic preterm labor.[28] A recent study by Haas and colleagues examined the effect of "poor maternal health," which would encompass but not be limited to chronic disease. Women who reported poor physical health prior to pregnancy had an approximately twofold increased risk of preterm labor.[29]

Further study of these issues is certainly needed. Most studies of chronic disease and pregnancy are limited to small samples of women with the chronic condition who are under the care of a specialist.[20–25] Therefore, the impact of the treated disease is being examined. To better understand the potential impact of chronic diseases for women who may not have access to such care, we need to examine the role of chronic disease within larger epidemiologic studies of pregnancy outcomes. This will be difficult because any one chronic disorder will be relatively rare within a study sample of pregnant women. However, if chronic diseases are considered as a group or populations at increased risk for chronic disease (e.g., low income, minority) are recruited, fruitful analysis of this issue might be possible within general cohort, as opposed to specialty clinic–based, studies.

Pregnancy may also exacerbate chronic diseases and cause maternal morbidity, especially given the many changes of pregnancy: hormones, body weight, cardiovascular function. Women with cardiovascular or renal disease may experience difficulty with the increased demands pregnancy places upon their body's already compromised systems.[30,31] Haas and colleagues[32] recently reported that women were four times more likely to be hospitalized antenatally if they had a history of chronic hypertension and two times more likely if they had a history of diabetes mellitus. There have also been some studies showing a change in asthma symptoms during the course of pregnancy but changes are not consistent. Asthma improves for some women whereas for others it remains unchanged or worsens; this unpredictability may be related to hormonal changes.[33] The stage of pregnancy also may play a role with differing effects and differing levels of adherence to medical regimens at different points in the pregnancy (e.g., women in early pregnancy may use less medication than prescribed because of fears of malformations).

There may also be effects on the woman's health long term associated with certain conditions in the pregnancy. Women who experience pregnancy-induced hypertension have an increased risk of becoming hypertensive later in life.[34] Women who have gestational diabetes are more likely to be diagnosed later with diabetes mellitus.[35] It is unclear at this time whether the association between these pregnancy complications and later manifestations of the disorder is linked to a common precursor or whether there is a direct causal link. If the relationship is directly causal, then preventing these complications during pregnancy may prevent chronic diseases from developing later. However, it seems more likely that there is a third factor involved. It might be that a predisposition to the chronic disease occurs under biologically stressful conditions such as pregnancy and aging.

INTERSECTION OF WOMEN'S AND PERINATAL HEALTH

As shown above, as a group, chronic conditions affect a substantial proportion of women of childbearing age and disproportionately affect low-income and minority women. Furthermore, chronic diseases have the potential to adversely affect the health of the mother, fetus, and infant. Effectively addressing this problem may require a shared agenda for women's and perinatal health. Current strategies aimed at improving pregnancy outcomes in the population may need to be broadened to include an emphasis on a woman's health prior to childbearing, and not just the period immediately preceding conception. A focus on preconceptional health was one of four recommendations by an expert panel charged with closing the gap in black–white infant mortality.[19] As a woman's decision regarding childbearing may change[36] and the mean age of first birth[16] has been steadily increasing, the protection of women's health must be universal and continuous to ensure optimal perinatal outcomes. Given the current features of the health services delivery and payment system, those seeking to protect women's health, regardless of pregnancy issues, might also find the perinatal period to be a critical linkage point to identify, follow, and connect, to care for those women who already have or are at increased risk for developing chronic diseases.

These issues are often discussed with regard to identified time periods in which perinatal care is provided and through which a woman cycles during her reproductive years from menarche to menopause: preconception, prenatal, and postpartum. What "prenatal" encompasses is self-evident. Conceptually, both the preconception and postpartum periods encompass all of the time before and between a woman's pregnancies. The time frame for the preconception period is not well-defined, although it is construed by most as a relatively brief period of preparation and planning for pregnancy proximate to conception, lasting just a few months or perhaps 1 year. Postpartum typically refers to the time period following a live birth or pregnancy loss; this is also typically a short period of time, often just 6 weeks. Therefore, while the postpartum period can merge into the preconceptional period, for many women there is a substantial portion of time labeled neither postpartum nor preconceptional. This period has been referred to as the "interconceptional period" which puts an emphasis on preparing for pregnancy and which could also encompass the postpartum and preconceptional periods for women after their first pregnancy. Figure 1 illustrates this cycle.

