

## **Executive Summary**

The City of Milwaukee has a high rate of infant mortality, particularly in its African American community. In 2001, Milwaukee's infant mortality rate was 11.5 deaths per 1,000 births, compared with 6.9 deaths per 1,000 births nationwide. Although African Americans comprise about 37.3 percent of Milwaukee's population, 69 percent of infant deaths occurred in the African American population in 2001.

This report evaluates the effectiveness of the City of Milwaukee's public health nurse home visitation program in reducing the overall infant mortality rate in the city and in reducing the disparity between African American and white infant mortality rates. The purpose of the analysis is to suggest ways in which the program might improve its service delivery and have a greater overall impact on infant mortality rates, given its current set of resources.

In order to evaluate the program, our first step was to understand how it fits into the Maternal and Child Health Division and the larger Milwaukee Health Department from a budgetary and service standpoint. We then conducted an assessment of the major challenges facing the program, including a nationwide nurse shortage, difficulties of keeping track of families, the implications of W-2 work requirements, the need to provide a safety net for families, and fiscal pressures. Next we reviewed the available literature on the value of home visitation. Finally, we contacted 11 other cities to learn about their strategies for conducting home visits.

We evaluated the program based on five criteria: impact on infant mortality, impact on the racial disparity, program effectiveness, program efficiency, and the use of outcomes and measures. Our evaluation yielded several important findings. First, infant home visitation in Milwaukee is an important and effective strategy for reducing both the overall rate of infant mortality and the racial disparity in infant mortality. The effectiveness of the program, however, is difficult to discern from the effects of prenatal prevention and education programs that are also provided by the Maternal and Child Health Division. Second, we found that the program's capacity is seriously limited by an inability to hire highly trained nurses. This inability will continue to impede any efforts by the Health Department to allocate resources to infant mortality prevention. Third, we found that data used by the Health Department to evaluate and monitor the program were sometimes insufficient and incomplete.

Our analysis leads to the recommendation that the city should add non-nurses to its home visitation teams by hiring social workers or lay home visitors. Social workers would add counseling and non-medical assessment expertise to the interactions that the nurse teams have with their clients. Lay home visitors would be local women with parenting experience and strong connections within local neighborhoods. These women could help to bridge some of the social barriers between nurses and their clients. They would also provide the nurses with more time to focus on their medical responsibilities by working to track down families and schedule appointments with them.

# Reducing Infant Mortality: An Evaluation of Nurse Home Visitation in the City of Milwaukee

by Ben Monty, Adam Signatur, and Amy Zeman

Milwaukee is the largest city in Wisconsin with 596,974 people. According to the 2000 Census, Milwaukee is the nineteenth largest city in the country. As the central city of Wisconsin's largest urban area, Milwaukee has social, economic, and health problems that other communities in the state do not. For example, Milwaukee's poverty rate is 21.3 percent, which is much higher than the state average of 8.7 percent. Per capita income in Milwaukee is \$16,181, which is about \$5,000 lower than the state's per capita income.<sup>1</sup>

The City of Milwaukee has a high rate of infant mortality, particularly in its African American community. In 2001, Milwaukee's infant mortality rate was 11.5 deaths per 1,000 births, compared with 6.9 deaths per 1,000 births nationwide. The 2001 infant mortality rate among whites, 6.9, was higher than the national average for whites of 5.7. Among African Americans, however, Milwaukee's rate of 18.3 was significantly higher than the national average of 14.2. Although African Americans comprise about 37.3 percent of Milwaukee's population, 69 percent of infant deaths occurred in the African American population in 2001. The infant mortality rate and the disparity between white and African American infant mortality in Milwaukee are also high when compared with other large cities.<sup>2</sup> Table 1 provides a comparison of the infant mortality rates for the United States, Wisconsin, and Milwaukee.

**Table 1. Comparison of Infant Mortality Rates, 2001**

	White	African American	Hispanic	Overall
United States	5.7	14.2	5.6	6.9
Wisconsin	5.7	18.7	7.0	7.1
Milwaukee	6.9	18.3	7.4	11.5

Sources: National Vital Statistics Reports, Vol. 51, No. 5, March 14, 2003, Wisconsin Department of Health and Family Services and City of Milwaukee Health Department

Home visitation by public health nurses is one program that the Milwaukee Health Department uses to try to lower infant mortality. The program is one part of a broader strategy focusing on risk prevention through education and assistance with learning behaviors that reduce the risk of mortality for newborns. Risk prevention activities target women before conception, during pregnancy, and after their baby's birth. Part of this strategy is to reach mothers as early as possible through pregnancy screening and community outreach in schools and health centers. Home visitation is a final

<sup>1</sup> U.S. Census, 2000.

<sup>2</sup> See Appendix A for a list of cities comparable to Milwaukee and other cities with high infant mortality rates. The City of Milwaukee Budget Office provided a list of cities that have characteristics similar to Milwaukee that they use when comparing municipal programs and policies.

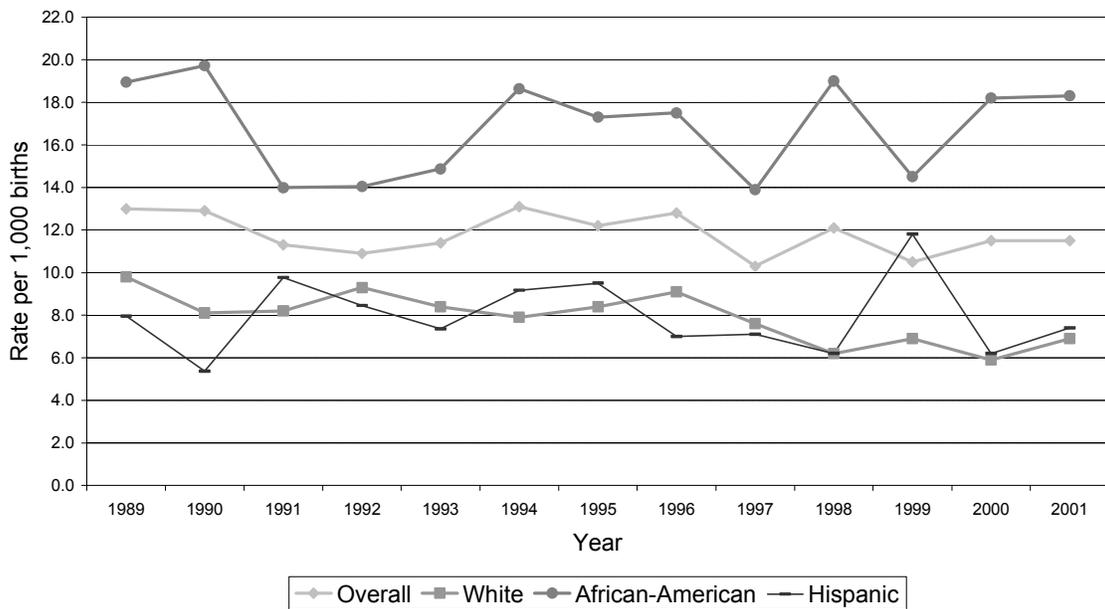
opportunity for the health department to address the risk factors for infant mortality that are present in the city’s newborns.

