

# **Rural Maternal and Infant Health**

Gary Hart, Ph.D.  
Denise M. Lishner, MSW

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## **Executive Summary**

## **Overview**

Many of today's problems regarding rural maternal and infant health are longstanding (U.S. Congress, 1990). Rural pregnant women and their infants generally have the same types of problems as their urban counterparts but these are often compounded with other, uniquely rural problems. Overall, pregnant rural women when compared to their urban counterparts are younger, have a higher maternal mortality rate, have a larger number of children, have less adequate prenatal care, experience higher fetal death rates, and are more likely to be on public health insurance or no insurance (Acosta, 2001a). While the overall rural infant mortality rate is not meaningfully different than the urban one, the rural post neonatal part of that rate is higher for rural infants. In addition, rural women clearly obtain fewer services and less timely prenatal care than their urban counterparts. Several factors contribute to the rural disadvantage. Many rural women and their infants experience poor geographic access to appropriate primary care providers and specialists. A shortage and maldistribution of health care professionals providing maternal and infant care persists in rural areas, particularly those areas that are most remote. There are disincentives for specialists to practice in small rural areas. Malpractice and liability concerns and diseconomies of scale discourage rural providers from including obstetrics within their practices. At the same time, rural women are more likely to be poor and to be on Medicaid, and to have little or no health insurance coverage (i.e., poor financial access). Rural minority women are more likely than rural white women to be disadvantaged.

Much of the rural environment is sparsely populated and requires long travel times to obtain primary and tertiary care, which translates into less timely care and less appropriate care. The U.S. rural milieu is much different than the urban one in terms of geography, demography, epidemiology, economics, social norms, and behaviors. Rural America has a population as great as that of the United Kingdom. Rural maternal and infant health has significant problems in its right and those problems vary dramatically between different types of rural areas and overall between regions and states. Many innovative best practice programs and demonstration programs illustrate opportunities to make differences in the rural status quo.

## **Recommendations**

For the most part, the recommendations for rural maternal and infant health parallel those for the U.S. population as a whole, such as those advocated by the March of Dimes and other concerned groups (e.g., the need for preconception and early and adequate amounts of prenatal care). However, the health care issues and barriers to services faced by rural women and their infants are often different from those in metropolitan America, though sometimes more in line with issues affecting inner-city women and infants. Clearly, financial access to health care is a problem for large numbers of rural and urban mothers, although relatively more of a problem for rural women. However, geographic access is much more problematic for rural women.

It is beyond the scope of this monograph to make recommendations regarding all of the federal and state programs that are intended to help with rural women's pregnancies, deliveries, and infant care. Many of these programs help urban women as well, especially

those located in inner cities. The recommendations enumerated below were selected to emphasize those areas not commonly addressed that have a differentially harsh influence on the problems faced by and care of rural women and their infants.

General rural recommendations are as follows:

Implement Programs and Policies to Increase Rural Health Provider Supply

- \* *Adequate funding is needed for federal and state programs aimed at increasing the numbers of rural perinatal and infant health care providers (e.g., family physicians (FPs), OB/GYN physicians, general surgeons, certified nurse midwives, and nurse practitioners and physician assistants able and prone to provide such services). These programs include training programs such as Title VII and programs that focus on placing providers in rural areas to both provide local health care service and provide them with rural practice exposure and facilitate subsequent rural recruitment and retention. The nation's medical schools are undergoing a period of expanding class sizes. It is critical that they be persuaded to concentrate this expansion in training physicians likely to practice primary care and likely to practice in rural areas. Likewise, there needs to be expanded emphasis on implementing physician residency training in rural areas.*
- \* *Legislation and program reforms should help increase provider numbers in rural places where shortages are most pronounced. For instance, the National Advisory Committee on Rural Health and Human Services recommends "... legislation that will extend the Federal Tort Claims Act to rural OB providers in federally designated shortage areas" (NACRHHS, 2005). Extending liability protection to Rural Health Clinics similar to that enjoyed by community health centers (CHCs) should be enacted. Helping to decrease the educational debt of new physician graduates will also increase the likelihood that physicians will choose to practice in primary care and in rural places (Rosenblatt and Andrilla, 2005).*

Fund Programs and Services to Increase Rural Access to Quality Health Care

- \* *The quality of care in rural areas should receive the focus and support of the federal and state governments along the lines recommended by the Institute of Medicine report on rural health care (IOM, 2005). It is important that rural providers, especially those practicing in underserved and poor areas, not be penalized for practicing under adverse conditions and with limited resources. It is also important that reimbursement schemes do not create perverse incentives (e.g., spending more time with healthier patients at the expense of seeing sicker patients) that can ultimately decrease provision of critically needed maternal and infant care.*
- \* *Additional programs and funding are needed to ensure that rural areas have access to much needed maternal and infant care specialized facilities and*

*equipment to adequately provide care. This includes support of such programs as the Rural Hospital Flexibility Program (including Critical Access Hospitals) to facilitate optimal access to hospital-based initial care, labor and delivery care, and emergency care.*

- \* It is critically important that federal, state, and local programs are funded and that policies be implemented to provide rural women with adequate financial means to obtain needed obstetric, facility, and infant care. Far too many rural women are not able to seek appropriate prenatal and other health care because of obstacles such as poverty and lack of transportation. Medicaid payments to rural providers for maternal and infant care should be increased to induce more providers to provide such care.*
- \* Federal and state expenditures should be increased to support evidence-based telehealth programs targeted to small and remote/frontier/isolated small community hospitals so that local providers can obtain the help they need in treating maternity and infant emergencies. Likewise, investment in sound distant learning should be increased, including continuing education and skill upgrade training (e.g., increased clinical competencies and degrees for nurses).*
- \* Formal safety net programs such as federally funded Community Health Centers and the National Health Service Corps (NHSC) should continue and be expanded in rural areas. The current administration's efforts to dramatically expand the CHCs should be supported. The recruitment and training of NHSC physicians should emphasize obstetrics. Federally designated Critical Access Hospitals and the overarching Small Rural Hospital Flexibility Program should emphasize women's quality health services including prenatal, emergency, delivery, and infant care.*
- \* Federal and state governments should fund programs that support and help create networks that link and improve rural maternal and infant care. Such networks should include clinical coordination and training. Regionalization is necessary for the best care to be provided to rural women and their infants.*

*Compile Rural-Focused Information to Guide Policy and Program Efforts*

- \* There should be a concerted effort to produce and compile more rural perinatal and infant care statistics that highlight rural and intra rural results. Those statistics should be based on geographic taxonomies that provide the needed levels of specificity to enable different types of areas to be characterized and compared. Without more relevant and detailed rural information, it is unlikely that policy makers and others will be persuaded to make productive changes or to appropriately target them to the locations and populations where they are most needed.*

- \* *Rural miscarriage and birth defect surveillance programs and prevention programs should be carefully evaluated for effectiveness and be adequately funded. This includes programs related to farm accidents and insecticides.*

Prioritize Strategies for Targeted Rural Populations

- \* *While there are often federal political expediencies with having egalitarian inter state policies regarding rural perinatal and infant care resource use, it is clear that the opportunities to make the largest gains related to infant mortality and morbidity are concentrated in certain areas of rural America. It is recommended that emphasis in resource use and programs be targeted to those rural areas and populations where the greatest gains can be realized per dollar spent--rural areas with the combination of high infant mortality rates (IMRs) and large numbers of death, concentrated poverty and minority populations, remote populations, and selected states.*

Identify Best Practices and Evaluate Program Effectiveness to Address Rural Health Care Disparities

- \* *Funding should be made available to identify and document innovative and effective rural maternal health and infant best practices and to widely disseminate them so that other rural communities can implement them where appropriate.*
- \* *While there appears to be an assumption that teams of different types of providers provide better care, more research needs to be performed to demonstrate the effectiveness and efficiency of such rural prenatal and obstetric teams (e.g., FPs and nurse practitioners). Maternal and infant care payers should encourage the development and appropriate use of such teams.*

These recommendations could be supplemented with a plethora of others that are mostly of a more detailed clinical nature (e.g., implementing programs to promote use of folic acid among preconception women). Such recommendations have not been included here because they are not specific to rural maternal and infant care and are already available from many sources, including the March of Dimes web site (<http://www.marchofdimes.com/>).

The rural population of the United States is well in excess of 50 million persons. Our efforts to improve maternal and infant health of this large segment of the American population should be substantially expanded. The unique problems experienced in rural America, especially in small and remote and isolated small rural towns, can be addressed with concerted effort. However, it remains to be seen whether the nation and its political pundits have the will and wisdom to make and pay for the necessary changes. The problem is not with finding the yellow brick road but with diligently following it.

## **Introduction**

Despite the fact that health expenditures in the United States are the highest among developed countries (Shi and colleagues, 2004), infant mortality in our nation is higher than that of 26 other nations (March of Dimes, 2005b). The problems that are experienced by pregnant women and newborns in obtaining health care services, and the potential for adverse health care outcomes when these services are impeded or delayed tend to be exacerbated in rural as compared to urban communities. In a book entitled “Rural Health in the United States”, the authors of this paper concluded: “Although the United States has the world’s most advanced perinatal technology, it fails in making these marvels equally available to the entire populace. Neonatal intensive care units have become increasingly accessible to most very low birth weight infants, but for some populations, routine care is not always within reach. “Although these inequalities and inequities are present throughout the country, rural areas bear additional burdens because of their remoteness and low population densities, burdens that translate into some of the demographic disparities between rural and urban areas...” (Lishner and colleagues, 1999:135).

Among the Healthy People 2010, objectives (U.S. DHHS, 2000) are the following:

- Reduce fetal and infant deaths.
- Increase the proportion of pregnant women who receive early and adequate prenatal care.
- Increase the proportion of very low birth weight infants born at Level III hospitals or subspecialty perinatal centers.
- Reduce preterm births.

These national objectives most certainly apply to rural America. Maternal, infant and child health ranked as the ninth highest rural health priority according to the Rural Healthy People 2010 survey (Gamm and colleagues, 2003a). In their companion document to Rural Healthy People 2010, Gamm and colleagues (2003b:152-153) asserted: “Rural mothers and their children comprise a large segment of the U.S. population. Thus, health disparities between rural and urban groups are of national concern. Increased rates of adverse pregnancy outcomes in rural areas, such as preterm birth and low birth weight, have been observed, as well as higher rates of infant mortality. Access to prenatal care is critical for reducing maternal and infant morbidity and mortality, though rural women tend to receive less adequate prenatal care than their urban counterparts. Although the risk factors for these conditions tend to disproportionately affect women in rural areas, the health status of rural mothers and infants can be largely improved by eliminating existing barriers to quality and comprehensive prenatal care.”

This paper illustrates recent rates and trends in rural births, maternal complications and adverse birth outcomes; explores disparities that may exist in rural as compared to urban areas as well as different categories of rural areas; describes patterns in the utilization of maternal and infant care by rural residents and obstacles that rural residents experience in obtaining

appropriate and timely care; and provides examples of model community programs and federal and state efforts to address these issues. The authors explore policy options for ameliorating these rural health care challenges to meet objectives such as those enumerated in Healthy People 2010.

A comprehensive review of the research literature on rural maternal and infant health care was conducted to update earlier reviews that showed substantial evidence of disparities in rural and urban obstetric care and outcomes (Lishner and colleagues, 1999; Peck and Alexander, 2003b). This literature review focuses on the following themes: challenges facing rural health care systems; issues regarding access to services for maternal and infant health care in rural communities; shortages and maldistribution of health care professionals serving rural areas and providing obstetrical care; non availability of local specialized facilities and services such as Neonatal Intensive Care Units and Cesarean Section capability; financial and insurance barriers; malpractice and liability issues; inadequate access to prenatal care; adverse birth outcomes; and descriptions of federal and state policies and community interventions aimed at improving rural maternal and infant care. A summary of this review and synthesis of the recent literature is presented in the Appendix. For definitions of terms, refer to the provided glossary.

While there is a wealth of data and literature on maternal health and pregnancy outcomes when considering factors such as race/ethnicity, age, and type of insurance, there are far fewer sources of data or recent studies that explore the geographic association, and more specifically, rural residence on these outcomes. As one of many examples, surveillance of disparities in maternal health-related behaviors through the Pregnancy Risk Assessment Monitoring System (Phares and colleagues, 2004) examined selected maternal behaviors by age, race, education, and income level--but not by geographical location. We know from the research literature on rural health care, in general, that there are wide variations in access, types of health care providers, locally available facilities, and certain health outcomes when comparing health care services in rural to urban areas. However, additional evidence is needed to determine how rural residency and remoteness from tertiary centers and specialty care and poor access to primary care influence the health and health care of mothers and their babies. This paper does not emphasize those circumstances, conditions, and policies that are common for both rural and urban maternal and infant health. Rather it emphasizes those that are unique or particularly severe in rural America, and highlights promising approaches and policies targeted at ameliorating rural health care disparities for women and their children.

### **Defining Rural**

Approximately 20 percent of the U.S. population resides in rural areas and about three-fourths of the nation's counties are rural (Hart and colleagues, 2005). Nearly 20 percent of the rural population is other than non-Hispanic white (e.g., African Americans, Hispanic/Latinos, American Indians and so forth) (Eberhardt and colleagues, 2001). Johnson and Beale (2001) report the fastest growth rate in non-metropolitan areas in the past 20 years, with a gain of 5.6 million residents since 1990. They attribute this population gain to an influx of migrants from urban centers, and fewer people leaving rural areas. Those rural counties located near metropolitan areas grew more than more distant ones. Implications of renewed rural



population growth include the need for expanded infrastructure and more services--including those related to maternal and infant health care.

Various definitions of rural have been used for research and policy purposes, and there is no standardized definition to designate places or populations as rural. Depending on which definitions and categories are used, the rural population can vary from 10 to 28 percent of the population (Hart and colleagues, 2005). Rural taxonomies are typically based on population size, density, proximity, degree of urbanization, adjacency and relationship to a metropolitan area, principal economic activity, economic and trade relationships, politics, and work commutes (Hart and colleagues, 2005). Hart and colleagues (2005) suggest that the use of incongruent definitions of rural may result in dramatically different conclusions and associated policy decisions. For example, the Office of Management and Budget (OMB) county-based definition of metropolitan and non metropolitan populations and the Census Bureau tract-based definition of urban/rural often do not concur on which population groups are rural (e.g., they disagree on 17.9% of the nation's population) (Hart and colleagues, 2005). This can have major repercussions when, for example, making government decisions on which rural areas should receive scarce federal and state resources.

A relatively recent new geographic taxonomy, the Rural-Urban Commuting Areas (RUCAs), uses census tract level-demographic and work-commuting data to define 33 categories of rural and urban census tracts (Morrill and colleagues, 1999). The RUCA categories range from core urbanized areas to isolated small rural places where the population is less than 2,500, but take into account the work commuting distances to urbanized areas. RUCAs can identify the rural portions of metropolitan counties and the urban portions of non metropolitan counties, and have been widely used for research and policy purposes where it is important to distinguish the nature and type of rural area and its distance from larger towns where more health resources are available (Hart and colleagues, 2005).