The distinction between the postpartum and the preconceptional periods reflects a structural disconnect between women's and perinatal health. Postpartum care has always been part of perinatal health but has generally been limited to addressing the immediate sequelae of childbearing. In practice, preconceptional care does not exist as a free-standing clinical service, reimbursable by insurance; primary care or family planning essentially therefore comprises what currently is provided as preconceptional care. In essence, preconceptional care is embodied in women's health. Despite the separation of the service delivery systems, the postpartum and preconception periods, as noted above, are not truly separate time periods. These periods could, and perhaps should, be considered part of an interconceptional period for parous women.

In the following section, we discuss the intersection of women's and perinatal health using these time periods of preconception, prenatal, and postpartum to organize the discussion. We use the concepts of preconception and postpartum care rather than the more general "interconceptional" care because these are the terms more generally recognized within the perinatal system and because they influence access and health coverage strategies. In doing so, however, we do not adhere to a narrow conceptualization of the

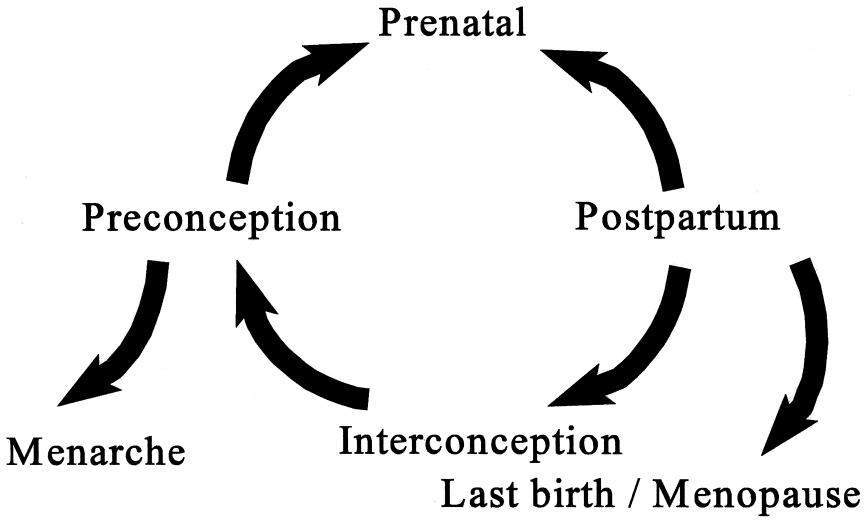

Figure 1. *Reproductive cycles of women.*

preconceptional and postpartum periods. The preconceptional period can be redefined as the period before a woman becomes pregnant, whether or not she intends a pregnancy. Some women (approximately 15%) will never become pregnant, either by choice or infertility. Many other women experience unintended pregnancies. Henshaw[37] estimated that approximately half of U.S. women aged 15–44 years had had at least one unplanned pregnancy at some time in their life. Because we cannot know in advance who these women will be and the potential for conception exists, technically the "preconceptional" concept applies throughout the entire range of reproductive years, except when a woman is pregnant, or in the immediate postpartum period. For parous women, the "interconceptional" period between pregnancies could be construed as either an extended postpartum period or a long preconceptional period. There are strategic arguments, however, for labeling this gap as a postpartum period, which will be discussed as we consider issues of access to care for women.