The purpose of this paper is to evaluate the city’s nurse home visitation program as it relates to the goal of reducing infant mortality and to suggest ways to improve its effectiveness. The current fiscal crisis in Wisconsin and the changing social environment in which the program operates are major concerns for the City of Milwaukee. In this context, it is important for the nurse home visitation program to provide services that are cost effective and that respond to its changing environment in innovative and efficient ways.

## The Problem of Infant Mortality in Milwaukee

Infant mortality rates are determined by the number of babies per 1,000 births that die before their first birthday. According to the *Big Cities Health Inventory*, in 1998 Milwaukee had the seventh highest overall infant mortality rate of the 47 largest cities in the United States at 12 deaths per 1,000 births (Benbow, 2002). To see how Milwaukee’s infant mortality rate compares with similar cities and other cities that were in the top ten for infant mortality rates in 1998, see Appendix A. Figure 1 shows how Milwaukee’s overall infant mortality rate and infant mortality rates by ethnicity have decreased from 1989 to 2001.<sup>3</sup>

Figure 1 - Infant Mortality Rates for the City of Milwaukee, 1989-2001



Source: City of Milwaukee Health Department

<sup>3</sup> A table displaying Milwaukee’s overall infant mortality rate and rates by ethnicity, the ratio of African American to white infant mortality rates, and the disparity between African American and white rates is included in Appendix B.

While the overall infant mortality rate declined from 14.15 to 12.26 deaths per 1,000 births, the decline in the white infant mortality rate relative to the decline in the non-white infant mortality rate was much greater. Over this period, the rate for whites declined from 9.8 to 6.9, and the rate for African Americans declined from 18.9 to 18.3. Between 1989 and 2001, the disparity between white and African American infant mortality rates increased 25 percent from 9.1 to 11.4 deaths per 1,000 births.

One of the programs undertaken by the Milwaukee Health Department that may have contributed to the overall decline in infant mortality is the “Back to Sleep” campaign that encourages mothers to place infants on their backs when sleeping. National studies have shown that sleeping face down is a contributing factor to Sudden Infant Death Syndrome (SIDS). Another action was the institution of a risk factor assessment that helped public health nurses target infants at the greatest risk for infant mortality. The City of Milwaukee used a regression analysis based on birth certificate and infant mortality data on infants that died after discharge from the hospital from 1997 to 2000 to determine characteristics of newborns who were at the highest risk of infant mortality.

### ***Causes of Infant Mortality in Milwaukee***

Nationwide, the three leading causes of infant mortality are Congenital Anomalies (birth defects), factors relating to prematurity or low birth weight, and SIDS (Mathews, Curtain, and MacDorman, 2000). In Milwaukee, these three factors accounted for nearly 80 percent of all infant deaths in 2001. Table 2 shows that deaths resulting from prematurity were by far the most common in 2001 and were particularly prevalent in the African American community.

**Table 2. Summary of Infant Deaths in the City of Milwaukee, 2001**

Type of Death	African American	White	Hispanic	Asian	American-Indian	Total
SIDS	17	3	2	0	1	23
Sudden Unexpected Death <sup>4</sup>	4	0	0	0	0	4
Prematurity	41	5	5	1	1	53
External Causation <sup>5</sup>	6	2	1	0	0	9
Congenital Abnormalities	12	9	3	1	0	25
Infections <sup>6</sup>	3	3	0	0	0	6
Perinatal Insults <sup>7</sup>	5	0	1	1	0	7
<b>Total</b>	<b>88</b>	<b>22</b>	<b>12</b>	<b>3</b>	<b>2</b>	<b>127</b>
<b>Percent of Total</b>	<b>69</b>	<b>17</b>	<b>9</b>	<b>2</b>	<b>2</b>	<b>100</b>

<sup>4</sup> Sudden Unexpected Death in Infancy is another exclusionary cause of death (like SIDS) but where there are other confounding factors, such as prone sleeping.

<sup>5</sup> External causation includes motor vehicle accidents, mechanical and positional asphyxiations, and overlays. These are considered accidents. The category also includes battered children and other infant homicides.

<sup>6</sup> Infections can be viral or bacterial.

<sup>7</sup> Perinatal insults include deaths due to complications of labor and delivery or as a result of a maternal disease process.

Source: Karen Michalski, City of Milwaukee Health Department, FIMR Project Coordinator.

You can also see how large the gap is between white and African American infant mortality. Note that while African American infants constitute about 69 percent of infant deaths, the 2000 census reports that African Americans make up only 32 percent of the population in the City of Milwaukee, while whites make up 58 percent of the population and experience only 17 percent of the infant deaths.

Roughly two-thirds of all infant deaths in Milwaukee occurred before the infant was discharged from the hospital (Fillmore et al., 2002). Among the deaths that occurred after discharge, SIDS was by far the leading cause, accounting for about 60 percent of deaths. Congenital abnormalities and prematurity combined accounted for close to an additional 30 percent of post-discharge deaths.

## **Response to the Problem of Infant Mortality**

Visiting high-risk infants in their homes in Milwaukee is one of the strategies that the city uses to reduce its infant mortality rates. To evaluate this practice, it is important to understand how home visitation fits into the overall mission of the Milwaukee Health Department.

### ***The Role of the Health Department***

The Milwaukee Health Department's mission is to ensure that services are available to enhance the health of individuals and families, promote healthy neighborhoods, and safeguard the health of the Milwaukee community. The department is organized into five divisions: Maternal and Child Health, Healthy Behaviors and Healthcare Access, Home Environmental Health, Consumer Environmental Health, and Disease Control and Prevention. Each of these divisions addresses a specific objective that helps the health department accomplish its overall mission.

In 2003 approximately \$5.7 million of the health department's \$30.7 million budget goes to the Maternal and Child Health Division.<sup>8</sup> This amount includes over \$2.5 million in state and federal grants. The health department's objective for this division is to promote the health and safety of women and children in Milwaukee by identifying at-risk populations for infant mortality, improving nutrition, providing early prenatal care, and ensuring that age-appropriate vaccinations are available. The division strives to promote reproductive health, healthy child development, and school readiness. One of the challenges this division faces is how to reduce Milwaukee's high rates of infant mortality.

Each of the divisions of the health department has target outcomes for 2005. The primary goal of the Maternal and Child Health Division is reducing the ratio of the non-Hispanic African American infant mortality rate to the non-Hispanic white infant mortality rate to less than 1.7. In 2001 the ratio was 4.13. The division also monitors and sets goals for a number of other outcomes. The following are the program results that the Maternal and Child Health Division measures, with 2001 outcomes shown in parentheses:

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<sup>8</sup> These amounts include both grant funding and capital projects.