Differentiating the nation's rural areas from its urban areas is necessary but not sufficient for research, policy, intervention, targeting, and other purposes (Hart and colleagues, 2005; Farmer and colleagues, 1993; Helme and Blegen, 1999). Rural areas differ greatly from one another across the country (Hartley, 2004). Just as their physical environments differ in important ways, so do the populations that inhabit them and their access to and need for health care services in general, and maternal and infant care. Across different rural areas access, race/ethnicity, need, provider supply, care processes, and outcomes vary significantly (Probst and colleagues, 2004). Aggregating heterogeneous areas washes out definitive results (e.g., all rural or rural by state) while differentiating intra rural areas by type allows perinatal-related differences to be exposed. Thus, it is important when studying and considering rural maternal and infant health to use appropriate intra rural geographic taxonomies as well as to examine other contributing factors.

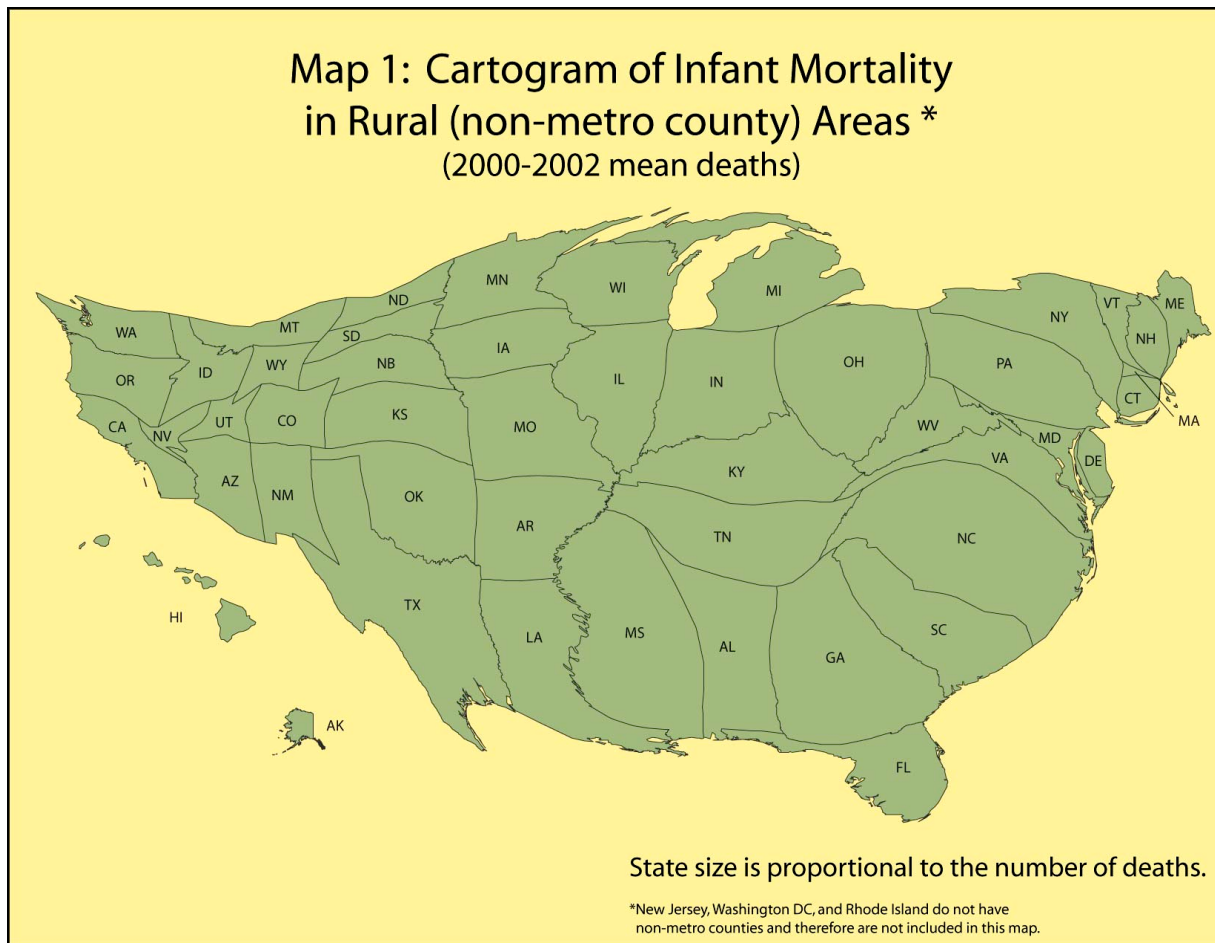
### **Rural Maternal and Infant Health**

In 2003, the nation's infant mortality rate (IMR) was 7.0 (per 1,000 births), which was unchanged from the comparable 2002 figure that showed an increase from 2001's 6.8, the first increase since 1959 (March of Dimes, web site, 2006). Currently there are more than four million births in the U.S. annually (Martin and colleagues, 2006). Among the world's

nations, the U.S. has a higher infant mortality rate than 35 nations, including Sweden, Japan, France, Germany, Australia, Canada, United Kingdom, Greece, Italy, Germany, Spain, Portugal, Ireland, and Cuba. The U.S. rate is more than twice that of Sweden. The Healthy People 2010 goal is a rate of 4.1 (Gamm and colleagues, 2003a).

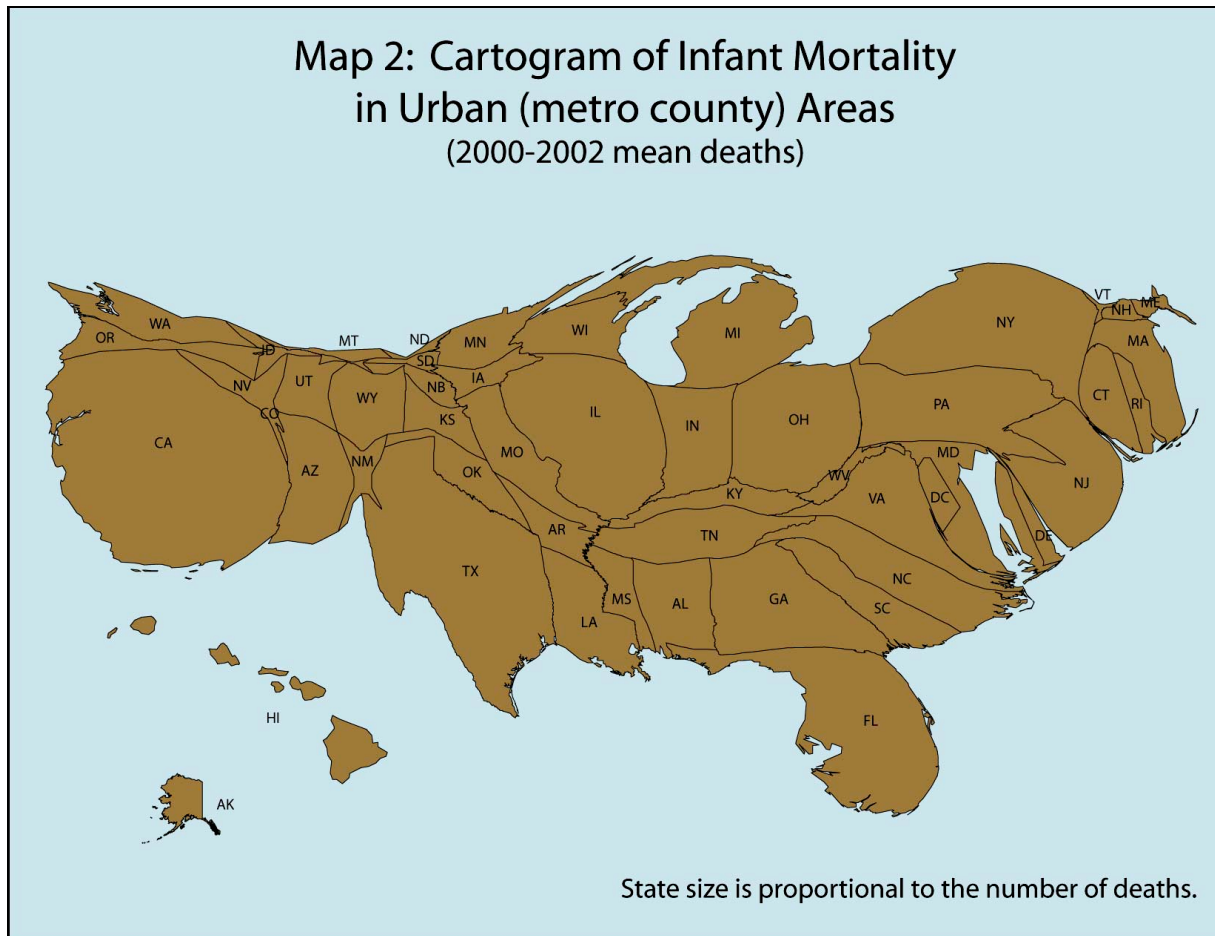
Nationally, there were 27,710 infant deaths in 2000-2002 on average. Of these, 16 percent (4,566) took place in rural areas and 84 percent were urban (23,144) (ARF, 2005). Slightly over 15 percent of the births were in rural areas. The rural rate has been slightly higher than the urban rate (Eberhardt and colleagues, 2001).

Map 1 is a cartogram that illustrates the number of rural infant deaths by state where the sizes of the states are proportional to their number of deaths (2000-2002) (ARF, 2005)). As can be seen, the South and Midwest states account for the lion's share of the rural infant mortality. The states that had the most deaths per year for 2000-2002 were North Carolina (302 mean per year), Texas (265), Mississippi (260), and Georgia (237).



For comparative purposes, Map 2 is a similar type of cartogram but shows urban infant mortality deaths. A comparison of the two maps shows that there are substantial relative differences where the deaths are taking place between rural and urban locations. For instance, New York, California, and Florida are relatively much larger on the urban map than on the rural map (i.e., it accounts for a much larger percentage of the deaths in urban U.S. than in the

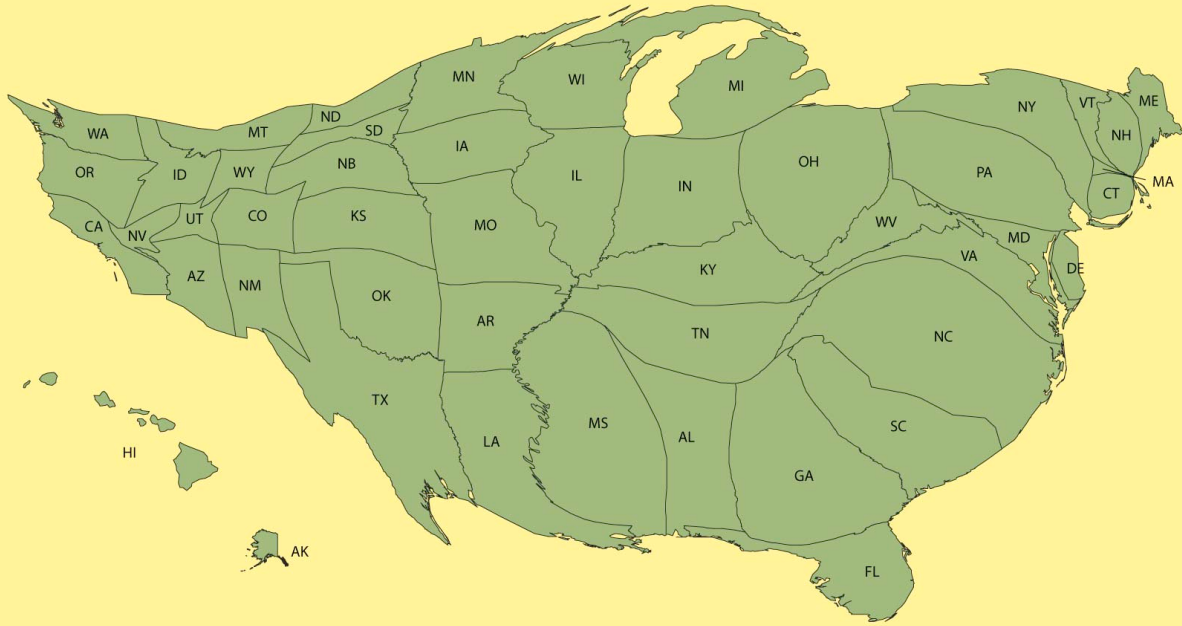
rural U.S.). Conversely, other states, such as Kentucky, North Carolina, and Arkansas are relatively more important contributors of infant deaths in the rural U.S. and in the urban areas.



Maps 3 and 4 are cartograms similar to Maps 1 and 2 except that they show rural neonatal and post neonatal deaths (yearly means across 2000-2002). The relative contribution of the states is similar in the two maps, although there are some differences. For example, Arkansas is relatively more important for post neonatal than for neonatal deaths.

Maps 5 and 6 show infant mortality rates (IMRs) for urban and rural areas by state. The highest state rates were in rural counties concentrated in the South. The highest 2000-2002 rural yearly mean mortality rates per 100,000 live births were in Mississippi (10.7), South Carolina (10.1), Georgia (9.7), and Louisiana (9.4). Comparatively, the highest state urban rates were the District of Columbia (11.3), Mississippi (9.9), Delaware (9.7), Alabama (9.7), and Louisiana (9.6). Overall, across the 2000-2002 period, the rural IMR rate of 7.3 was significantly higher than the urban rate of 6.8. Rural infant deaths represented 16.2 percent of the nation's total and 15.0 percent of the births. The rural IMRs vary by many delivery system, individual women, and locational characteristics. For instance, American Indians/Alaska Natives (AI/ANs) have much higher IMRs than whites (Baldwin and colleagues, 2002). Rural AI/AN women's rates are slightly higher than urban AI/AN

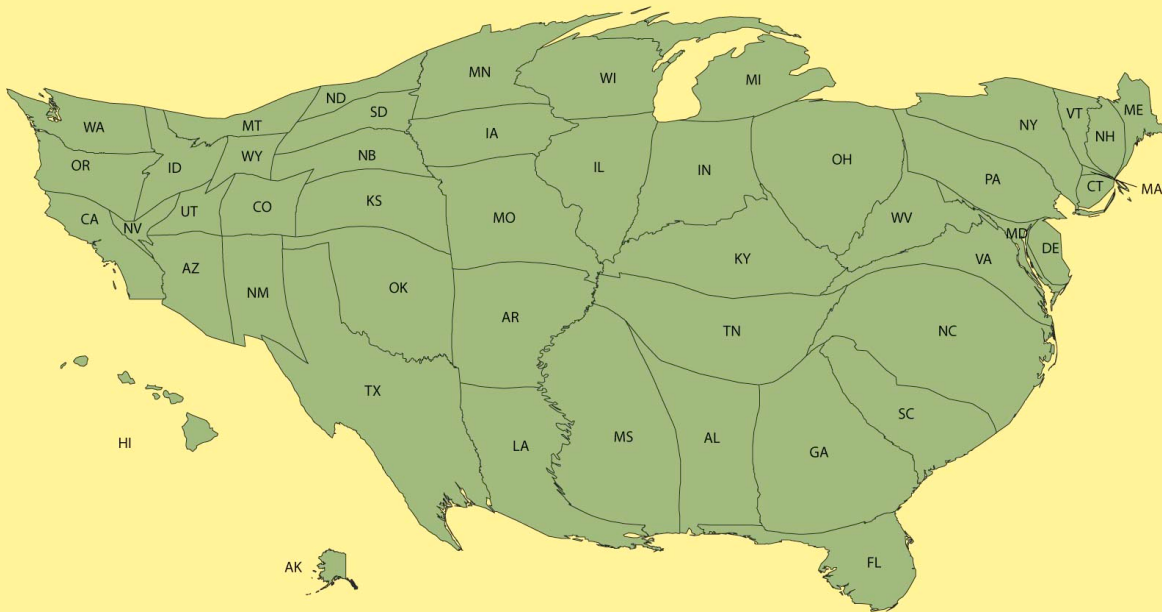
Map 3: Cartogram of Neonatal Deaths  
in Rural (non-metro county) Areas\*  
(2000-2002 mean deaths)



State size is proportional to the number of deaths.