Preconception

We need to broaden strategies aimed at improving perinatal health to include an emphasis on a woman's health prior to childbearing. Interventions that increase the practice of protective behaviors, such as proper nutrition and exercise, as well as those that seek to reduce negative factors, such as smoking and stress, are important steps toward reducing the incidence and sequelae of chronic conditions and concurrently improving perinatal outcomes and women's overall health. Adolescents may be a critical group to target for prevention. There is growing evidence that healthy behaviors adopted in adolescence (e.g., physical activity, diet) continue at least into young adulthood.[38,39] Given the multiplicity of roles many adult women assume, they may experience conflicting demands as they seek to guard their own health and well-being. Many health promotion behaviors require significant investments of time and energy that women may find difficult if they have not adopted such habits early in life.

While prevention is desirable, our ability to prevent many chronic conditions is hampered by lack of knowledge regarding the etiology of these diseases and the nature of the risk factors. Early detection and effective management of chronic disease are needed to improve outcomes. Access to

and appropriate utilization of high-quality medical care is essential in coping with chronic disorders. When detected early and effectively managed, the adverse sequelae of most chronic diseases can be averted. For example, most organ damage that occurs with diabetes and hypertension can be avoided by controlling blood sugar and blood pressure levels.[40,41] Appropriate management of chronic diseases may prevent costly emergency department visits and repeat hospitalizations. Many chronic diseases, including asthma, hypertension, and diabetes, can also be fatal. As chronic diseases can be difficult to address effectively during pregnancy, high-quality care to identify and manage chronic diseases even when a woman is not pregnant is critical to ensuring good pregnancy outcomes.

Primary care and family planning services represent an ideal opportunity to institute routine screening to identify chronic conditions (e.g., diabetes, hypertension, asthma). The provision of well woman care and family planning services also represent opportunities for the management of chronic medical conditions prior to pregnancy and initiation of prenatal care. For example, tight glycemic control of a diabetic woman prior to conception and in early pregnancy will reduce the risk of associated congenital malformations.[42,43] Hypertension and thyroid medications may also need to be adjusted to reduce the risk of malformations. Development of a management plan prior to pregnancy could preempt maternal and fetal morbidity in pregnancy, particularly in early pregnancy.

Family planning services represent an ideal opportunity for management of chronic conditions prior to pregnancy

Prenatal

Appropriate management of the chronic disease during pregnancy can improve the mother's health and could reduce risk for both the woman and the fetus/infant. Haas and colleagues[32] recently reported that women were four times more likely to be hospitalized antenatally if they had a history of chronic hypertension and two times more likely if they had a history of diabetes mellitus. As with nonpregnant women, appropriate management of the disease may prevent costly hospitalizations.

However, detection and treatment of chronic illnesses is not always straightforward, particularly in vulnerable subpopulations. Chronic diseases are often asymptomatic and many women, particularly poor and minority women, have little contact with the health care system prior to pregnancy. In a 1995 study of low-income persons, only half of African-Americans had seen a physician in the past year as compared with two-thirds of whites.[44] Even among moderate to upper income Americans, African-Americans are more than twice as likely as whites to be uninsured (14% vs. 5%) and have fewer physician visits per year (2 vs. 3).[44] Therefore, in addition to providing services to women already diagnosed, screening for chronic conditions must also remain a focal point within the package of prenatal care services. Antenatal care may be the first time a woman has obtained care since pediatric care in childhood. With the exception of diabetes (blood sugar) and hypertension (blood pressure, urine protein), few chronic conditions are purposively screened for during the provision of routine prenatal care services. Instead, women are queried regarding previous diagnoses which assumes previous utilization of care. Screening for additional disorders, such as asthma, may simply entail a detailed history of signs and symptoms (e.g., wheezing, shortness of breath) and family history, not necessarily a laboratory test.

Women with chronic diseases who rely exclusively on their prenatal care provider to have their health needs met also confront problems. The provider may be limited in his or her ability to address all aspects of treatment, as she or he may not be knowledgeable about the standards of care for particular chronic conditions. Some treatments may not be safe for the developing fetus.