- Reducing infant mortality rate to 9.6 or less (11.5)
- Reducing the percent of live births below 2,500 grams (approximately 5 pounds and 8 ounces) to 8.6 percent (10.32 percent)
- Increasing the percentage of live births that have initiated prenatal care in the first trimester to 85 percent (74.93 percent)
- Reducing the number of mothers who smoke during pregnancy to 10 percent (15.74 percent)
- Increasing the percent of children entering kindergarten through fifth grade who have received the 4,3,1 vaccination series before 36 months of age to 77 percent (74.20 percent)

To achieve these outcomes, the division's activities include:

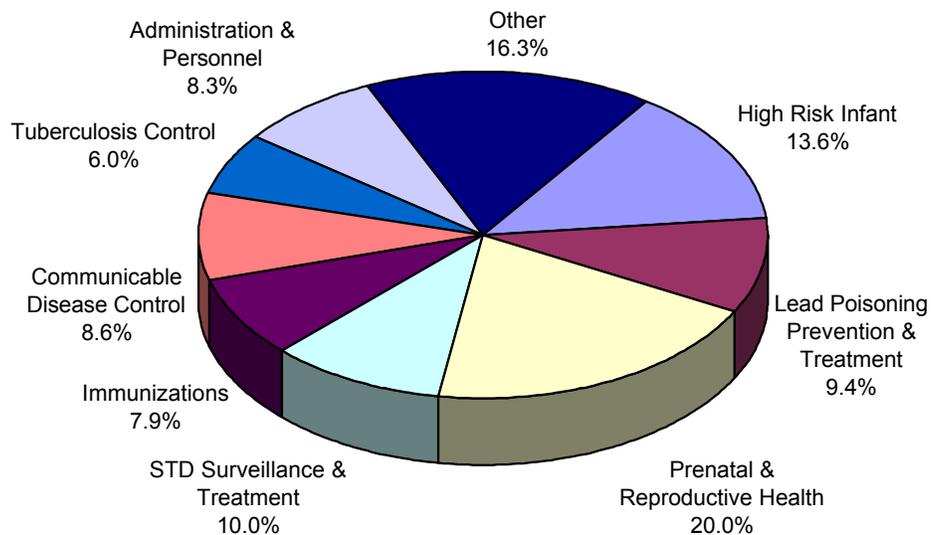
- Providing immunizations
- Screening newborns for development and health problems
- Administering Women, Infants, and Children (WIC) and the Milwaukee Family Project<sup>9</sup>
- Reviewing fetal infant mortality
- Providing district public health nursing
- Preventing pregnancy
- Providing education about maternal and child health and breast and cervical cancer

District public health nursing is responsible for supporting most of these activities through its two health centers. All nurses at these centers perform a variety of functions, including administering walk-in clinics, family health clinics, WIC, and special health clinics. In addition, nurses are responsible for visiting the homes of residents with communicable diseases and infants at risk for mortality. Figure 2 shows the proportion of public health salary dollars devoted to each nursing activity in 2002. This chart reflects a rough breakdown of the total time that nurses spend on various activities. Of these categories, high-risk infants, or home visitation, constitutes about 13.6 percent of total nurse hours. It is important to keep in mind, however, that nurses often provide services that overlap budget categories. For example, while a nurse may be logging time spent at a client's home under the high-risk infant category, the nurse may also notice and provide information and referral regarding a potential lead poisoning problem in the home.

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<sup>9</sup> The Milwaukee Family Project is a program that targets Milwaukee area families who are assessed to be at risk of child abuse or neglect after the birth of a child. According to the Wisconsin Department of Health and Family Services, the program is based on a home-visiting model designed to promote positive parenting and child care practices, improved health outcomes, and strengthened family functioning.

**Figure 2 - 2002 Public Health Nurse Spending**  
 Total spending: \$1,763,613



Source: City of Milwaukee Budget Office.

### ***Nurse Home Visitation Program***

Visiting the homes of newborns at risk for infant mortality is one of the strategies the health department uses to reduce infant mortality. Through the nurse home visitation program, the City of Milwaukee sends public health nurses to the homes of newborn babies. Each week, the Maternal and Child Health Division receives the birth records of all the babies born in Milwaukee. Public health nurses review the records to determine which newborns may be at risk. Public health nurses then attempt to contact families at the homes of any newborn baby whose birth record meets certain risk criteria. Newborns are determined to be “at risk” if they match any one of the criteria on a predetermined list. We explain the risk criteria in the next section. The health department also receives referrals from hospitals, other community agencies, neighbors, and families concerned about the well-being of their newborn child. If the newborn fits certain criteria, the family is assigned a public health nurse. Each of the public health nurses has a caseload of newborns.

Initially, the nurse tries to contact the family by phone. If unable able to reach the family by phone, the nurse visits the family’s residence. If no one is home, the nurse leaves a note with the health department’s phone number saying that he or she was there and would like to meet with the family. Typically, if the nurse is unable to reach the family after three attempts, the family does not receive a home visit.

If the family is home when the public health nurse arrives, the nurse explains the purpose for the call and asks permission to enter the home to conduct the visit. All visits

require voluntary cooperation on the part of the family. Given permission, the nurse assesses the child and the home environment. The nurse collects information about the history of the pregnancy, the physical characteristics of the newborn, the relationship between the mother and newborn, and the environment and safety in the home. The nurse also collects information about the mother's health.

The nurse then determines whether the family will need any other additional medical, education, or referral services, and if the family has supportive medical services for future health care of the newborn. The nurse provides information about care for the newborn and how to prevent infant mortality. This information includes explaining the importance of having babies sleep on their backs to reduce the risk of SIDS and putting babies in cribs instead of sleeping with them to prevent accidental deaths.

The nurse makes additional visits as necessary to ensure the health and safety of the newborn. Each infant receives an average of three to four visits. Once it is determined that the risk of infant mortality of the newborn is minimal, the nurse no longer visits the family's home. Typically, home visits occur until the infant's first birthday.

Infant home visitation is a non-revenue-supported expenditure for the City of Milwaukee. The city spent approximately \$239,000 on home visiting for newborns in 2002. This expenditure was calculated as a portion of public health nurse salaries based on the number of reported hours spent on high-risk infant activities and the Milwaukee Family Project. Table 3 summarizes the number of hours and dollars spent on home visiting for newborns from 1999 to 2002. In 2002 nurses spent the least amount of time on visits, a reduction of 3,268 hours from 2001. A combination of factors, including budget and personnel constraints, may explain the decrease. The increase in dollars per hour is likely due to the combination of a 3 percent increase in nurse salaries each year as well as the inability to avoid fixed costs within the program.

**Table 3. Summary of Public Health Nurse Hours and Dollars Spent on High-Risk Infants, 1999–2002**

	1999	2000	2001	2002
<b>Dollars</b>	\$235,712	\$268,903	\$291,884	\$238,875
<b>Hours</b>	12,571	14,645	14,681	11,413
<b>Dollars/Hour</b>	\$18.75	\$18.36	\$19.88	\$20.93

Source: City of Milwaukee Budget Office

Table 4 places spending on infant home visitation in the context of the overall city budget, the health department budget, and the Maternal and Child Health Division budget. Since spending on infant home visitation reflects only salaries and not administrative costs, the comparison is imperfect. It does, however, provide some sense of the budgetary scope of the program. It should also be noted that in 2001, over half of the Maternal and Child Health Budget was funded through grants and reimbursements.