\*New Jersey, Washington DC, and Rhode Island do not have non-metro counties and therefore are not included in this map.

Map 4: Cartogram of Postneonatal Deaths  
in Rural (non-metro county) Areas\*  
(2000-2002 mean deaths)

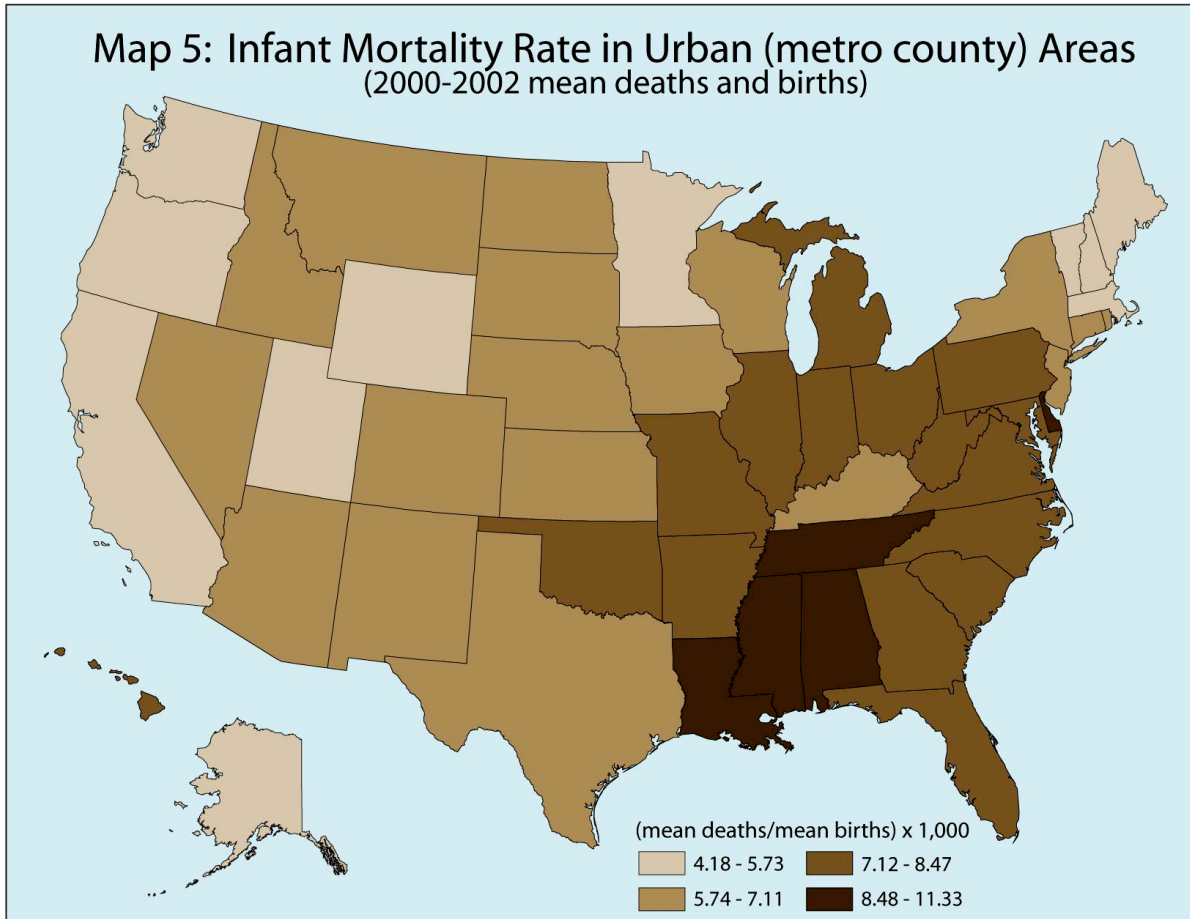


State size is proportional to the number of deaths.

\*New Jersey, Washington DC, and Rhode Island do not have non-metro counties and therefore are not included in this map.

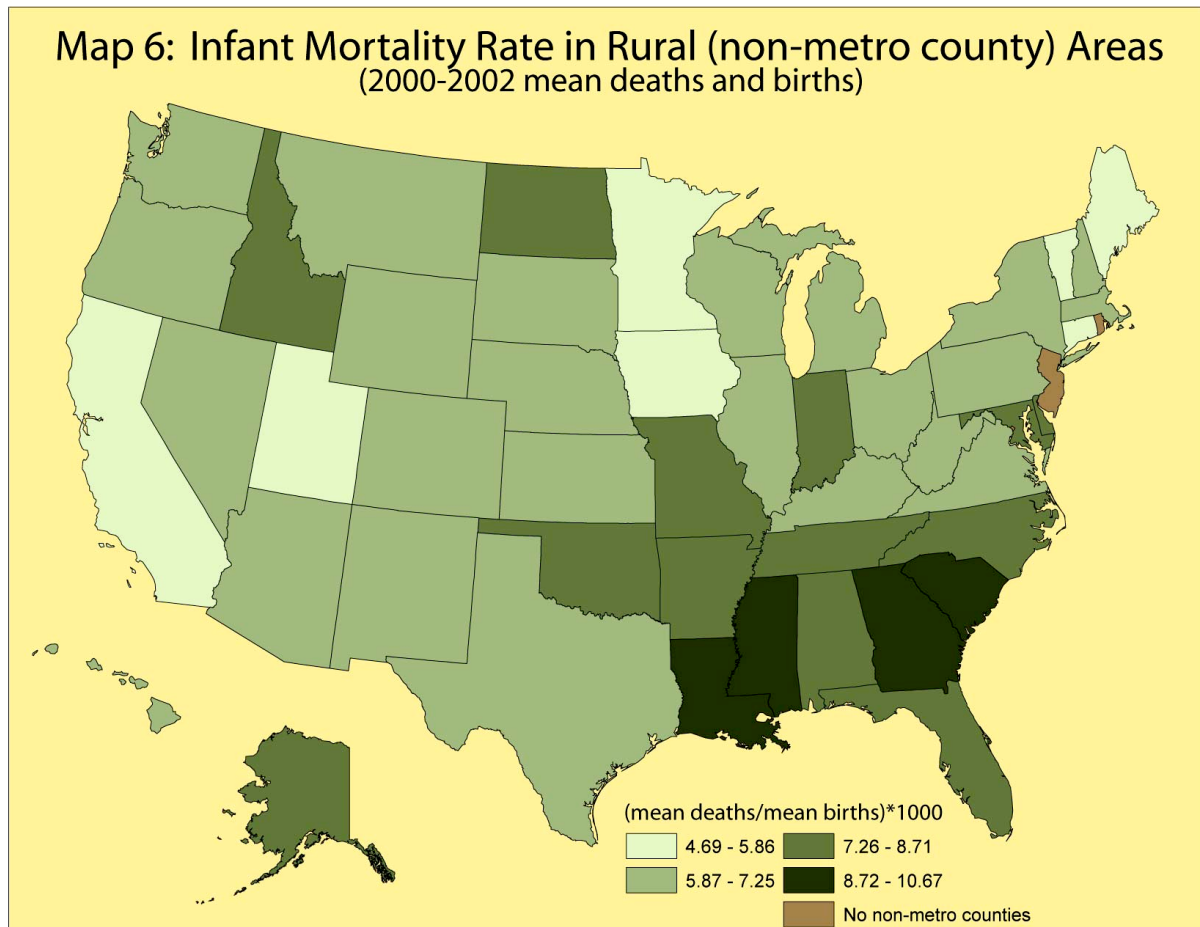
rates and much higher than the overall urban rates. In fact, the rural AI/AN post neonatal death rate was 6.9 per 100,000 live births compared to an overall white rate of 2.6 and an African American rate of 5.8 (Baldwin and colleagues, 2002).

Overall, pregnant rural women when compared to their urban counterparts are younger, have a higher maternal mortality rate, have a larger number of children, have less adequate prenatal care, experience higher fetal death rates, and are more likely to be on public health insurance or no insurance (Acosta, 2001a).



As previously indicated, rural residents not only suffer from geographic isolation but also suffer in comparison to their urban counterparts in terms of income, insurance coverage, and subsequent fiscal access to care (Schur and Franco, 1999). Rural women and their infants are more likely to depend on public programs (e.g., Medicaid and State Children's Health Insurance Programs (SCHIPs)) for their fiscal access to care (Lishner and colleagues, 1999). Health care providers often limit access to their practices for those without insurance and those on public insurance coverage, because of the low rates of payment.

The purpose here is not to document all the nuances of differences in rates between rural and urban outcomes and process of care measures but to provide the flavor of the comparisons. While many rural outcomes are similar to urban ones and many factors are known to be associated with differences that do occur (e.g., race, parity, maternal age), this does not negate the fact that rural mortality and morbidity problems are important in their own right.



### Challenges Facing Health Care Systems in Rural Areas

While underserved individuals across the nation experience disparities in access to health care, certain obstacles and conditions are unique to rural residents. Rural residents tend to be older, use more health care services, have a lower median income, have higher unemployment rates, and report higher rates of chronic disease and infant mortality than their metropolitan counterparts (Hart and colleagues, 2005; Ricketts and colleagues, 1999). The declining role of agriculture and the growth of low wage jobs without benefits make it more difficult for rural residents to afford health care (Ricketts and colleagues, 1999). Rural areas are becoming more racially and ethnically diverse, and their residents are more likely to be underemployed, have lower wages, and have higher poverty rates than their urban counterparts. At the same time, low population densities, limited organizational resources, geographic and sociocultural factors impede service delivery in rural areas.

Unique challenges to maternal and infant care in rural and remote areas include low immunization rates, lack of early and adequate prenatal care, tobacco and alcohol use during pregnancy, and higher rates of infant and child mortality (AMCHP, 2004). Compounding these problems are limited means of transportation to visit providers, inclement weather, limited technical infrastructure, physical and medical isolation, fewer choices of providers and health care plans, minimal access to specialty services, increased confidentiality concerns,

values affecting trust of health care systems, limited volunteer resources, and constraints limiting the skilled health care workforce, among other factors. The AMCHP report recommends strategies to address barriers to care, improved methodologies to analyze health data for small populations, use of a consistent definition of rural for equitable policies and distribution of funds, routinely incorporating rural-urban data into analyses, raising the profile of rural health disparities, coordination of services to rural populations, supporting innovative strategies to address geographic disparities, critically assessing the impact of changes in reimbursement rates and funding formulas, strengthening the NHSC, fully funding the Maternal and Child Health Block Grant, strengthening public health insurance programs and safety net legislation, working closely with state offices of rural health, building third party reimbursements for rural residents to access health care services, and accounting for transportation costs and travel needs in appropriation formulas (AMCHP, 2004).

Rural women experience some unique disadvantages. Mulder and colleagues (2001) report that rural white women are more likely than men to be poor, have higher fertility rates than urban women, have limited economic and educational opportunities, and have a greater proportion of births occurring to teenage mothers. They cite studies demonstrating disproportionately higher fetal, infant and maternal mortality among rural residents, and residence in counties without physicians trained in or willing to do obstetrics. The situation for rural minority women is often even more desperate. Rural children are sometimes comparatively disadvantaged regarding their health and well being when compared to their urban counterparts, albeit less so than for their mothers (U.S., DHHS, 2005).

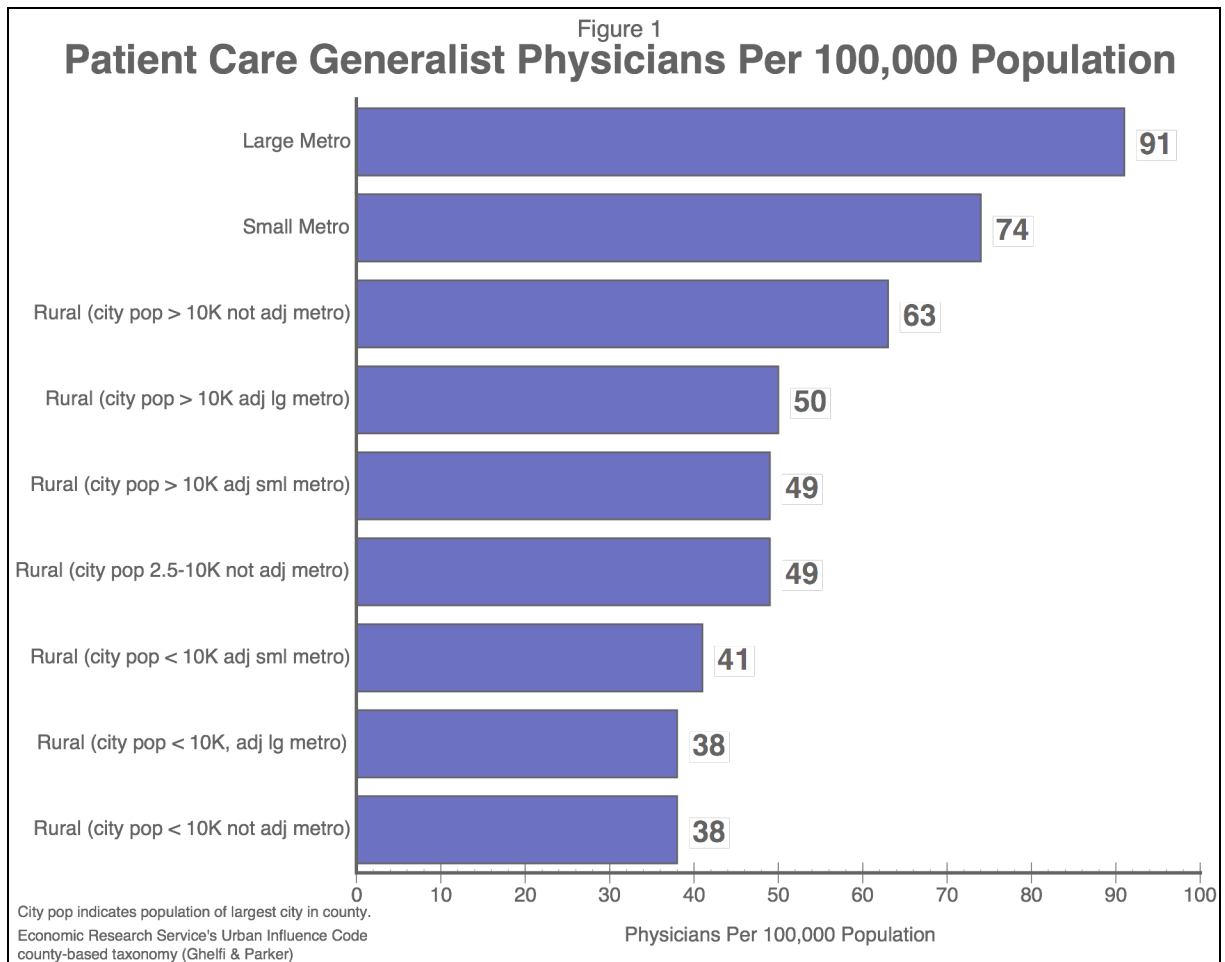
Importantly, rural areas vary dramatically in terms of their size, remoteness, ease of access to metropolitan areas, demography, economies, environmental characteristics, amenities and culture—as well as the type and quantity of health care providers and resources that are available within them. However, as indicated earlier, conventional definitions of rural use a single classification that does not differentiate between rural areas of very different sizes and degrees of isolation. Averaging data across a single rural category fails to differentiate the more acute shortages of providers or the higher rates of some adverse outcomes found in the nation's smallest and most remote areas. Circumstances surrounding maternal and infant care may be very different in large rural compared to small and remote rural areas.