The chart review and follow-up interviews of pregnant patients with asthma at Johns Hopkins Hospital suggest that prenatal care providers may be limited in their knowledge of chronic disease management. The guidelines for the care of asthma during pregnancy call for at least one baseline pulmonary function test in pregnancy[45] and suggest use of a home peak flow meter to assess and monitor asthma severity. The sparse documentation of these tests in the charts certainly does not suggest that either is being undertaken regularly for most patients. While this may be the result of incomplete documentation, the follow-up interviews suggest that very few women in this population receive pulmonary function tests or track their peak expiratory flow on a regular basis.

Postpartum

Pregnancy-related care also can be an important bridge to a relationship with another health care professional or system that can provide ongoing care for the woman's chronic condition after the pregnancy. In addition, women who experience adverse pregnancy outcomes or pregnancy complications may be particularly at high risk of future morbidity and need to be targeted for follow-up. As noted earlier, women who experience hypertension or diabetes during pregnancy are at increased risk of developing these diseases later. Although it may not be a causal assocation, the occurrence of hypertension or diabetes during pregnancy therefore has implications for care of the woman postpartum. Prenatal care represents an opportunity to connect to the ongoing care needed by women with chronic diseases.

Whereas linking women to care is important, financial barriers to care exist for many nonpregnant women. Few resources are allocated to provide access to care for women (or men for that matter) who have or are at risk for developing chronic diseases. While it has been argued here that care for these women outside of pregnancy is necessary to improve perinatal health outcomes, care during pregnancy is also critical. It is unlikely that resources allocated for perinatal health, as it is currently conceptualized, are sufficient to provide for care outside of pregnancy.

What is the best way to expand care to women outside of pregnancy? Should it be through expansion of primary care, preconceptional care, or postpartum care? Preconceptional care may need to be repackaged as an extension of the postpartum period. The strong commitment to ensuring access to pregnancy care, including both services availability and insurance coverage, may then extend to care in the preconceptional period. While care for women should be ensured regardless of their childbearing role, the link between a woman's health and pregnancy outcomes provides a strong rationale for expanding access to care. This does not solve the problem of providing care to women who have never been pregnant. Increased emphasis on adolescent health and health care coverage can be a first step in reaching that population.

Extension of the postpartum service and payment system might be the most feasible approach

In the short term, extension of the postpartum service and payment system might be the most feasible approach. Postpartum care is considered inextricably linked to pregnancy and the prenatal period whereas the same cannot be said for the preconception period. This linkage to pregnancy is critical because pregnancy care is more widely accessible in our health care system than care for other health conditions. Although the U.S. population lacks universal access to health care, we have increasingly expanded programs to ensure access to care for all pregnant women. Beginning in the mid 1980s, for example, Congress enacted a series of reforms in the Medicaid program expanding eligibility requirements and facilitating enrollment practices specifically for pregnant women and their infants. Medicaid eligibility may end for women 60 days postpartum unless they are eligible for coverage on the basis

of low-income status. A number of these legislative initiatives also established allowances for enhanced prenatal care services. Recently, several states have secured federal waiver authority to provide family planning and/or primary care services to nonpregnant low-income women. Legislative protections specific to prenatal care access have been enacted with respect to commercially insured women, such as found in the Health Insurance Portability and Accountability Act (1996). Again, however, as with low-income women, health care coverage outside of pregnancy is not universally ensured.

CONCLUSION

Chronic diseases are a burden for women of childbearing age generally and have specific effects on maternal, fetal, and infant health. Perinatal health needs to be broadened to consider the health of all women whether or not pregnant, and improvements in women's overall health in the population may result if potential intersections with perinatal health are exploited. Currently, preconception and postpartum/interconception periods are treated differently from the prenatal period by both our health services delivery system and health insurers (public and commercial). This separation, indeed the terms themselves, may be barriers to the comprehensive, continuous care for women that is likely necessary for preventing and/or addressing chronic conditions, and maximizing perinatal health outcomes.

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