**Table 4. City of Milwaukee Expenditures , 2001**

	<b>Actual Expenditure*</b>	<b>Percent of City Budget</b>	<b>Percent of Health Department Budget</b>	<b>Percent of Maternal and Child Health Budget</b>
<b>City of Milwaukee</b>	\$454,853,514			
<b>Health Department</b>	\$13,867,057	3.05		
<b>Maternal and Child Health</b>	\$4,131,377	0.91	29.80	
<b>Infant Home Visit Salaries</b>	\$291,884	0.06	2.10	7.07

\*Not including grant funding

Source: City of Milwaukee Health Department and Budget Office

### ***Criteria for Home Visits***

Milwaukee’s health department has a long history of visiting newborns. In recent years, however, the program for visiting newborns has changed dramatically. Specifically, the number of nurses entering the public health field has decreased because of the pull of nurses into the private sector. Thirty-three years ago, 144 public health nurses visited each of the approximately 14,000 infants born each year, making around 45,000 total visits per year. Twelve years ago, according to estimated high-risk selection criteria, 85 nurses made 5,552 infant home visits out of approximately 13,000 births. Three years ago, according to the same risk criteria, 47 nurses made only 3,599 infant home visits per year. Today, the health department has only 24 public health nurses have time to visit about 1,500 newborns per year. Consequently, it is important for nurses to visit newborns with the highest risk of infant mortality.

In 2002 the health department started to base decisions about which infants to visit on evidence from past infant mortality records. The purpose of using evidence-based criteria is to focus on the infants at the highest risk for infant mortality. This involved linking infant mortality records between 1997 and 2000 to records from birth certificates for all post-discharge cases of infant mortality. Any factor in the data that increased the risk of infant mortality by more than three-fold constituted “high risk.” Using the data from 1997 to 2000, as of October 2002, a home visit is required if a newborn baby matches any one of the following high-risk criteria:

- 1) Gestation = 35 weeks
- 2) Mother’s age = 20 years old with = 2 previous children
- 3) Mother’s age = 27 years old with = 4 previous children
- 4) Apgar = 7 at 5 minutes
- 5) Previous infant death
- 6) Any alcohol use reported
- 7) Cigarette use by mother and infant’s weight = 2500 grams (5 lbs. 9 oz.)
- 8) Mother has maternal diabetes (not gestational), Lupus, or cardiomyopathy
- 9) Mother’s age = 17 years old with = 18 months since the last live birth
- 10) Infant’s weight = 2,000 grams (4 lbs. 6 oz.)

The criteria are designed to change over time. As the data collected about these risk factors changes, the selection criteria will be adjusted. In addition, the health department can adjust criteria according to its capacity to make home visits.

Between 1997 and 2000, 174 deaths occurred after the infant was discharged from the hospital. Using the evidence-based criteria, between 1997 and 2000 the health department would have visited about 1,800 newborns that would have included 101 of the infants that died between those years. Under previous, non-evidence-based criteria, they would have visited 3,600 newborns between 1997 and 2000, but only would have reached 94 of the infants that died. The recent implementation of these risk criteria has allowed nurses to visit a smaller caseload of infants, but reach more that are at high risk for infant mortality.

## **Program Challenges**

In responding to community health needs in Milwaukee, the nurse home visitation program faces a variety of challenges. In part, these challenges reflect the complex and changing social, economic, and policy environments in which the program operates. They affect both the capacity of the program to respond to the needs of Milwaukee's residents and the ability of the program to measure its success. The major challenges the program faces are a nationwide nurse shortage, keeping track of families, the implications of W-2 work requirements, providing a safety net for families, and fiscal pressures.

### ***Nurse Shortage***

In the last few years, a local and nationwide shortage of nurses has constrained the health department's ability to recruit public health nurses with bachelor's degrees. In the coming decades, the shortage is expected only to get worse, which means rising salaries and increasing competition with hospitals for nurses (Milwaukee Journal Sentinel 2/22/03). Nationwide, by 2020 the nurse shortage is expected to reach 800,000, with demand outstripping supply by around 40 percent (U.S. DHHS 2002). In Wisconsin, the effects have not been as severe. Current predictions, however, suggest that the shortfall will reach 13 percent by 2020, a deficit of 6,500 nurses (U.S. DHHS 2002). Long-term demographic factors, such as an aging population of nurses, an aging overall population needing care, rising health care costs, the inability of nursing schools to meet enrollment demands, and high rates of burnout and turnover among nurses have all contributed to creating the crisis in nurse staffing.

Over the past several annual budgets, the health department has averaged about 20 unfilled, budgeted nursing positions. This has not only limited the ability of the department to respond to community health needs, but also its ability to plan and budget for the future. For a number of reasons, recruitment is likely to remain a challenge in the face of ongoing shortages.

First, the City of Milwaukee is required by state statute to fill public health nurse positions with nurses holding a minimum of bachelor's degree. This requirement limits the potential use of certified nursing assistants, licensed practical nurses, or even some registered nurses. Second, the health department has less flexibility than hospitals in attracting nurses. Hospitals can offer signing bonuses, generous fringe benefits, higher salaries, more flexible schedules, and overtime opportunities. Finally, the city's residency

requirement means that the health department can recruit only from a pool of potential employees who either live in the city or are willing to move into the city.

Several factors may mitigate the effects of the nurse shortage for the health department. First, working in public health is likely to draw some nurses to city employment even in the face of competition from the private sector. The prospect of challenging, interesting work that serves vital community needs will always be an important consideration for some nurses. A further attraction is the predictable schedule, stable hours, and the flexible, self-directed workload of a public health nurse. The health department has emphasized these features of public health nursing in recruitment on college campuses, print and radio advertisements, and in attempting to improve staff morale. The health department also conducts exit interviews to identify reasons that public health nurses leave city employment.

### ***Keeping track of families***

A second challenge faced by the nurse home visitation program involves locating and keeping in contact with families. There are many potential reasons for high-risk families not actively seeking public health services. Some of these reasons include lack of education about health risks, lack of knowledge about services, stigmatization, and fear of contact with authorities. In large part, home visitation functions to make health services available to families that would not ordinarily actively seek services. Several factors have made it increasingly difficult over time to visit families in their homes and maintain relationships with them, including high rates of mobility in Milwaukee and the increasing phenomenon of children living with their grandparents instead of their parents.