### **Access to Maternal and Child Health Services in Rural Areas**

Women living in rural areas experience many serious and sometimes unique barriers to obtaining health care services that may delay or impede receipt of care. This is most problematic for residents of the more remote and isolated areas that have few medical resources and are more distant from alternative care sources (Schur and Franco, 1999). The major barriers to the provision and receipt of rural maternal and infant care in rural areas are discussed in detail in the Appendix, but are highlighted below, and include:

## Fewer Health Care Professionals Practicing and Providing Obstetrical Care in Rural Areas

One of the major obstacles to the provision of maternal and infant care in rural communities involves the shortage and geographic maldistribution of health care professionals practicing in rural areas. Over two-thirds of health care providers in rural America in 2000 were nurses, while physicians represented less than 15 percent (Hart and colleagues, 2002). Only about 11 percent of the nation's physicians practice in rural locations (Hart and colleagues, 2002). For patient care generalist physicians, large and small urban cities had 91 and 74 per 100,000 population compared to 38 per 100,000 in remote rural counties whose largest town had less than 2,500 population (see Figure 1). The physician rates per 100,000 population for FPs, obstetrician/gynecologists (OB/GYNs), general surgeons, and general pediatricians (those physician specialties most relevant to maternal and infant health) for large urban cities, were 24 (FPs), 15 (OB/GYNs), 15 (general surgeons), and 21 (general pediatricians), compared to 28, 8, 10, and 8 in large rural places and 29, 3, 6, and 3 in small rural places (Hart and colleagues, 2002).



Physician specialists dealing with complications of pregnancy, surgery, delivery, low birth weight infants, birth defect infants, and distressed infants are often in short supply in rural areas. Because obstetricians are concentrated in urban areas, smaller rural communities



depend on FPs and non-physician providers for basic obstetric care. However, fewer FPs have been electing to include obstetrics in their practices (Chen and colleagues, 2006; Madden and Moore, 2001; Ratliffe and colleagues, 2002), threatening access to maternity services for rural residents in particular. Many factors have led providers to select to discontinue obstetrics—foremost among them, rising malpractice insurance costs. The numbers of nurse practitioners (NPs), physician assistants (PAs), certified nurse midwives (CNMs), and certified registered nurse anesthetists (CRNAs) have increased rapidly during the past decade and are slightly more prevalent per capita in rural than urban America (Baer and Smith, 1999). However, these practitioner groups are often in short supply in remote areas where women need access to obstetric care (e.g., Larson and Hart, 2005). Appropriate perinatal care is severely hampered for rural women because of insufficient numbers, mix, and distribution of providers within rural areas.

### **Non-Availability of Local Specialized Facilities and Services Such as Neonatal Intensive Care Units and Cesarean Section Capability**

Studies have shown that high technology care in designated Level III perinatal regional centers providing risk assessment, emergency care, consultation, outreach/education, transportation, care coordination and specialty medical services results in better risk-adjusted infant mortality rates (see Schwartz and colleagues, 2000). Schwartz and colleagues (2000) found that high-risk urban women were two to three times more likely to deliver in a high-technology facility than were their rural counterparts, with distance clearly a factor. In a study of pregnant women at a rural hospital without on-site Cesarean capability, Leeman and Leeman (2002) found that 64.7 percent were able to give birth in the hospital without operative facilities, 25.6 percent were transferred before labor, and 9.5 percent were transferred during labor. The authors conclude that “the presence of a rural maternity care unit without surgical facilities can safely allow a high proportion of women to give birth closer to their communities”. They suggest that rural hospitals that do not have Cesarean delivery capability can safely offer obstetric care to selected patients as part of an integrated perinatal system that uses appropriate screening risk criteria.

### **Financial and Insurance Barriers**

Access to appropriate health care for rural women and their children is also impeded by poverty, prejudice, and inadequate health care insurance. It is estimated that 36 percent of rural children were uninsured at some time during the year and their rates are 10 to 50 percent higher than rates for urban children (see Coburn and colleagues, 2002). The State Children’s Health Insurance Program (SCHIP) was created in 2001 in response to increasing rates of uninsured children in the nation. Coburn and colleagues (2002) showed that rural children were more likely than urban children to experience protracted periods of no insurance and were more likely to move between public and private coverage. They are also more likely to be underinsured (i.e., have more limited insurance coverage). They estimate that there are about 1.9 million chronically uninsured rural children in America. Lichtenstein and colleagues (2005) indicate that almost 1 in 3 children do not have health insurance coverage for all or part of the year, with rural children among the most impacted. Rural areas have about a 20 percent lower rate of insured persons than do urban areas, and this is, in part, attributable to fewer employer-based health insurance programs, greater poverty, and a higher

bar for Medicaid eligibility. Reed (2004) comments that shrinking and delayed Medicaid reimbursements to rural physicians have resulted in many of them limiting their practices to existing Medicaid patients or deciding not to see Medicaid patients at all. This not only results in greater use of emergency room care but also in limited access to prenatal care, with an increased risk of preterm birth and maternal complications. As with many aspects of today's social order, rural women and infants often suffer the health care consequences of the disparities of differential treatment by a prejudiced society, which are exacerbated and compounded by income and education differentials (Glassgow and colleagues, 2004). As of the end of 2004, there were 3,950,000 rural and urban children enrolled across the nation in SCHIP (Smith and Russeau, 2005).

Differentials in fiscal and geographic access to perinatal care are being combated by a cornucopia of federal and state programs that are mentioned throughout this monograph, albeit not nearly as well as needed. Over 40 million Americans remain without insurance and many more are underinsured. Programs to help pregnant women and their infants, while well meaning and often effective, have not kept up with the demand for many reasons, including severe budgetary problems at the federal and state levels. The ability to pay remains a severe barrier to care for rural women and their infants.

### **Malpractice and Liability Issues**

Another major impediment to the availability of obstetric providers in rural areas stems from increasing malpractice insurance rates and liability concerns. A survey of FPs in Louisiana (Madden and Moore, 2001) showed that barriers to deliveries included cost of malpractice insurance and liability issues (32.8%) and lack of coverage (19.7%). Reed (2004) reports that problems with Medicaid and high liability insurance undermine efforts to recruit physicians to rural practices, with about half of the obstetricians responding in a survey that they intended to quit, move or limit their high-risk procedures such as routine obstetric care. A Washington State survey showed that fewer FPs were providing obstetric services, leaving rural areas particularly vulnerable since they provide the majority of such care in rural locations. Dramatic increases in liability insurance premiums led many obstetric providers to make changes such as decreasing high-risk obstetric procedures and increasing Cesareans and consultation rates (Benedetti and colleagues, 2006). Rural FP obstetric providers often have lower volumes than rural OB/GYNs and urban FPs. This translates into their higher insurance and other costs per delivery and more on-call time. There are many approaches to ameliorating these problems, including tort reform that limits liability and/or personal damage awards and more finely tuned rate structures that are based on evidence of risk leading to adjustments in rates for delivery volume.

### **Barriers to the Receipt of Prenatal Care**

Despite the importance of prenatal care in improving pregnancy outcomes and the clear evidence of the risks associated with delayed or inadequate amounts of prenatal care, Gamm and colleagues (2003b) cite several studies demonstrating less adequate levels or timing of care among rural compared to urban women. They attribute this to the lack of locally available prenatal and obstetrical care, less health insurance, greater travel time and distance to providers, lack of transportation and inadequate childcare. A study on the use of prenatal

services by Hispanic women showed that two-thirds of the women reported barriers to obtaining prenatal care, with rural women citing transportation, an inconvenient clinic schedule, having a provider who did not accept Medicaid, and uncertainty as to where to seek care. Both rural and urban women indicated lack of the ability to pay, distance of the prenatal care facility, lack of transportation and sadness or depression as barriers to care. In a study of prenatal care utilization among rural low-income women, although 80 percent initiated prenatal care in the first trimester, only 60 percent received an adequate number of visits (Omar and Schiffman, 2000). Women who received care from CNMs were more satisfied with the information received than those who received care from physicians.

In a survey of pregnant women in rural California, late entry into prenatal care occurred in 27.3 percent of the cases (Chandler, 2002). Factors correlated with late entry included stress, Medicaid as a payer, lack of support from family and friends, being a teenager or over the age of 34, lack of acceptance of the pregnancy, and not having a high school diploma. A study to determine the impact of Medicaid-sponsored prenatal care on birth outcomes in an impoverished rural county in South Carolina found that infants born to mothers who initiated prenatal care in the first trimester had increased morbidity and increased utilization of hospital service compared to infants of mothers who initiated prenatal care later (Guillory and colleagues, 2003). The authors suggest that mothers who were at high-risk were appropriately identified and were entering prenatal care earlier. In a Washington State study, Pilkey and colleagues (2004) found that women living in rural areas were less likely than their urban counterparts to begin prenatal care in the first trimester of pregnancy and were more likely to smoke during pregnancy. No statistically significant differences were found across rural and urban locales from 1999 to 2001 in the rate of infant mortality or low birth weight births.

Because of the lack of provider surgical capability (e.g., lack of nearby OB/GYN and general surgeon physicians) and facilities in many rural areas, rural women who need Cesarean sections are often disadvantaged compared to their urban and large rural town counterparts. While this is often an inconvenience for scheduled C-sections, it can also be life threatening in emergencies. This lack of access is clearly more of a burden for pregnant women who are poor, uninsured, and without easy access to means of transportation.

### **Adverse Birth Outcomes in Rural Areas**

Problems that are unique to rural areas place rural residents at risk of deleterious health outcomes, including a range of health issues related to pregnancy and newborn care. Given the disparity in access to various types of health care services and providers within rural (especially small, remote rural) as compared to urban areas, how does this influence the outcomes of care that is received?

Peck and Alexander (2003a) reviewed numerous studies and indicators of rural maternal and infant health and found disparities in infant mortality, adverse pregnancy outcomes, prenatal care and obstetrical care. They found increased rates of adverse pregnancy outcomes such as pre term birth, low birth weight and infant mortality in rural as compared to urban areas, and a greater tendency for rural women to receive inadequate prenatal care. The authors indicate that rural residence may have an indirect effect on adverse outcomes, and that “disparities in infant mortality by area of residence may result from the disproportionate distribution of

poverty, race/ethnicity, age, education, and availability and access to medical resources” (Peck and Alexander 2003a). Poor access to prenatal care; lack of OB/GYN, general surgeon, perinatologists and FPs; and non availability of the associated specialized facilities/equipment pose increased risks of morbidity and death for many preterm rural pregnant women and pregnant women with various pregnant complications and their infants because of delays in obtaining the necessary care.

Findings concerning various adverse pregnancy outcomes and factors that place rural women and infants at special risk of morbidity and mortality are further described in the Appendix.

## **Improving Maternal and Child Health Services in Rural Communities**

### **Federal and Other Programs Aimed at Improving Rural Health Care**

Many federal and state policies and programs were created and implemented to help ameliorate the shortages of health care providers in rural area, such as the NHSC; Medicare Incentive Program (MIP); federally-funded community health centers (CHCs), including other Federally Qualified Health Clinics (FQHCs) such as Migrant Health Centers and FQHC look-alikes; rural health clinics (RHCs); Critical Access Hospitals (CAHs); Area Health Education Centers (AHECs); Health Professional Shortage Area (HPSAs) and Medically Underserved Area (MUA) designations to help target resources; Conrad-30 J-1 waiver visa physician international medical graduate (IMG) programs; distant learning, telehealth medical services, and health information technology initiatives from various federal agencies such as the federal Office for the Advancement of Telehealth (OAT) and the Agency for Healthcare Research and Quality (AHRQ); Department of Labor Workforce Investment Act (WIA), and Title VII and VIII funding to support primary care provider training, to name just some of the programs (Ricketts, 1999; Hart and colleagues, 2002). In addition, federal and state Medicaid and SCHIP programs aim at making care for pregnant women and their infants accessible, although national enrollment has been relatively stagnant given the tough budgetary conditions for states and the federal governments.

These programs, to varying degrees, have expanded the supply of and access to providers within rural areas. For example, the federally funded CHCs’ 5,000 locations are an important component of the nation’s formal safety-net system of health care and their expansion is a President Bush administration priority. During 2003, CHCs provided over 1.4 million encounters where a pap smear was performed: urban, 83 percent; large rural, 12 percent; small rural, 3 percent; and isolated small rural, 2 percent of visits. Of all CHC visits, 17 percent (238,736) took place at rural locations. Parallel figures for the number of perinatal care patients are: 87 percent, 10 percent, 2 percent, and 1 percent (13%)(computed by authors from Bureau of Primary Health Care 2003 Uniform Data Set). Thus, 42,744 rural women received all or part of their prenatal care in CHCs in 2003. Likewise, prenatal, labor and delivery, neonate, and post delivery care have also been provided in the 3,000 RHCs, which likewise help to provide safety-net care. The CAH program has helped preserve the fiscal viability of over 1,200 small rural hospitals, which in turn has made their services available to women and their infants. The rural program also emphasizes emergency services and quality improvement. As part of the informal safety net, many providers and facilities provide care

for free or at reduced rates. For instance, a recent study found that over half of Wyoming FPs reported 10 percent or more of their visits as nonpaying (Dobie and colleagues, 2005).

Another approach has been the establishment and expansion of facilities such as CAHs and federally funded health centers serving underserved rural populations to increase access and reduce disparities to primary and essential care, including obstetrics. A study comparing rural patients of federally-funded rural health centers with people in the general rural population based on data from the 1999 Uniform Data System, published national census data, patient surveys and National Health Interview Survey and National Vital statistics data showed that rural health center patients experienced lower rates of low birth weight compared to those in the general rural population, particularly for African American infants (Shi and colleagues, 2003). Findings in terms of use of preventive services such as Pap smear screening and mammograms were mixed.

Federal and state initiatives regarding CAHs, CHCs, RHCs, and relevant training for and emphasis on rural providers are necessary to ensure accessible quality perinatal care for rural women. Many significant strides are being made in these programs: for instance, the quality initiatives in the CAHs and CHCs are meaningful. Other initiatives to improve care in rural locales are being implemented by the Office for the Advancement of Telehealth, the Agency for Healthcare Research and Quality, and other entities in an effort to bring technology to bear on rural quality and access issues (e.g., telehealth and electronic medical records). The various types and combinations of health information technology (HIT) hold the potential to significantly help in the care of rural pregnant women and the infants they deliver. The application of these technologies facilitates rural local access in remote locations to highly specialized obstetrical and neonatal care physicians as well as the fast transfer of medical record information, especially in emergency circumstances. In addition, continuing education for providers, including registered nurses, can be delivered through the telehealth and web technologies. However, it is important to be cautious and practical in not seeing these advancements as a panacea for the problems of access to providers. While the technologies are useful, they do not take the place of a competent and accessible cadre of rural providers who provide hands-on perinatal and infant care, especially in remote rural communities.

The problems with rural access to quality perinatal care and infant care are real and current. Too many rural women and their infants do not receive optimal care judging by any standard. Too often these rural women and infants are poor, minority, and reside in remote locations. The time to ameliorate these problems is now, by implementing many of the diverse strategies discussed above and by adhering to the recommendations enumerated below. While these issues are critical, there are additional future challenges impeding rural American health care delivery. For example, it is not clear how the genetics revolution will play out for providers in rural areas. Who will take responsibility for the testing and counseling? How will the added costs of information and communications technology (ICT) be paid for and by whom? How effectively can we protect residents and prepare for biological terrorism in rural places? All these questions and more will need to be dealt with over the next decade. Nevertheless, the severe hardships resulting from poor access of rural pregnant women and their infants to health care are here now and beg for national attention and solutions (see Institute of Medicine, 2005).

## **Programs Aimed at Increasing the Supply of Rural Health Care Professionals**

Because there is a shortage of FPs willing to practice obstetrics in rural and remote locations, and a decline in the number of rural OB/GYNs, programs have evolved to encourage providers to practice in rural places, and to include deliveries in their scope of services. Anderson (2000) reported on the effects of a rural track residency program in Buffalo that emphasized the practice of low-risk obstetrics in physician shortage areas. An OB/GYN works in the residency practice as a backup for more complex cases. This residency practice increased access to obstetrics in the region as well as the number of deliveries provided locally, while reducing the number of Cesarean sections. Ratcliffe and colleagues (2002) examined the effect of a 1997 Residency Review Commission (RRC) regulation that stipulated that all family medicine residencies have at least one FP serve as an attending physician for family medicine resident deliveries. Family medicine residency program directors responding to a survey estimated a 16 percent increase in the number of residents who include obstetrics in their practice after residency completion compared to survey results from 1993 (Ratcliffe and colleagues, 2002). Those programs with four or more FP faculty doing obstetrics and those with more than 10 deliveries per month had higher obstetric participation. More than half of the previously non-compliant programs added or retrained faculty who could attend resident deliveries after the RRC regulation was imposed.

Delzell and Ringdahl (2003) described a rural obstetrical network at the University of Missouri Family Practice Residency Program designed to increase the number of deliveries performed by each resident, the number of graduates practicing in rural areas, and the number of graduates going on to practice obstetrics. Residents participate in a one-month rural obstetrics rotation where they staff the labor and delivery suite, working closely with FPs and OB/GYNs. A comparison of residents who graduated before and after this program was implemented showed the same percentage practicing in rural areas but a 30 to 41 percent increase in the percentage of those including obstetrics in their practices among the participants of this network.

Helton and colleagues (2003) examined the effects of a University of North Carolina family residency practice educational intervention to increase the number of graduates who included prenatal care and deliveries in their practices. The pregnancy care curriculum was expanded to include a maternal and child health teaching service, improved role modeling by FP faculty, a lengthier pregnancy care training curriculum, more deliveries, evidence-based didactics, breast-feeding and child health services, and enhanced collaboration with other health care providers and settings to increase the volume of deliveries and broaden experiences. The authors report an increase from 27 to 52 percent in the number of residents who included prenatal care or deliveries in their practices after graduation from the program.

One strategy to address the shortage of rural providers who include obstetrics in their practices is greater use of nurse midwives during low-risk pregnancies. Levy and colleagues (2005) measured newborn indices before, during, and after a demonstration project that introduced nurse-midwives into a health personnel shortage area in a rural county hospital in California. Prenatal care visits increased, and prematurity and neonatal mortality decreased during the program, but were not sustained after the program ended because of the discontinuation of the nurse-midwives' services and resulting shortage of health care

personnel. Raisler and Kennedy (2005) reviewed the research literature on 45 studies of midwifery care of poor and vulnerable women from 1925 to 2003 and found that midwives predominantly serve women who are poor, young, immigrants, or members of racial/ethnic minority groups. The authors contend that excellent outcomes of midwifery care for poor women were evidenced in urban and rural settings.

The NHSC program funds provider education in return for service in underserved rural communities, as do many state loan repayment programs. The J-1 visa waiver programs allows international medical graduates who complete U.S. residency training to practice in U.S. underserved areas instead of returning to their origin countries. Title VII funding helps to support initiatives for primary care physician training programs in rural areas and a key goal of the AHECs is to facilitate the training of rural providers. Some of the federal and state health care provider workforce-related programs have an influence on short-term service while others have created a more permanent cadre of rural providers and facilities. Nevertheless, issues of poor geographic access for rural residents to health care providers and facilities remain a grave problem in rural America (Rosenblatt, 2004). The core problem is not that these programs are ineffective but rather that they are not funded at a significant enough level to meet the complexity and scope of rural problems. Of course, the lack of and/or insufficiency of insurance coverage for large segments of the rural population underlie all of these issues.

Federal and state family medicine training programs need fiscal and statutory inducements to include prenatal care, obstetrics, and infant care in their curricula. The nation's medical schools are undergoing a period of expanding class sizes. In fact, the number of generalist physician (e.g., FP) graduates has been declining for some time. It is critical that medical training programs focus their expansion in training providers to those likely to practice primary care and likely to practice in rural areas – and to include obstetrics in their clinical repertoire. Likewise, there needs to be heightened emphasis on implementing physician residency training in rural areas, which is currently extremely scarce (e.g., only 7.5% of time spent in training within rural areas for FP residents and much less for other primary care specialties) (Hart and colleagues, 2005). Likewise, there is a need for much more rural - oriented training for OB/GYN physicians, CNMs, NPs, and PAs.

### **Regionalization of Care**

Regionalization of obstetric care has been one strategy to address poor local access to obstetric services for women with high-risk pregnancies who reside in remote rural locations. This approach to making neonatal intensive care services available involves establishment of a perinatal network that identifies three levels of inpatient care, and transport of high-risk mothers from rural areas to a facility with newborn intensive care services (Gibson and colleagues, 2001). A steady decline in the U.S. infant mortality rate since the 1960s has been attributed in part to regionalization of care resulting in the transport of high-risk mothers and their babies from birthing hospitals to specialized tertiary care (Level III) center for perinatal and neonatal care with highly specialized health professionals. However, this system has been undermined by current trends such as the influx of neonatologists and neonatal intensive care units into community hospitals and changes in the financing and organization of intensive care services (<http://www.rwjf.org/portfolios/resouces/grantsreport.jsp?filename=>).

A survey of perinatal nursing directors of nine community hospitals in rural Virginia about personnel, training, equipment, transportation, and protocols (Gibson and colleagues, 2001) found wide variation in services, such as the number and training of accompanying personnel during maternal transport. After establishment of guidelines, some practice changes were revealed in a follow-up survey in terms of increased use of appropriate protocols including better communication with the use of cell phones in every transport to deal with emergencies and allow for immediate contact with physicians.

Despite regionalization efforts including infant mortality review in small hospitals, advancing neonatal resuscitation skills at the local level, and facilitating the timely transfer of high-risk women and infants from rural hospitals to tertiary care centers, a national study showed that rural residents had continued higher rates of post neonatal mortality and inadequate prenatal care (Larson and colleagues, 1997). However, Larson and colleagues (2006 draft) suggest that the overall rural/urban differential in neonatal mortality and risk of low birth weight during the 1980s narrowed substantially with the movement to regionalize care for high-risk rural women and infants. An examination of rates of birth outcomes in 1985-87 and 1995-97 showed better outcomes overall and improvements in the provision of prenatal care over these two periods, but persistence of rural/urban differentials in post neonatal mortality, especially in the more remote and persistent poverty rural areas. Larson and colleagues conclude that the continuing closure of the rural-urban gap in care requires the maintenance of regionalized system of care for high-risk women and infants and addressing poverty issues that influence birth outcomes.

### **Community Interventions in Rural Areas**

A plethora of programs have been implemented across the nation to improve the delivery of maternal and infant care to those residing in rural areas. Examples of promising rural-focused programs that have been documented in the literature are described below. The companion document to Rural Healthy People 2010 (Gamm et al 2003b) describes several models for practice in the area of maternal, infant and child health, including an outreach program that provides free home visits within days of hospital discharge and nursing and family development visits by volunteer health care providers from the region, and a “Nurse-Family Partnership”, in which nurse home visitors in 23 states provide services and information to low-income and first time mothers to improve health care behaviors that can influence preterm delivery, low birth weight and infant development (Gamm et al 2003b).

Moore and colleagues (1989) investigated the effect of a comprehensive regional preterm birth prevention program in North Carolina that involved working with the high-risk patients' customary providers to employ risk assessments, patient education, review protocols, specific guidance and medical and nursing consultation. When comparing white to nonwhite women in rural counties, the percent of very low birth weight newborns for women not in the program was more than twice that of women in the program. Rural outcomes were found to be as or more favorable than urban outcomes, especially for very low birth weight and preterm low birth weight for nonwhite women. Yawn and Yawn (1989) described a program targeting prevention of preterm birth in a community hospital in rural Minnesota, involving intensive instruction to medical personnel, a designated preterm birth prevention nurse educator, a



patient education curriculum and pamphlet, continuing education of low-risk women concerning warning signs, periodic risk assessments, and weekly visits and monitoring for high-risk patients and those with signs and symptoms of preterm labor. Significant decreases were found in the rate of preventable preterm births and admissions to neonatal ICUs, as were significant increases in gestational ages and weights of preterm newborns.

An evaluation of a nursing telephone intervention in an African American community clinic population to reduce preterm and low birth weight births among pregnant women at risk (Muender and colleagues, 2000) found cost savings and reduced preterm and low-birth weight births among African American women who received weekly telephone calls from an RN, compared to those in the control group. Although this study did not focus on rural outcomes per se, its generalizability to a rural setting should be tested. Pistella and colleagues (2000) described social work strategies and a rural demonstration project addressing barriers to prenatal care faced by rural residents, including review of data and program development, enhancing community health partnerships, encouraging participant involvement in advocating for their health care needs, fostering grassroots efforts to improve community perinatal care services, and a community needs assessment that identified barriers to prenatal care. The federally funded intervention included approaches to address inadequate transportation and increase the number of health care delivery sites, outreach, case management and clinical services, assessment and referral, a mobile unit, and a referral hotline.

Margolis and colleagues (2001) demonstrated positive outcomes for a community-wide system-level intervention in North Carolina to improve the delivery of preventive services to low-income pregnant women and their children. The intervention included community, (e.g., policy changes to make resources more available locally) practice (e.g., enrolling practices seeing at least 5 infants per month to improve clinical preventive care) and family-level strategies (e.g., recruiting high-risk women for a home visiting intervention involving teams of nurses and parent educators). Dotson and colleagues (2003) described a fetal alcohol syndrome (FAS) and alcohol-related birth defect prevention program in Montana that added paraprofessional support specialists with substance abuse backgrounds to case management teams to provide weekly visits to women at risk during pregnancy and provided health education, motivational interviewing and links to community services. Astley (2004) described a study in Washington State that led to a significant decline in the prevalence of maternal drinking during pregnancy and FAS among foster children, with the implementation of primary prevention efforts ranging from public health education to direct intervention with high-risk women.

A common assumption is that healthy mothers have healthy babies. Bitler and Currie (2005) examined national data from the Pregnancy Risk Assessment Monitoring System to evaluate the effect of the Special Supplemental Nutrition Program for Women and Infants (WIC) on pregnancy and birth outcomes. This federally funded, state run program provides food and nutritional advice to pregnant and postpartum women, infants and children who are low income and at risk in terms of their nutrition. Positive outcomes included reductions in the number of low birth weight infants and reduced likelihood of an infant ending up in an intensive care unit. While not a rural program per se, this approach clearly has relevance for rural areas where poverty is prominent.

We have shown that lack of health care insurance is a factor in compromised access to health care in rural locations. A study of the effect of the State Children's Health Insurance Program (SCHIP) from 1998-2000 demonstrated a decrease of 2.5 million in the number of uninsured children, and an increase in Medicaid enrollments (Menifield and Fletcher, 2004). The authors comment that region and poverty rate are the best predictors of uninsured children, and other chronic problems that need to be addressed include unemployment, high school dropouts, homelessness, female-headed households, the disparity between rich and poor, and low per capita income.

Several evaluations of the Healthy Steps for Young Children Program have examined its effects on quality of early childhood care and parenting practices for children enrolled in the program at birth and followed up through the age of three (Guyer and colleagues, 2000; Minkovitz and colleagues, 2001; 2003). This multi-site, large-scale intervention incorporates developmental specialists and services into pediatric care, and provides enhanced well-child care, 6 home visits in the first 3 years, a child-development telephone line, developmental assessments, prevention and health promotion materials, parent groups and linkages to community resources. Positive effects were noted on receipt of child rearing services, high satisfaction with care, receiving timely well-child visits and vaccinations, and remaining in the practice for 20 months or longer, although its effect on rural populations were not examined.

Interventions that appear to be particularly effective in increasing access to maternal and infant care in the larger population of high-risk families should also be implemented and tested in rural populations to see if they are equally effective or if they require specific modifications to address diverse environments.

## **Recommendations**

For the most part, the recommendations for rural maternal and infant health parallel those for the U.S. population as a whole, such as those advocated by the March of Dimes and other concerned groups (e.g., the need for preconception and early and adequate amounts of prenatal care). However, the health care issues and barriers to services faced by rural women and their infants are often different from those in metropolitan America, though sometimes more in line with issues affecting inner-city women and infants. Clearly, financial access to health care is a problem for large numbers of rural and urban mothers, although relatively more of a problem for rural women. However, geographic access is much more problematic for rural women.

It is beyond the scope of this monograph to make recommendations regarding all of the federal and state programs that are intended to help with rural women's pregnancies, deliveries, and infant care. Many of these programs help urban women as well, especially those located in inner city locales. The recommendations enumerated below were selected to emphasize those areas not commonly addressed that have a differential influence on the care of rural women and their infants.