The Milwaukee Public Schools (MPS) estimates that, on average, 20 percent of its students change schools each year because their families move. In some schools, mobility rates reach over 50 percent (Student Mobility Task Force, 2001). This provides some indication of the challenges involved in locating families, particularly in poorer neighborhoods where mobility is typically highest and telephones are sometimes not connected. MPS also reports that the frequency of mobility has been increasing over time, accompanied by a gradual breakdown in social and neighborhood institutions. As a result, public health nurses have found it increasingly difficult to make initial contacts with families, keep updated contact information on them, and track them down when they move.

The phenomenon of increasing numbers of grandparents raising grandchildren has also emerged as a challenge for reaching out to families with at-risk infants. The U.S. Census Bureau estimates that, nationally, grandparents are the primary guardians responsible for raising 6 percent of all children. For home visitation, this presents difficulties in locating, tracking, and keeping records on families. Moreover, it makes it difficult for nurses to get a clear sense of who in a family is primarily responsible for infant care and to link non-custodial parents with formal services.

### ***Implications of W-2 work requirements***

A factor that has made it increasingly difficult for public health nurses to visit families in their homes is the emergence of new welfare rules in 1996 intended to bring welfare recipients into the labor market. Both tougher work requirements and increases in child care subsidies have resulted in greater numbers of low-income mothers of infants

working outside the home (Legislative Audit Bureau, 2001) and substantial increases in the use of unlicensed child care facilities (Quinn and Pawasarat, 1999).

While the health department has tried to keep pace with these trends by securing funding to visit some child care facilities, it has been difficult to target these visits to the most high-risk infants. Many mothers use unlicensed facilities or ask family or neighbors to watch their children. It is very difficult for public health nurses to know where a child is while a mother works. Even when a nurse can see an infant in a child care facility, the inability to observe infants in their home environment has reduced some of the usefulness of these visits. Much of the effectiveness of infant home visitation involves the ability of the nurse to assess environmental risk factors such as potential dangers in the home environment, to observe interactions between mothers and babies, and to communicate face-to-face with mothers about available services and healthy practices.

### ***Safety Net Issues***

Home visitation, in the absence of other resources, has little chance of alleviating the complex, environmental factors that lead to infant mortality and other health risk factors. Factors such as poverty, lack of medical insurance, inaccessible health care, high health care costs, and the nonexistence of other supportive community resources present continual challenges to fostering infant health through home visitation.

Therefore, a fourth challenge that infant home visitation faces involves the extent to which it is forced to function as a safety net in providing direct care and intervention rather than prevention and education. Public health services work best in concert with other community health resources and clients that are eager to respond to nurses' concerns. In other words, a public health department sees the most success when the local community provides easy and widespread access to private and public health care providers, when residents of the community utilize their insurance and public assistance plans, and when the local government ensures that the local services are easily and readily available to all residents. In this environment, public health can focus its efforts on serving the very needy. This environment also allows public health to focus its resources on preventive rather than reactive measures.

### ***Fiscal Environment***

The district nursing home visitation program is a non-revenue-supported program. Since most clients that receive home visits from nurses are poor, they are unable to afford to pay fees. For this reason, and because of the challenging fiscal climate that Wisconsin and Milwaukee face, careful attention must be paid to providing cost-effective services and to targeting these services appropriately so that they are aligned with program goals. In the coming years, the city will likely face cuts in aid from the state and continued pressure to keep property taxes relatively low. The major factors driving the current fiscal crisis are the proposed cut in shared revenue of \$10 million and rising costs in other city departments. These two factors are in addition to an ongoing "structural deficit" that is caused by expenditures rising at a pace faster than revenues. This structural deficit creates a budget gap that increases every year. Because of these challenges, all city programs are under increasing scrutiny each year. In this context, nurse home visitation will be under pressure to operate as effectively and efficiently as possible.

## Literature Review on Nurse Home Visitation

Extensive studies have considered the impact of public health nurse home visits on the families and the infants visited. Many studies target their analyses at mothers and newborns that are considered “high risk.” High risk refers to a number of problems, such as drug abuse, domestic violence, medical problems, and welfare dependency. Not many studies evaluate home visit programs in the context of infants that are specifically at risk for infant mortality.

Most studies find significant results favoring nurse home visitations. The studies do not, however, reach the same conclusion regarding the magnitude of the value of the visits. Another issue is that home visitation programs and their clients may be very different from one city to the next. Consequently, a program that works and produces results in one city is not guaranteed to be transferable to a different city. The result of research on one home visitation program cannot necessarily be generalized to every other nurse home visitation program. There is value, however, in exploring the literature about these programs to learn which types of programs tend to have positive results. See Appendix C for a synopsis of the research reviewed.

### *Home Visits and Infant Mortality*

Among studies on nurse home visitations, few attempt to find a link between nurse home visits and infant mortality. The June 1999 issue of *Public Health Nursing* published a study on the effect of home visits and mentorship on the infants of adolescent mothers (Flynn 1999). Study participants included 137 women who were 18 years old or younger, Medicaid eligible, residents of Newark, New Jersey, not currently clients of the Division of Youth and Family Services, either pregnant with their first child or within six weeks postpartum, and who screened at risk for potential child maltreatment using their Family Stress Checklist. Each client received a monthly home visit from a community health nurse as well as visits from a family support worker once a week initially and slowly tapering off to once every three months over the course of three years. The family support worker acted as a mentor for the mother and taught parenting skills and healthy behaviors as well as offering emotional and social support. The resulting infant mortality rate for the 137 participants was zero as compared to the local infant mortality rate of 15.8 per 1000 (which is double the state of New Jersey’s average). It is important to note, however, that applying the state average to the sample group meant that 2.2 infants would have been expected to die.

Another study on infant mortality studied a group of infants in Chicago born in poverty to teenage mothers, mothers with little or no prenatal care, infants and mothers who were discharged early from the hospital, and families with psychosocial problems (Barnes-Boyd et al. 1996). The infants and their mothers received a home visit at two weeks, six to eight weeks, four months, eight months, and twelve months, with additional visits as necessary. Phone calls were used to follow up between visits and monthly newsletters were sent. Hospital-based registered nurses and lay home visitors trained as community health advocates made initial visits. Public health nurses or aides from the Chicago Department of Public Health or nurses from the Visiting Nurses Association made the other visits. This program addressed preventable causes of after-birth mortality such as respiratory problems, weight loss, and diarrhea. The program complemented

existing services rather than replacing them and ensured that families had access to a full range of services at a university medical center. Among the 1,269 program participants, there were six infant deaths, a rate of 4.7, which is lower than the national average. This is notable because of the high-risk factors that this group of infants was facing.

These studies demonstrate that visiting the homes of new mothers, monitoring the development of the child, discussing and advising the moms on the proper care of their infants, and providing information on available resources has lessened the risk of future harm or behavioral problems for infants. Not much research directly demonstrates lower risk of infant mortality, but what we found suggested that nurse home visits could reduce the risk of infant mortality. All the programs we studied were much more intensive than the Milwaukee program. While this should not necessarily discourage a public health department from using nurse home visitations, there is no evidence that a more limited program will have the same results.

### ***A Preference for Home Visitation?***

A 2001 report in *Pediatric Nursing* presents a slightly different twist on nurse home visitation analysis. This study examined mothers' preferences in clinical intervention strategies (Gaffeny and Altieri, 2001). The study questioned 138 mothers of four-month-old babies on their preferences among eight intervention strategies. The aggregate results of the mothers' preferences from most to least preferred are:

1. Registered nurse home visitation
2. Group sessions
3. Lay home visitor
4. Classes in a clinic
5. Health diary
6. Videotapes in the home
7. Brochures
8. Videotapes in the clinic

The report ends with recommendations for intervention practices. The researchers found that the forms of intervention that allowed mothers the opportunity to discuss problems and receive feedback ranked higher than interventions like videotapes and brochures that did not allow a mother to discuss her individual needs.

Another interesting conclusion reached by the study was that a collaborative program for high-risk mothers that includes both nursing assessments for the infant as well as nurturing support from a lay community health worker might be an ideal arrangement. The high ranking that both of these interventions received from the mothers supports this conclusion. In addition, a lay home visitor could fill the needs left by the disadvantages of nurses' visits. Specifically, a nurse could intimidate some mothers, while they are more comfortable and can relate better to a community worker. An obvious side note to this study is that the interventions most preferred by the mothers are typically those that are more expensive, while the lowest-rated choices, such as videos and brochures, would cost less.

## Home Visiting Strategies in Other Cities

We contacted 11 city and county health departments to interview them about providing home visits for newborns.<sup>10</sup> Some of the cities we contacted do not provide home visits to newborns. Of those that do, the levels of staffing and intervention intensity vary. We have included discussions about each home visiting program for newborns from seven of the cities in Appendix D. Table 5 provides a brief summary of the cities we contacted and the programs they use to reduce infant mortality.

**Table 5. Reducing Infant Mortality in Other Cities**

City	Population	1998 Infant Mortality Rate	Provides Home Visits for Newborns	Nurses with Bachelor's Degree on Staff	Other Visiting Staff
Austin	656,562	5.3	No	NA	NA
Baltimore	651,154	12.6	Yes	Yes	Yes
Boston	589,141	5.8	Based on referrals	About 20	About 13 public health advocates
Chicago	2,896,016	11.3	Based on state-mandated risk criteria	About 70	Yes
Cincinnati	331,285	12.3	Yes	12	2
Jacksonville, FL	735,617	9.8	Based on referrals	About 20	About 40 case managers
Nashville	545,524	7.7	Based on referrals	4	1 part-time social worker
Philadelphia	1,517,550	11.8	Based on referrals	Yes	Lay Home Visitors
Washington, DC	572,059	12.5	Only if mother requests	1	No

Through our discussions with these cities, we identified service delivery models, referral and criteria systems, and approaches for preventing infant mortality that are different than Milwaukee's nurse home visitation program. In addition, we found several similarities between these cities' programs and Milwaukee's program. This section summarizes the major findings from these other cities.

Most of the cities we contacted use lay home visitors (sometimes referred to as public health advocates) and social workers, in addition to public health nurses, for conducting home visits for newborns. Lay home visitors typically do not have a bachelor's degree in nursing. Instead, this person is usually a well-connected woman within the community who has parenting experience. Most of these cities use public health nurses primarily to provide medical services and health assessments to families without access to health care. The lay home visitors provide information about receiving medical services, utilizing public assistance plans, and behaviors and practices that

<sup>10</sup> Two of the cities we contacted, El Paso and Oklahoma City, do not have city health departments and are not included in Table 5.

promote infant health. Social workers generally had a higher level of responsibility than lay home visitors in providing nonmedical services and assessments.

The cities we examined use three different approaches for providing home visits. Some of the cities use a geographic approach based on census tracts or zip codes to administer home visits. Some of the cities use an approach that employs only public health nurses who specialize in providing home visits. Another approach uses teams of nurses and lay home visitors for administering home visits. One of the cities uses a hybrid of these approaches, combining the team and geographic approaches.

Most of those we contacted rely upon referrals for identifying newborns for home visits. These cities usually receive referrals from hospitals and community members. Representatives of only one city mentioned using a criteria approach similar to Milwaukee's for identifying newborns at risk of infant mortality.

Similar to Milwaukee, most of the cities we considered provide home visitation in conjunction with prevention-based services that occur prior to birth. These other cities also faced challenges similar to Milwaukee's, such as the nurse shortage and family mobility.

## **Evaluating Milwaukee's Nurse Home Visitation Program**

The value of infant home visitation in Milwaukee can be discussed in several ways. First, the program can be evaluated in terms of its effect on outcome indicators, specifically on Milwaukee's overall infant mortality rate and on the disparity between African American and white infant mortality. The program can also be evaluated based on how efficiently program resources are used, whether the program's capacity is sufficient to meet challenges, and finally on the appropriateness of the program's goals and objectives.

### ***Infant Mortality***

One of the most important measures of program success is the extent to which nurse home visitation can directly improve Milwaukee's infant mortality rate. A central goal of the Maternal and Child Health Division is to decrease the rate through infant home visitation and other programs. By 2005 the goal of the division is to reduce infant mortality to 9.6 (from 11.5 in 2001).

A clear connection between nurse home visitation and infant mortality rates is difficult to establish. This is because of the many complex social, economic and health factors that influence infant mortality rates. The effects of any health program might be exaggerated, dampened, or reversed by external factors. A connection is currently even more difficult to establish because the health department has limited data on the direct effects of the home visitation program, including the infant mortality rate among the infants that receive home visits.

Moreover, establishing a clear connection with reductions in infant mortality is difficult because infant home visitation affects only a minority of infant death cases. The program mainly focuses on post-neonatal (i.e., after the first 28 days of life) infant mortality because most neonatal deaths occur prior to discharge from the hospital. In

2001 about two-thirds of infant deaths occurred before discharge, indicating that, at most, home visitation can affect about one-third of infant mortality (Fillmore et al. 2002).

Finally, infant home visitation is only one program among several that affects infant mortality. Even among the approximately one-third of infant deaths that occur after discharge from the hospital, other earlier interventions play an important role in preventing deaths. Much of the opportunity to prevent infant mortality after birth is supported by good prenatal care and early prevention and education efforts.

Despite the fact that a direct connection between infant home visitation and reductions in the infant mortality rate is difficult to establish, there is some limited evidence that home visits in Milwaukee are effective in preventing deaths. While more recent numbers are not yet available, in 2001 only two of the approximately 50 post-discharge infant deaths occurred in families that received home visits. This number reflects program outcomes prior to the implementation of evidenced-based risk criteria in 2002. It is quite possible that since then, more efficient targeting has increased the number of visits that reach babies at the highest risk for infant mortality. Nevertheless, it indicates that very few visited babies die. The remainder of post-discharge deaths must either have occurred in families who did not meet risk criteria or in families who the health department could not reach. To the extent that the latter is true, this raises serious questions about the capacity of the program to reach families in need. Much of the program's effectiveness in reducing infant mortality hinges on the capacity of nurses to identify and make contact with this group of families.