General rural recommendations are as follows:

Implement Programs and Policies to Increase Rural Health Provider Supply

- \* *Adequate funding is needed for federal and state programs aimed at increasing the numbers of rural perinatal and infant health care providers (e.g., FPs, OB/GYNs, general surgeons, certified nurse midwives, and nurse practitioners and physician assistants able and prone to provide such services). These programs include training programs such as Title VII and Title VIII and programs that focus on placing providers in rural areas to both provide local health care service and provide them with rural practice exposure and facilitate subsequent rural recruitment and retention. Federal and state family medicine training programs need fiscal and statutory inducements to include prenatal care, obstetrics, and infant care in their curricula. The nation's medical schools are undergoing a period of expanding class sizes. It is critical that they be persuaded to concentrate this expansion in training physicians likely to practice primary care and likely to practice in rural areas. Likewise, there needs to be expanded emphasis on implementing physician residency training in rural areas, which is currently extremely scarce (e.g., only 7.5% of time spent in training within rural areas for FP residents and much less for other primary care specialties). Likewise, there is a need for much more rural-oriented training for OB/GYNs, CNMs, nurse practitioners, and physician assistants.*
- \* *Legislation and program reforms should help increase rural provider numbers in the places where shortages are most pronounced. For instance, the National Advisory Committee on Rural Health and Human Services recommends "... legislation that will extend the Federal Tort Claims Act to rural OB providers in federally designated shortage areas" (NACRHHS, 2005). Extending liability protection to Rural Health Clinics similar to that enjoyed by community health centers (CHCs) should be enacted. Helping to decrease the educational debt of new physician graduates will also increase the likelihood that physicians will choose to practice in primary care and in rural places (Rosenblatt and Andrilla, 2005).*

Fund Programs and Services to Increase Rural Access to Quality Health Care

- \* *The quality of care in rural areas should receive the focus and support of the federal and state governments along the lines recommended by the Institute of Medicine report on rural health care (Institute of Medicine, 2005). It is important that rural providers, especially those in underserved and poor areas, not be penalized for practicing under adverse conditions and with limited resources. While the quality standards should be clear and providers should be adequately trained to meet them, their performance must be judged against the limitations of the environment in which they practice. For instance, a pay-for-performance (P4P) quality improvement and cost management national payment scheme should be devised in such a way that practicing well under unfavorable circumstances is not financially or professionally penalized. It is also important that such schemes do not create perverse incentives (e.g., spending more time with healthier patients at the*

*expense of seeing sicker patients) that can ultimately decrease provision of critically needed maternal and infant care.*

- \* Additional programs and funding are needed to ensure that rural areas have access to much needed maternal and infant care specialized facilities and equipment to adequately provide care. This includes support of such programs as the Rural Hospital Flexibility Program (including Critical Access Hospitals) to facilitate optimal access to hospital-based initial care, labor and delivery care, and emergency care.*
- \* It is critically important that federal, state, and local programs be funded and that policies be implemented that provide rural women with adequate financial means to obtain needed obstetric, specialized facility, and infant care. Far too many rural women are not able to seek appropriate prenatal and other health care because of obstacles such as poverty and lack of transportation. It is additionally important that rural providers be protected from “innovative” national payment schemes that are urban centric and whose ramifications for rural providers need to be carefully and prospectively understood before putting them and their pregnant and infant patients at risk. Medicaid payments to rural providers for maternal and infant care should be increased to induce more providers to provide such care.*
- \* Federal and state expenditures should be increased to support evidence-based telehealth programs targeted to small and remote/frontier/isolated small community hospitals so that local providers can obtain the help they need in treating maternity and infant emergencies. Likewise, investment in sound distant learning should be increased, including continuing education and skill upgrade training (e.g., increased clinical competencies and degrees for nurses).*
- \* Formal safety net programs such as federally funded Community Health Centers and the National Health Service Corps should continue and be expanded in rural areas. The current administration’s efforts to dramatically expand CHCs should be supported. The recruitment and training of NHSC physicians should emphasize obstetrics. Federally designated Critical Access Hospitals and the overarching Small Hospital Flexibility Program emphasize women’s quality health services including prenatal, emergency, delivery, and infant care.*
- \* Federal and state governments should fund programs that support and help create networks that link and improve rural maternal and infant care. Such networks should include clinical coordination and training. Regionalization is necessary for the best care to be provided to rural women and their infants.*

*Compile Rural-Focused Information to Guide Policy and Program Efforts*

- \* There should be a concerted effort to produce and compile more rural perinatal and infant care statistics that highlight rural and intra rural results.*

*Those statistics should be based on geographic taxonomies that provide the needed levels of specificity to enable different types of areas to be characterized and compared. Currently, there is a scarcity of rural-focused information available from common maternal and infant data sources. Without more relevant and detailed rural information, it is unlikely that policy makers and others will be persuaded to make productive changes or to appropriately target them to the locations and populations where they are most needed.*

- \* Rural miscarriage and birth defect surveillance programs and prevention programs should be carefully evaluated for effectiveness and be adequately funded. This includes programs related to farm accidents and insecticides.*

#### *Prioritize Strategies for Targeted Rural Populations*

- \* While there are often federal political expediencies with having egalitarian inter state policies regarding rural perinatal and infant care resource use, it is clear that the opportunities to make the largest gains related to infant mortality and morbidity are concentrated in certain areas of rural America. It is recommended that emphasis in resource use and programs be targeted to those rural areas and populations where the greatest gains can be realized per dollar spent-- rural areas with the combination of high infant mortality rates (IMRs) and large numbers of death, concentrated poverty and minority populations, remote populations, and selected states (e.g. Georgia, Louisiana, Mississippi, and North Carolina, and South Carolina). Much of the targeting should be within rural areas of the South.*

#### *Identify Best Practices and Evaluate Program Effectiveness to Address Rural Health Care Disparities*

- \* Funding should be made available to identify and document innovative and effective rural maternal health and infant best practices and to widely disseminate them so that other rural communities can implement them where appropriate.*
- \* While there appears to be an assumption that teams of different types of providers provide better care, more research needs to be performed to determine the effectiveness and efficiency of such rural prenatal and obstetric teams (e.g., FPs and nurse practitioners). Maternal and infant care payers should encourage the development and appropriate use of such teams.*

These recommendations could be supplemented with a plethora of others that are mostly of a more detailed clinical nature (e.g., implementing programs for preconception women to take folic acid). Such recommendations have not been included here because they are not specific to rural maternal and infant care and are already available from many sources, including the March of Dimes web site (<http://www.marchofdimes.com/>).

The rural population of the United States is well in excess of 50 million. Our efforts to improve maternal and infant health of this large segment of the American population should

be substantially expanded. The unique problems experienced in rural America, especially in small and remote and isolated small rural towns, can be addressed with concerted effort. However, it remains to be seen whether the nation and its political pundits have the will and wisdom to make and pay for the necessary changes. The problem is not with finding the yellow brick road but with diligently following it.

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## **Glossary**

Antepartum	Period from conception to beginning of labor
Community Health Center (CHC)	Federal program that funds ambulatory medical centers to provide care in underserved areas to underserved residents (migrant and other types of clinics are also included – often referred to as 330 grantees)
Critical Access Hospital (CAH)	Small rural hospitals that meet specific criteria and receive cost-based reimbursement from Medicare
Health Professional Shortage Area	Areas designated by federal government as having shortages of various types of health care providers (geographic units, facilities, and populations). Approximately 40 federal programs use HPSAs as eligibility criteria.
Infant Mortality Rate (IMR)	Infant deaths during first year after birth per 100,000 live births
International Medical Graduate (IMG)	Physicians who received their medical school degrees outside the United States and Canada – about 11 percent were born in the U.S.
Intrapartum	Period from onset of labor through delivery
Medically Underserved Area	Areas designated by federal government as being underserved regarding health care delivery
National Health Service Corps (BHSC)	Federal program through which health care providers receive training loan forgiveness for providing care in underserved areas
Perinatal	Period 20 <sup>th</sup> week pregnant through one month after giving birth
Postneonatal Mortality Rate	Infant deaths during period from 29 <sup>th</sup> day after birth through one year after birth per 100,000 live births
Postpartum	Period after childbirth
Neonatal Mortality Rate	Infant deaths during first 28 days after birth per 100,000 live births
Rural Health Clinic (RHC)	Ambulatory clinics that are designated by the federal government to receive cost-based reimbursement
Workforce Investment Act (WIA)	Federal program from the Department of Labor that funds various types of training and retraining, including health care workers.

## **About the Authors**

**Gary Hart**, PhD: is the Director of the Center for Rural Health and a professor in the School of Medicine, University of North Dakota in Grand Forks.

**Denise M. Lishner**, MSW: is the Director of Administration at the University of Washington Rural Health Research Center.

For questions regarding this monograph, send e-mail to Dr. Hart at the following e-mail address: [gary.hart@med.und.edu](mailto:gary.hart@med.und.edu)



## **Appendix: Summary of the Recent Literature on Rural Maternal and Infant Health Care**

### **Obstacles to Accessing Maternal and Infant Health Care in Rural Areas**

Women living in rural areas experience many serious and sometimes unique barriers to obtaining health care services that may delay or impede receipt of care. This is most problematic for residents of more remote and isolated areas that have few medical resources (Schur and Franco, 1999). Some of the major barriers to the provision and receipt of rural maternal and infant care in rural areas are enumerated below.

### **Fewer Health Care Professionals Practicing in Rural Areas**

Shortages and maldistribution of health care providers has been a chronic characteristic of rural America. There is a tendency for health care professionals to practice in more affluent suburban and urban areas that have a wealth of health care resources than in small and remote rural communities. Furthermore, the more highly specialized the physician, the less likely that physician will practice in a non metropolitan area, since specialists require a large population base, sophisticated hospitals and labs, and specialty colleagues (Rosenblatt and Hart, 1999) (COGME, 1998). Physicians are reluctant to locate their practices in rural areas for a variety of reasons, including longer practice hours, lack of collegial support, the need to provide night call coverage, diseconomies of scale, high rates of fixed overhead per-patient revenue, lack of specialist consultants or tertiary hospitals in the area, limited access to advanced technologies, economically fragile hospitals, greater dependency on Medicare and Medicaid reimbursement, and a variety of personal life style and other factors (Rosenblatt, 2001; Hart and colleagues, 2005). Having an adequate supply of rural health care providers is essential to improve the quality of rural care (Institute of Medicine, 2005).

In terms of overall numbers in 2000, over two-thirds of the main health care providers in rural America were nurses (e.g., nearly 400000 were RNs and licensed practical nurses (LPNs)), while allopathic and osteopathic physicians represented less than 15 percent (Hart and colleagues, 2002). In order, the next most frequent providers were: pharmacists, dentists, nurse practitioners (NPs), physical therapists, dental hygienists, physician assistants (PAs), and optometrists.

Only about 11 percent of the nation's physicians practice in rural cities and towns (Hart, and colleagues, 2002), although this takes in to account highly specialized physicians who are bound to large urban centers. Among patient care generalist physicians, large urban cities had 91 per 100,000 population (plus the primary care provided by their large numbers of specialists) compared to 38 per 100000 in remote rural counties whose largest town had less than 2500 population. The rates of physicians per 100000 population for FPs, OB/GYNs, general surgeons, and pediatricians, those physician specialties most relevant to maternal and infant health, for large urban cities were 24, 15, 15, and 21 compared to 28, 8, 10, and 8 in large rural places and 29, 3, 6, and 3 in small rural places. Only FPs were not dramatically less likely per population to be in rural areas, especially the less populated ones. Only about 35 percent of rural FPs provide perinatal care and the percentage of declining (Acosta,

2001a). The per capita numbers of physicians in rural areas has not increased nearly as much during the past 50 years as their urban counterparts. In addition, the number of rural general surgeons has remained relatively constant during the last decade but their demography destined the numbers to decline (per capita numbers have already declined) (Thompson and colleagues, 2005). Though there are fewer physicians in rural areas who provide perinatal care, across rural areas there are substantial variations in the distribution. Physician specialists dealing with complications of pregnancy, surgery, delivery, low birth weight infants, birth defect infants, and distressed infants are often also in short supply. It needs to be understood that not all rural towns have the populations to support highly specialized physicians, as they need large regional populations to both supply the needed number of cases and to fiscally support them. Maldistribution is as much of a problem as relatively fewer numbers of physicians and other types of providers (Larson and colleagues, 2003; NACRHHS, 2005).

Without belaboring the point, the same types of findings of shortage and maldistribution as for physicians are relevant for other perinatal specific providers: NPs, PAs, certified nurse midwives (CNMs), RNs, anesthesiologists, and certified registered nurse anesthetists (CRNAs). The numbers of NPs, PAs, CNMs, and CRNAs have increased rapidly during the past decade and are more prevalent per capita in rural than urban America (Baer and Smith, 1999). Clearly there is a much-publicized worsening national RN shortage in both urban and rural areas. Skillman and colleagues (2006) show that RNs per 100000 population by place of work for urban and rural places varies significantly from 839 in urban areas to 836 in large, 679 in small, and only 411 in isolated small rural places.

However, not only are the relatively low numbers of perinatal providers important to rural women's health, but it is important that these providers and public health workers work as a team to facilitate optimal care and protection from environmental risks (Rosenthal and Campbell-Heider, 2001; Conway, 2001). The bottom line here is that appropriate perinatal care is severely hampered for rural women because of insufficient numbers, mix, and distribution of appropriate providers within rural areas. There is widespread agreement about the lack of geographic access to health care providers by much of the rural population (NACRHHS, 2006; NACRHHS, 2005; Schur and Franco, 1999). At the community level, the nitty-gritty of the recruitment and retention of providers who are trained and willing to perform perinatal and infant care is critical, especially in poor communities that are amenity challenged. Much attention to the detail of rural recruitment and retention is essential (Robinson and Guidry, 2004).

Grumbach and colleagues (2003) investigated the geographic distribution of different types of clinicians in California and Washington and showed that California FPs had a twofold greater proportion of their members practicing in rural areas than pediatricians, internists and OB/GYNs, and that this proportion was even larger in Washington. Cohen and colleagues (2003) examined 2000 Healthcare Cost and Utilization Project data for Maine to identify the specialty of physicians attending hospital births, and found that nearly 20 percent of labor and delivery care was provided by FPs. FPs made their greatest contribution to delivery care for births of women on Medicaid (26% of deliveries) and those living in completely rural areas (37% of deliveries).

Because obstetricians are heavily concentrated in urban areas, smaller rural communities depend on FPs and non-physician providers such as certified nurse midwives for basic obstetric care. However, fewer and fewer FPs have been electing to include obstetrics in their practices. Chen and colleagues (2006) surveyed two cohorts of graduates from the University of Washington Family Medicine Residency Network about their current maternity care practice patterns. There was a 20 percent decline from 2000 to 2003 in the proportion of recent graduates performing deliveries in their practices despite perceived adequacy of their training in maternity care. Since maternity care is an important component of family medicine in rural and underserved communities, the decline in FPs performing deliveries threatens access to maternity services for rural residents in particular. Many factors have led providers to select to discontinue obstetrics—foremost among them, rising malpractice insurance costs.