### ***Addressing Racial Disparity***

Infant mortality can occur within two distinct periods, before or after discharge from the hospital. Those deaths occurring prior to discharge account for roughly two-thirds of infant deaths for both white and African American newborns. The other one-third of deaths occurs post-discharge and is the only portion of deaths that a nurse home visit can prevent.

The majority of these post-discharge deaths result from SIDS. City of Milwaukee data shows that, in 2001, 17 of the 23 babies who died because of SIDS were African American. This high rate of SIDS deaths is an important target for home visitations in reducing the racial disparity in infant mortality. It is important for nurses to assess factors in African American households and care patterns that contribute to this high rate and do not correlate to factors in white households. Once these factors are identified, aggressive action from the health department has the potential to reduce the high racial disparity in infant mortality.

The reasons for the high rate of SIDS in African American infants are complex. Some literature, however, attributes the higher rate to factors such as the prevalence of babies sleeping on their stomachs or sleeping with adults (and being vulnerable to suffocating) in African American families (Hauck et al. 2002; Gibson et al. 2000). Based on this literature and the high rate of SIDS in African American infants, it appears that the city health officials have not yet found an effective means of communicating information about sleep safety to its African American population. Various employees from the health department have expressed to us a concern that some members of the African American population are more comfortable accepting the traditions of their

families than the advice of doctors, nurses, and health professionals. If this is true, increasing amounts of literature and information available on the risks associated with prone sleeping and sleeping with adults may not influence the habits of some African American women. A more effective strategy may be to share the message of better sleeping environments with the younger members of the population through adults whom they respect or to whom they can relate. Currently, the city employs 14 African American public health nurses, although only two or three work in the home visitation program. Increasing the number of African American home visitors could be one strategy for addressing this problem.

African American infants also constituted almost half of the deaths due to congenital abnormalities and over three-quarters of the deaths due to prematurity in 2001. Pre-discharge infant deaths are caused primarily by either congenital abnormalities or prematurity, but some post-discharge deaths result from these factors also. This fact supports the need for both preventative measures and nurse home visitations.

It is important to keep the racial disparity in infant mortality in a context of social factors. It is possible that a statistical analysis that controlled for race would show that social problems such as poverty, poor nutrition, or limited access to health care, not race, are the factors that lead to a high risk for infant mortality. It is possible that the disparity in socioeconomic status between whites and African Americans in Milwaukee is at the root of the disparity in infant mortality. This is not to say that the disparity is not relevant; but the city may need to employ broader social programs to address all of the disparities that exist between the races in Milwaukee.

The implication for the Milwaukee Health Department is that, in addressing the disparity in infant mortality, two potential approaches are feasible. One would be to focus on risk factors by increasing the capacity of the health department to visit infants considered high risk. Another would be to focus on potential community and cultural barriers to preventing the risk factors from occurring. A combination of these approaches might be necessary to lower the gap in the infant mortality rates.

### ***Program Effectiveness***

The capacity of infant home visitation to respond to changing community needs and to stubborn infant mortality rates is an important part of the overall effectiveness of the program. To what extent do limited program resources such as staffing or funding compromise the program's ability to respond to the public health needs of the Milwaukee community?

Public health nurses do not visit most of the approximately 40 to 50 post-discharge infants that die each year. This seems to indicate that the program suffers from a serious lack of capacity. The immediate constraint on program effectiveness, however, is not a limited budget but a lack of nurses. For the past several years, the program has averaged about 20 vacant public health nurse positions. Although the health department budget includes funding for these positions, a severe nurse shortage has impeded the ability of the department to hire an adequate number of nurses.

Several innovative efforts by the health department to improve its ability to hire nurses with bachelor's degrees, which are required by state statute, have not been able to

fill all of the available positions in the department. These efforts have included marketing strategies to emphasize the benefits of employment in public health nursing, aggressive recruitment, media advertising, increasing salaries, and even a pilot training program to hire nurses while they are in the process of attaining the appropriate credentials. The failure of these efforts to produce an adequate, stable workforce of public health nurses for the city may indicate that staffing limitations will continue to be a major constraint on nurse home visitation in coming years.

The ongoing limitations to program capacity that go along with low levels of public health nurse staffing are likely to make it difficult for the program to meet evolving challenges within the community. Such challenges include the increasing mobility and instability of families, the work requirements that welfare reform places on low-income mothers, and the growing need for the health department to function as a safety net for residents without any other access to health care. Families that are mobile and unstable increasingly tax the resources of existing public health nurses who attempt to visit them. Often several attempts are made by nurses to reach a single family and some are never reached at all, costing valuable nurse hours.

The work requirements of welfare reform have also stretched the capacity of nurses to provide an adequate number of home visits. Under welfare reform rules, mothers are normally required to return to work after twelve weeks. This still provides nurses ample opportunity to make a first visit, but potentially compromises follow up visits and costs valuable staff resources as nurses attempt to make second, third, and fourth visits to a family. To make up for some of the lost opportunity to make visits, the health department has secured grant funding to visit licensed child care facilities. This, however, adds to nurse responsibilities and further taxes the collective time of nurses. In addition, the nurses still do not reach the many infants that receive care from non-licensed facilities.

### ***Efficient Use of Resources***

About 24 public health nurses are available for high-risk infant home visitation. In 2001 these nurses spent a total of 14,681 hours on high-risk infants. That is about 612 hours each, which constitutes 34 percent of a full-time nurse's yearly work hours. The rest of the nurses' time would have been spent on communicable disease cases and staffing the community health centers. An important point of evaluation is how efficiently this time is spent since nurses have other important demands placed on their time.

An infant home visit involves not only the time spent at the home, but also the preceding and follow-up paperwork and assessment, as well as the time spent in attempting to contact the mother and drive to and from the home. Sometimes the mother is easy to contact and an appointment can be set up; other times it is impossible to make telephone contact, and the nurse drives to the home address hoping to catch the mother and infant at a good time. Sometimes, however, it requires multiple phone and traveling attempts to get in contact with the family of a newborn.

There may not be an issue with nurses devoting one-third of their time to high-risk infants. Nevertheless, if much of this time is spent in failed attempts to meet with the family, this is wasted time that could be spent on other cases or in other areas. There is

also a question whether a highly trained nurse's time is best spent struggling to contact families. The extra time spent on the phone, and especially in the car, detracts from the time that the nurses can devote to assessing cases and administering medical services to those cases that they already work with.

### ***Outcomes and Program Result Measures***

The Maternal and Child Health Division has yet to meet any of the target outcomes for 2005 that were identified earlier. The success of the nurse home visitation program affects the primary goal of reducing the ratio of non-Hispanic African American infant mortality rate to non-Hispanic white infant mortality rate. It also affects two other program results that health department measures. One of these is reducing the city's overall infant mortality rate. The other is increasing the percent of children entering kindergarten through fifth grade who have received the 4,3,1 vaccination series before 36 months of age. This result is affected because nurses conducting home visits provide information about vaccinating newborns. Prenatal strategies to reduce the risk of infant mortality affect the division's three other program result measures that are not addressed by home visitation.