Shi and colleagues (2004) demonstrated a negative correlation between primary care and infant mortality and low birth weight, showing that an increase of one primary care physician per 10,000 population was associated with a 2.5 percent reduction in infant mortality and a 3.2 percent reduction in low birth weight. While income inequality was positively associated with infant mortality and low birth weight, its effect on infant mortality disappeared when primary care and other covariates were accounted for. The authors suggest that continued high absolute levels of U.S. infant mortality, when compared to other countries, likely reflect poor access to appropriate health care.

Madden and Moore (2001) identified perceived barriers of FPs in Louisiana to provision of obstetric services and found that only 10.4 percent of 308 survey respondents provided obstetric services at the current time even though 56.5 percent had done so in the past. Rural family physicians were significantly less likely (6.7%) than urban FPs (13.9%) to offer obstetric services.

Ratcliffe and colleagues (2002) surveyed the directors of 462 U.S. family medicine residencies in 1998 and found that they estimated a 16 decrease in the number of residents who included obstetrics in their first practice after residency compared to a survey conducted five years earlier. Increased obstetric participation was associated with having only FP faculty supervise uncomplicated deliveries and having FP faculty that could perform other perinatal procedures. A much earlier study by Nesbitt and colleagues (1997) showed that poor local access to providers of obstetric care was associated with a significantly greater risk of having a non-normal neonate for both Medicaid and privately insured women.

Many federal and state programs were created to help ameliorate the shortages of health care providers in rural areas (e.g., National Health Service Corps (NHSC); Medicare Incentive Program (MIP); federally-funded community health centers (CHCs); rural health clinics (RHCs); Critical Access Hospitals (CAHs); Area Health Education Centers (AHECs); Health Personnel Shortage Area (HPSAs) and Medically Underserved Areas (MUAs) designations to help target resources; Conrad 30 and other programs that facilitate international medical school graduate visa waivers to practice in underserved areas; state educational loan repayment in underserved area programs; distant learning, telehealth medical services, and health information technology initiatives from various federal agencies such as the federal Office for the Advancement of Telehealth (OAT) and the Agency for Healthcare Research

and Quality (AHRQ); and Title VII and VIII funding to support primary care provider training, to name just a few (Ricketts, 1999; Hart and colleagues, 2002, Hart and Taylor, 2001). These programs to varying degrees have certainly helped rural areas regarding their provider availability. For instance, federally funded (CHCs are the backbone of the nations formal safety-net system of health care. These centers provide care at some 5000 locations nationwide. During 2003, the CHCs provided over 1.4 million encounters where a pap smear was performed: urban, 83%; large rural, 12%; small rural, 3%; and isolated small rural, 2% of visits. Of all the visits, 17% (238,736) took place at rural locations. Parallel figures for the number of perinatal care patients are: 87%, 10%, 2%, and 1%. Of all the patients, 13% (42,744) were at rural locations (computed by authors from BPHC Uniform Data Set). Overall, rural women annually give birth to 600,000 infants. Some of them have helped more related to short-term service while others have helped more related to creating a more permanent cadre of rural providers. The nation's 3,000 designated Rural Health Clinics also provide care for substantial numbers of pregnant rural women. Nevertheless, despite the contribution of these important programs issues to address poor geographic availability for rural residents to health care, providers and facilities remains a grave problem in rural America.

On a related topic, having enough providers is far from optimal if their quality of care is inadequate either because of poor training, a fractured health care delivery system, poor regionalization and coordination of care, or unreasonable demands on their time caused by severe shortages of health care providers, facilities, and equipment (Institute of Medicine, 2005). While there is no reason to inherently think that rural care should be of lower quality given the available resources (e.g., the FPs went to the same schools and residencies as their urban counterparts), there is scant evidence that extenuating circumstances sometimes lead to poorer quality rural care (e.g., Baldwin and colleagues, 2005). There is clearly an appropriate push to improve care quality across the nation and rural providers need to be fully vested in these changes (Institute of Medicine, 2005).

### **Non-Availability of Local Specialized Facilities and Services Such As Neonatal Intensive Care Units and Cesarean Section Capability**

Studies have shown that high technology care in designated Level III perinatal regional centers results in better risk-adjusted infant mortality rates (see Schwartz and colleagues, 2000). Services in these centers include risk assessment, emergency care, consultation, outreach/education, transportation, care coordination and specialty medical services. Schwartz and colleagues (2000) looked at the use of high-technology care among high-risk rural and urban women in the U.S. by linking 1988 National Maternal and Infant Health Survey data to 1988 American Hospital Association survey data for all obstetrical hospitals. The authors found that 30 to 45 percent of high-risk pregnancies nationally delivered in less than optimal facilities. High-risk urban women were two to three times more likely to deliver in a high-technology facility than were their rural counterparts, with distance clearly a factor in access to high-technology care.

Leeman and Leeman (2002) analyzed perinatal outcomes at a rural hospital without on-site Cesarean capability in a study of all pregnant women at age 20 weeks of greater gestational age over a 5-year period in a mostly Native American area of New Mexico. Of the 1,132

women in the study, 64.7 percent were able to give birth in the hospital without operative facilities, 25.6 percent were transferred before labor, and 9.5 percent were transferred during labor. Most transfers were for induction or augmentation of labor. Despite being a high-risk obstetric population, the perinatal mortality rate (11.4 per 1,000) was similar to the nationwide rate (12.8 per 1,000). Interestingly, the c-section rate was significantly lower than the national rate (7.3% versus 20.7%). While the incidence of neonates with low Apgar scores was significantly lower than the nationwide rate, the incidence of neonates requiring resuscitation was comparable. The authors conclude that “the presence of a rural maternity care unit without surgical facilities can safely allow a high proportion of women to give birth closer to their communities”. They further suggest that rural hospitals that do not have Cesarean delivery capability can safely offer obstetric care to selected patients as part of an integrated perinatal system that uses appropriate antepartum and intrapartum screening risk criteria.

### **Financial and Insurance Barriers**

It is estimated that uninsured rates for children living in rural counties of the U.S. are 10 to 50 percent higher than rates for children residing in urban counties (see Coburn and colleagues, 2002). The State Children’s Health Insurance Program was created in 2001 in response to increasing rates of uninsured children in the U.S. Coburn and colleagues (2002) emphasize that expansion of public health insurance to rural children through programs such as the State Children’s Health Insurance Program is impeded by lack of insight into insurance enrollment patterns and uninsured spells. Their examination of the Census Bureau’s 1993-96 panel of the Survey of Income and Program Participation showed that rural children were more likely than urban children to experience protracted periods of no insurance and were more likely to move between public and private coverage. The authors estimate that there are about 1.9 million chronically uninsured rural children in America.

Lichtenstein and colleagues (2005) indicate that almost 1 in 3 children do not have health insurance coverage for all or part of the year, with rural children among the most impacted. Rural areas have about a 20 percent lower rate of insured persons than do urban areas, and this is, in part, attributable to fewer employer-based health insurance programs, greater poverty, and a higher bar for Medicaid eligibility. The authors evaluated a local plan to provide health care to children in school in a rural county in Alabama, and found some gains in enrolling children in health insurance, although the program was vulnerable because of limited resources and an economic recession.

Reed (2004) comments that shrinking and delayed Medicaid reimbursements to rural OB/GYNs has resulted in many physicians limiting their practices to existing Medicaid patients or deciding not to see Medicaid patients at all. This results not only in greater use of emergency room care but also in limited access to prenatal care, with an increased risk of preterm birth and maternal complications.

### **Malpractice and Liability Issues**

Another impediment to the availability of obstetric providers in rural areas of the U.S. involves increasing malpractice insurance rates and serious liability concerns. Reported

barriers to provision of obstetric services, according to a survey of FPs in Louisiana (Madden and Moore, 2001) included cost of malpractice insurance and liability issues (32.8%), lack of coverage (19.7%), not having enough time (12.8%) and lifestyle protection (11.3%).

Reed (2004) reports that problems with Medicaid and high liability insurance undermine efforts to recruit physicians to rural practices. She notes that a recent survey by the Georgia OB/GYN Society found that about half of the thousand practicing obstetricians in that state intended to quit, move or limit their high-risk procedures such as routine obstetric care.

A survey of Washington State OB/GYNs, FPs, certified nurse midwives and licensed midwives found that fewer FPs than other provider types were providing obstetric services, leaving rural areas particularly vulnerable since FPs provide the majority of such care in rural locations. Dramatic increases in liability insurance premiums were shown from 2002 to 2004, leading many to make changes in their practices such as decreasing high-risk obstetric procedures and increasing Cesarean and consultation rates (Benedetti and colleagues, 2006).

Rural FP obstetric providers often have lower volumes than rural OB/GYNs and urban FP. This translates into their having higher insurance and other costs per delivery and more on-call time. Furthermore, longer travel distances and times for women to reach their obstetric providers decreases the amount of care that they obtain.

## **Prenatal Care**

Despite the importance of prenatal care in improving pregnancy outcomes and the clear evidence of the risks associated with delayed or inadequate prenatal care, Peck and Alexander (2003a) cite several studies demonstrating less adequate care among rural compared to rural women. Obstacles to receipt of timely and adequate prenatal care among rural inhabitants include, for example, lack of locally available prenatal and obstetrical care, less access to health insurance, greater travel time and distance to providers, lack of transportation and inadequate childcare (Peck and Alexander (2003a)).

A study comparing the use of prenatal services by Hispanic women in urban and rural settings in San Diego County showed that women who lived in urban areas were twice as likely to enter prenatal care late when compared to those living in rural areas. The urban women were more likely to be single, while the rural women were less likely to have attended any high school. Women with Medical were almost twice as likely to get timely prenatal care as women without it. About two thirds of the urban and rural women reported barriers to obtaining prenatal care, with rural women citing transportation, an inconvenient clinic schedule, having a provider who did not accept Medicaid, and uncertainty as to where to seek care. Both groups indicated lack of the ability to pay, distance of the prenatal care facility, lack of transportation and sadness or depression as barriers to care.

Omar and Schiffman (2000) examined adequacy and satisfaction of prenatal care utilization among 60 rural low-income women from a small rural underserved community in the Midwest who met Supplemental Food Program for Women, Infants and Children (WIC) eligibility criteria. Although 80 percent of the women initiated prenatal care in the first trimester, only 60 percent received an adequate number of visits. Women who received care

from Certified Nurse Midwives (CNMs) were more satisfied with the information received than those who received care from physicians. Despite the fact that almost two fifths of the women attended less than the recommended number of visits, outcomes for infants were generally positive. The authors suggest that the use of CNMs in the provision of prenatal care for low-risk women living in rural areas may ameliorate the disparity to rural prenatal care and rising costs of health care.

Chandler (2002) surveyed a sample of 176 women over the age of 18 served by four obstetrics practices in a rural county in California to assess the determinants of late entry into prenatal care. Overall, late entry into prenatal care occurred in 27.3 percent of the cases. Factors found to be correlated with late entry included stress, Medicaid as a payer, lack of support from family and friends, being a teenager or over the age of 34, lack of acceptance of the pregnancy, and not having a high school diploma. Financial problems, transportation and difficulty getting off work were not associated with entry in this sample; the author suggests this may reflect broad access to Medicaid in California.

In a study to determine the potential impact of Medicaid-sponsored prenatal care on birth outcomes in an impoverished rural county in South Carolina, Guillory and colleagues (2003) reported that infants born to mothers who initiated prenatal care in the first trimester had increased morbidity and increased utilization of hospital service compared to infants of mothers who initiated prenatal care later. The authors suggest that mothers who were at high-risk were appropriately identified and were entering prenatal care earlier.

Pilkey and colleagues (2004) examined U.S. Census Bureau data for Washington State and used RUCA codes to compare data by rural/urban locations to assess selected maternal and infant health outcomes. The authors found that women living in rural areas were less likely than their urban counterparts to begin prenatal care in the first trimester of pregnancy and were more likely to smoke during pregnancy. No statistically significant differences were found across rural and urban locales from 1999 to 2001 in the rate of infant mortality or low birth weight births.

### **Adverse Birth Outcomes in Rural Areas**

Problems that are unique to rural areas place rural residents at risk of deleterious health outcomes, including a range of health issues related to pregnancy and newborn care. Given the disparity in access to various types of health care services and providers within rural (and small, remote rural) as compared to urban areas, how does this influence the outcomes of care that is received?

Peck and Alexander (2003a) reviewed numerous studies and various indicators of rural maternal and infant health and found disparities in infant mortality, adverse pregnancy outcomes, prenatal care and obstetrical care. Specifically, they found increased rates of adverse pregnancy outcomes such as pre term birth, low birth weight and infant mortality in rural as compared to urban areas, and a greater tendency for rural women to receive inadequate prenatal care. The authors indicate that rural residence may have an indirect effect on adverse outcomes, and that “disparities in infant mortality by area of residence may result from the disproportionate distribution of poverty, race/ethnicity, age, education, and

availability and access to medical resources” (Peck and Alexander 2003a). In fact, Larson and colleagues (1997) in a national study that after controlling for demographic and biological risk factors that rural women, on average, were not at adverse neonatal or of delivering a low birth weight infant risk when compared to urban women, although late prenatal care was strongly related to rural residence.

Findings concerning various adverse pregnancy outcomes and factors that place rural women and infants at special risk of morbidity and mortality are further described below.

### **Cesarean Sections and Complications of Deliveries**

Despite national efforts to decrease the Cesarean rate among low-risk women, primary and repeat Cesarean rates for all women have reached their highest levels and VBAC rates have dropped to their lowest levels since these data were first reported on birth certificates in 1989 (Martin, 2005).

A comparison of birth outcomes among women who delivered by Cesarean section at a tertiary hospital, comparing rural, rural adjacent to urban, and urban women, demonstrated that rural women had the worse outcomes overall and had to travel the longest distance for delivery (Hulme and Blegen, 1999). A negative correlation was found between distance and gestational age, birth weight, and Apgar scores, while a positive association was found for total complication score, length of hospital stay and costs incurred.

A study of provider distribution and variations in statewide Cesarean section rates in 1996 found that even after adjusting for the level of rurality of a state and statewide median income, the percentage of FPs offering obstetric care was inversely related to Cesarean section rates. As the percentage of FPs offering obstetric services increased in a state, the rate of Cesarean deliveries for that state declined (Hueston and Lewis-Stevenson, 2001). A retrospective review of all deliveries performed in an 11-year period by a solo practitioner in a rural community demonstrated that approximately 75 percent of VBAC attempts were successful, with no incidence of maternal or fetal mortality (Upadhyaya and colleagues, 2003). The authors emphasize the importance of using a conservative approach in determining which patients should be offered trial of labor, close involvement of nurses in patient management, and awareness of the trial of labor on the part of the on call anesthesiologist and operating room staff.

Greene and colleagues (2004) examined delivery patterns in rural hospitals and compared Cesarean section rates in rural as compared to urban areas based on data from the 2001 Nationwide Inpatient Sample. Seventy percent of rural as compared to 76 percent of urban hospitals provided delivery services, and overall Cesarean section rates were only slightly higher in rural (25.3%) compared to urban (24.9%) hospitals. When comparing rates in rural and urban hospitals of similar sizes, Cesarean section rates were generally higher in the rural hospitals. VBAC rates ranged from 25.5 percent in urban teaching hospitals to 20 percent in urban non-teaching hospitals and 17.8 percent in rural hospitals. The authors conclude that the Cesarean section rate in rural hospitals was well above the 10-15% rate recommended by the World Health Organization, and that more information is needed to determine the appropriateness of this surgical procedure in a rural setting.



Following the introduction of new ACOG guidelines in 1998-9 requiring the presence of a surgeon, anesthesiologist and operating room personnel throughout the trial of labor for women with prior Cesareans, an examination of birth certificate and hospital data from rural Maine from 1998 to 2001 demonstrated that VBAC rates declined from 30.1 to 13.1 percent, and the Cesarean rate increased from 19.4 to 24.0 percent (Pinette and colleagues, 2004). VBACs declined significantly in both large and small hospitals. According to the authors, the ACOG position disproportionately affects smaller hospitals. The authors suggest that smaller hospitals should select patients at lower risk who can safely deliver in smaller institutions and that better criteria are needed for determining risk.

In a study of differences in Cesarean sections based on 2001 National Inpatient Sample data, Kabir and colleagues (2005) found that repeat Cesareans considered to be potentially unnecessary were most likely to occur in women younger than the age of 35, weekday admissions, and rural hospitals. The authors note a recent trend to not offer VBAC in rural or community hospitals since 24-hour anesthesia and other support services are often not available.

Alternatively, access to Cesarean section capability for women in small and isolated rural places is often limited by the availability of OB/GYN physicians, general surgeons, FPs who are trained to perform them, anesthesiologists and certified nurse anesthetists, and the appropriate hospital support personnel. Rural women often have to travel significant distances to obtain Cesarean sections, which is particularly dangerous in emergency cases. Many factors relatively unique to small and remote rural places influence decisions about whether to perform a Cesarean and, if so, when to perform it (e.g., availability of personnel and distance from tertiary medical center) (Acosta, 2001b). These decisions are complicated by concerns over care of distressed newborns.

### **Preterm Births and Low Birth Weight**

A March of Dimes Special Report indicates that the leading obstetric problem and cause of newborn death in the United States is prematurity (March of Dimes, 2005a). Babies born before 37 weeks of gestation are often of low birth weight, placing them at risk for a variety of health problems, including newborn death, developmental delays, and neurological impairment. Risk factors associated with preterm birth include previous delivery of a preterm or low birth weight baby, multiple births, young or advanced maternal age, low education and socioeconomic level, mother underweight prior to conception, African American race, gaining too much or too little weight during pregnancy, smoking and drug use, and certain infections (Hall and Berlin, 2004 March of Dimes draft).

Unfortunately, many of the programs that attempt to reduce potentially preventable preterm deliveries in rural areas rely on special high-risk clinics not readily available to rural FPs or their patients (Yawn and Yawn, 1989).

Jesse and Alligood (2002) investigated psychosocial risks that predict preterm birth among 120 pregnant women attending three prenatal clinics in rural Appalachia. Nearly half of the women smoked (42%) and over half reported symptoms of depression. Psychosocial

variables associated with pre-term birth included depression, level of self esteem and negative perceptions about the pregnancy, while sociodemographic variables predicting this outcome included adequacy of prenatal care; with each level increase in inadequacy of prenatal care, women were found to be 6.87 times more likely to have a preterm birth.

Storms and Van Howe (2004) examined birth log data at a rural referral center in Michigan to determine the distribution of singleton birth weights by gestational age and gender. The babies in this study were larger than expected, but the authors note their homogeneous background (northern European heritage), maternal nutritional status and older maternal age, and conclude that national reference standards may not apply to diverse populations and may reflect regional differences.

### **Birth Malformations and Genetic Problems**

Very few recent studies were found in the literature that focused on rural birth malformations or adverse genetic problems. Schreinemachers (2003) studied rates of adverse birth outcomes in rural agricultural counties in four wheat producing states (Minnesota, Montana, North Dakota and South Dakota) during 1995-97 by comparing counties with a high and lower proportion of wheat acreage to determine the effects of widely used herbicides. Increased levels of birth malformations were found, leading the author to recommend more targeted studies of the developmental effects of chlorophenoxy herbicides and routes of exposure for pregnant women living in these regions. The relatively unique hazards to pregnant women and their infants, as well as all rural persons living near or working in rural extractive industries, including farming, are numerous and serious (Schulman and Slesinger, 2004; and Hodne, 2004).

### **Fetal Alcohol Syndrome**

Astley (2004) describes Fetal alcohol syndrome (FAS) as “a permanent birth defect syndrome caused by maternal consumption of alcohol during pregnancy” that is the leading known cause of mental retardation and developmental disability. Dotson and colleagues (2003) indicate that FAS is a constellation of abnormalities and birth defects resulting from maternal alcohol consumption that are entirely preventable through changes in the behavior of the mother.

Alcohol and drug use during pregnancy is linked to risks to the fetus such as Fetal Alcohol Syndrome, growth retardation, impairment of cognitive function and other health problems (in Hayes and colleagues, 2002). Hayes and colleagues (2002) examined prior alcohol use and psychosocial factors associated with alcohol and/or drug use among 212 pregnant women who delivered at a predominantly Caucasian rural clinic in Maine. While a decline in tobacco and alcohol use was reported after pregnancy awareness, a significant proportion of the women continued to use alcohol (30%) and tobacco (42%) while pregnant. Logan and colleagues (2003) surveyed a convenience sample of 3,346 persons living in 16 rural areas of Kentucky, and found that neither males nor females were very knowledgeable about the harmful effects of alcohol use during pregnancy. Prenatal providers identified lack of knowledge and comfort with assessment and lack of available and accessible treatment for

referrals as barriers to the assessment and treatment of pregnant women with alcohol use problems.

### **Maternal Complications and Morbidity**

A study of variation in maternal complication rates following normal vaginal delivery in 282 rural U.S. hospitals, based on a review of discharge abstracts of more than 84,000 women in 1993 and 1994, revealed that hospital volume of vaginal deliveries (300 or more annually) and the availability of obstetricians (but not generalist physicians) in the county in which the hospital was located were inversely associated with complication rates. However, no association was found between complication rates and geographic remoteness or distance to the nearest tertiary care facility (Heaphy and Bernard, 2000). While most of the rural hospitals in the study had acceptable performance rates, some had higher than expected maternal complications. The authors note that this study sample consisted mostly of low-risk women.

In a five-state study of the impact of Medicaid Managed Care, race/ethnicity and rural/urban residence on potentially avoidable maternity complications (PAMC), Laditka and colleagues (2004) found no notable risk differences between rural compared to urban residents, with mothers delivering in rural hospitals having lower PAMC risks than those who delivered in urban hospitals. The authors attribute this to the fact that mothers with high PAMC risks are typically directed to urban hospitals for care.

Laditka and colleagues (2005) examined the risks of potentially avoidable maternity complications (i.e., those that can often be prevented through adequate prenatal care and health behaviors) among mothers insured by Medicaid in rural and urban hospitals. The authors examined data from the 2000 Nationwide Inpatient Sample, a stratified sample that represents all discharges from 20.5% of U.S. community hospitals. Interestingly, the authors found that mothers insured by Medicaid who had deliveries in rural hospitals were less likely to experience these complications than their urban counterparts. The authors suggest that women with greater pregnancy risks tend to travel to urban hospitals where specialized services are available. However, among women insured by Medicaid who had deliveries in rural hospitals, the risks were higher for African-American women than for whites, likely reflecting lesser access to prenatal care or impediments to travel to urban hospitals for specialized care.

### **Birth Outcomes Among Ethnic/Racial Minority Rural Women and Infants**

Overall the rural American Indian and Alaskan Native population experiences excess morbidity and mortality (Rhoades and Cravatt, 2004). Likewise, rural African American, Hispanic/Latino, and other minority/ethnic populations generally experience greater morbidity and mortality than their white counterparts—just as in urban areas (Peek and Zsembik, 2004; Torres, 2004; Baer and Nichols, 2004; and Goldberg and Napolitano, 2004).

Although numerous studies have documented disparities in birth outcomes among those from racial and ethnic minority groups (LaVallie and colleagues, 2003; and Shi and colleagues, 2004), fewer studies have looked at birth outcomes for rural minority populations. An

examination of urban-rural differences in six health areas for racial and ethnic minorities (Slifkin and colleagues, 2000) showed that in 1995 the infant mortality rate for rural Blacks (15.4 deaths per 1,000 live births) was slightly higher than that for urban Blacks (15.1 deaths) and the rate for rural residents categorized as “other” was lower than for Blacks but substantially higher than for their urban counterparts. The authors indicate that “the gap in health status and reduced access to a full range of health services that exists for minorities nationwide may be exacerbated by a variety of factors in rural areas, such as poverty, transportation problems, and limited provider accessibility.”

Baldwin and colleagues (2002) conducted a cross sectional study of all 1989-91 singleton American Indian/Alaska (AI/AN) native births to U.S. residents, and found that rural mothers of AI/AN infants (18.1%) were significantly more likely to have received inadequate prenatal care compared to urban mothers of AI/AN infants (14.4%), and rates for both groups were twice that of Whites. Overall infant death rates were slightly higher for rural than for urban AI/AN births, with significantly higher post neonatal death rates among rural compared with urban AI/ANs, especially for unintentional injuries and infectious diseases. Rural post neonatal infant mortality rates for rural AI/AN births were higher than for the nation’s African American births.

### **Teen Pregnancy**

In 1994, unmarried teenagers accounted for one out of nine births in rural areas. While the proportion of births to unmarried women has remained higher in urban areas, it has increased more rapidly in rural areas since 1980, narrowing the rural/urban difference (Frenzen and Butler, 1997). Based on an examination of 1992 Vital Statistics Data, Lishner and colleagues (1999) reported that greater proportions of rural than urban mothers were teenagers or in their 20s, and that this disparity was more pronounced for Black women.

An assessment of the services available through and outcomes of the Missouri Rural Adolescent Pregnancy Project (MORAPP) showed that the rural white birth rate was higher than that for urban white adolescents, although the birth rate was higher among urban residents when comparing nonwhite adolescents (Anderson and colleagues, 2000). Poor birth outcomes (including infant mortality, preterm births and low birth weight) and pregnancy risk factors were as or more prevalent among rural as compared to urban adolescent mothers. Rural white teens had higher birth rates in all age groups and lower abortion rates than their urban white counterparts. The authors suggest: “Resources to serve rural pregnant adolescents should reflect their equal or higher risk and the challenge of serving a geographically dispersed population.”

In a pilot study of 52 college-bound adolescents, Carter and Spear (2002) examined the knowledge, attitudes and behaviors of a rural teenage population related to pregnancy prevention and intention. While over one third of the girls were sexually active and several had experienced pregnancy, knowledge about pregnancy prevention was modest. The authors suggest that teen pregnancy prevention is a continuing priority in rural areas. A needs assessment conducted in a South Carolina county to identify programs that address teen pregnancy found that while the highest teen birth rates for each age and race category were in rural ZIP codes, there was an unmet need for teen pregnancy prevention services in rural areas

of the county, with intervention programs primarily located in urban areas (Key and colleagues, 2003).

### **Reimbursement for Care**

Like their urban counterparts, rural women and their families are faced with the considerable direct and indirect costs associated with insurance coverage and pregnancy and delivery care. The rural and urban issues are generally similar but rural women tend to be more economically disadvantaged, are faced with greater geographic access and other issues (HHS Rural Taskforce, 2001). Many of the programs that have been implemented in for urban women and their infants are helpful and available in rural areas (e.g., Medicaid; and Women, Infants and Children (WIC)).

The rural population has higher rates of unemployment and underemployment and lower incomes than does the urban population, resulting in their being less likely to have adequate health insurance. Because rural areas are often less economically diversified and are dependent on extractive and government-funded instillations, they are more susceptible to having severe economic crises than urban areas. They also often have smaller businesses that are less likely to offer insurance. Correspondingly rural populations are relatively more likely to not have private insurance and to be underinsured (Hummer and colleagues, 2004; and Aday and colleagues, 2001). For instance, there is often mention made of “save the farm” health insurance policies that farm families have with high deductibles for very serious illnesses to protect them from losing their farms. Additionally, managed care is much less common in rural areas than in urban areas. Hummer and associates (2004) showed that after controlling for confounding factors rural residents had 80 percent higher odds than their urban counterparts of non insurance coverage and 30 percent higher odds of Medicaid coverage. Lishner and colleagues (1999) reviewed 1995 National Survey of Family Growth data on source of insurance coverage for women aged 15-44 and reported that rural women were less likely than urban or suburban women to be covered by employer-sponsored health insurance, and that 10 percent of married women and 17 percent of unmarried women in rural areas lacked health insurance.

### **Interventions and Model Programs to Increase Access to Maternal and Infant Health Care in Rural Areas and Reduce Disparities in the Care Received**

#### **Regionalization of Care**

Regionalization of obstetric care has been one strategy to address poor local access to obstetric services in remote rural locations. This approach involves establishment of a perinatal network that identifies three levels of inpatient care, and transport of high-risk mothers from rural areas to a facility with newborn intensive care services (Gibson and colleagues, 2001). A steady decline in the U.S. infant mortality rate since the 1960s, in part, has been attributed to regionalization of care resulting in the transport of high-risk mothers and their babies from birthing hospitals to specialized tertiary care (Level III) center for perinatal and neonatal care with highly specialized health professionals. However, it has been suggested that this system has been undermined by current trends such as the influx of neonatologists and neonatal intensive care units into community hospitals as well as changes

in the financing of intensive care and organization of services  
(<http://www.rwjf.org/portfolios/resouces/grantsreport.jsp?filename=>).

Gibson and colleagues (2001) surveyed perinatal nursing directors of nine community hospitals in rural Virginia about personnel, training, equipment, transportation, and protocols, and found wide variation in these services such as the number and training of accompanying personnel during maternal transport. After an intervention involving the establishment of guidelines, some practice changes were revealed in a follow-up survey in terms of protocols, communication and equipment. One example is the use of cell phones in every transport to deal with emergency situations and allow for immediate contact with physicians.

Despite regionalization efforts including infant mortality review in small hospitals, advancing neonatal resuscitation skills at the local level, and facilitating the timely transfer of high-risk women and infants from rural hospitals to tertiary care centers, rural residents were found to have continued higher rates of post neonatal mortality and inadequate prenatal care (Larson, 1997). However, Larson and colleagues (2006 draft) suggest that the overall rural/urban differential in neonatal mortality and risk of low birth weight during the 1980s narrowed substantially with the movement to regionalize care for high-risk rural women and infants. An examination of rates of poor outcomes in 1985-87 and 1995-97 by rural and urban residence at the national and regional levels showed better outcomes overall and lower rates of inadequate prenatal care, but persistence of rural/urban differentials in post neonatal mortality, especially in the more remote and persistent poverty rural areas (Larson and colleagues, 2005 draft). Larson and colleagues conclude that the continuing closure of the rural-urban gap requires the maintenance of regionalized system of care for high-risk women and infants and addressing poverty issues that influence birth outcomes.

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