It is difficult to estimate the value provided by the nurse home visitation program because the outcomes of public health programs are uncertain, long term in nature, and take place in a changing social environment. Therefore, the major outcome measurements used by the Maternal and Child Health Division may need expansion and clarification to capture the full array of potential program benefits.

Using target outcomes to evaluate the home visitation program presents three potential problems. First, it is possible that program outcome indicators do not capture the long-term and difficult-to-measure aspects of program value. It is likely that the City of Milwaukee in general could be benefiting from these positive outcomes because of its home visitation program. The health department, however, has no way of reporting its possible contribution to these social goods. Consequently, this problem is likely to persist.

Second, program outcome indicators are measured for the entire city of Milwaukee, while the nurse home visitation program is administered primarily to a specific set of at-risk newborns. While the health department should collect and evaluate citywide data on infant mortality, the data on those visited by nurses provides a more accurate measure of program effects. If the program could find some way of calculating infant mortality among its client group, this measure would be a much more effective way of estimating program success. Numbers showing the percentages of infants that died and did not receive a home visit compared to the percentage of infants that received a home visit but still died could also be used to evaluate the nurse home visitation program and how well its selection criteria are working.

Finally, using the ratio of non-Hispanic African American infant mortality rate to non-Hispanic white infant mortality rate presents some problems. For example, as long as the white infant mortality rate declines at a rate faster than the African American infant mortality rate, it is possible that the ratio could remain the same or even increase. The decline in both rates is an indication of progress. Conversely, an increase in the white infant mortality rate while the African American infant mortality rate remains the same

will decrease the ratio. The results of this situation are that the outcome indicator will show improvement even though no progress has been made in reducing infant mortality. It is important for the health department to have a target outcome that relates to the racial disparity in infant mortality rates. Using ratios, however, may not be the best outcome indicator.

## **Recommendations**

We have identified two actions that the Milwaukee Health Department can undertake to improve the effectiveness of the nurse home visitation program. These recommendations are intended to enhance the program's capacity to achieve its goals and address its challenges.

### ***Hire Non-medical Personnel to Work within Public Health Nurse Teams***

Hiring non-medical personnel, such as social workers or lay home visitors, to assist with home visits would benefit the health department by freeing up valuable nurse time, by potentially gaining legitimacy within the African American community, and by adding different kinds of expertise to the staff. Such employees can help to reduce the workload of current nurses by doing non-medical follow-up visits and tracking down newly recommended families and families that have moved. They would work with the team of nurses so that the nurses are always aware of all of the information on their families, but the nurses can focus on the medical aspects of these cases, while lay home visitors and social workers would serve to establish better communications and stronger relationships with the families.

Hiring local residents as "lay home visitors" may increase the response and respect that public health nurses receive from the visited families. If African American mothers prefer the advice of those around them to the advice of health professionals, a local resident who accompanies a public health nurse and makes follow up visits may be able to break down barriers. If behaviors such as infant prone sleeping and co-sleeping are still practiced in families despite current communications, maybe providing a home visitor that the mothers can relate to and feel comfortable with will make the information seem more legitimate. Maybe clients will be more likely to listen to the advice and adopt less risky behaviors.

The use of non-medical staff may also add expertise to the staff of home visitors. Social workers could add such skills as counseling, assessment of family interactions, and knowledge of appropriate services to help families. Lay home visitors might provide the program with knowledge of cultural practices and familiarity with neighborhood institutions.

Many other city health departments use lay home visitors and social workers to perform such functions. Appendix D provides a list of our contacts from these cities. These contacts could provide more information on how these practices were adopted and implemented by their departments.

Some obstacles stand in the way of implementing this recommendation: (1) the state law requiring nurses with bachelor's degrees in city health departments and (2) potential resistance from the city's nurses union. State law does not prohibit a health department from using employees other than nurses with bachelor's degrees, but the city

would have to outline, very specifically, the duties of the nurses, lay home visitors, and social workers to ensure that the non-medical staff are not providing any services for which the state requires a nurse with a bachelor's degree.

It will be important to gain the support of the nurses union in implementing this recommendation. Hiring non-medical staff decreases possible membership within the union and could reduce its negotiating power. Generally, unions are resistant to the prospect of declining membership. Hiring non-medical personnel, however, would not have to displace any nurses but could fill in some of the long-standing vacancies in the health department. We are not suggesting that the city should not hire more nurses, given the opportunity. Nevertheless, given the projected continuation of the nursing shortage, these positions are not likely to fill up anytime soon. Ideally, with good communication and assurances that public health nurses are still the primary providers of home visitations, the nurses' union is apt to welcome the additional assistance that non-medical personnel can provide.

Considering the likelihood that poverty and social conditions and reliance on family traditions in some neighborhoods are contributing to the risk of infant mortality in newborns, it is necessary to become a stronger and more respected presence within these neighborhoods. Better relationships with local health providers and their clients can go a long way toward a better understanding of what social and cultural forces are increasing the presence of risk criteria in the neighborhoods' newborns. Hiring social workers along with lay home visitors from the neighborhoods in which they will be working will help to establish these relationships.

### ***Improving Data Reporting and Utilization***

Over the course of this evaluation, it was difficult to find data to answer some of the essential questions regarding the effectiveness of this program. While some information is collected for long-term study, it is not readily available to aid in routine program monitoring. For example, within a recent time period, it would be helpful in evaluating the program to know how many home-visited infants died, at what age (in months) the death occurred, for what reason, and how many visits the infant and the family had received prior to the infant's death. Currently such information is available only for 2001.

It would also be useful to know why some post-discharge cases of infant mortality did not receive a visit. Did the infant not meet the high-risk criteria or was it just impossible to reach the family? This distinction is critical to knowing the appropriateness of high-risk criteria and the ability of nurses to make connections with families.

Another area where data reporting needs to be improved is in gaining a better understanding of the population receiving home visits and identifying the influence and effects of the program. Some of the information that is important to understand regarding the clients receiving home visits is race, income, and access to and utilization of health insurance. Constant monitoring of these factors will help the department know whether its criteria are targeting the families that need public health services the most.

As already stated, the health department already collects most of this data. It is not aggregated and reported, however, in a timely manner so that it can influence decision-

making. Department personnel have also indicated that they are looking into easier methods for collecting data such as electronic notepads. Implementation of this should help make data recording, aggregation, and reporting much easier and more accurate. The benefit of collecting this data is that it can help the department analyze the program's results, defend its value, and—much more important—improve the program's effectiveness.

## **Conclusion**

In considering these recommendations, it is important to recognize that home visitation is only one part of an effective strategy to reduce infant mortality. It appears that the nurse home visitation program provides an essential service that saves lives. Addressing the city's high infant mortality rate involves both preventative and reactive programs. Early health care and education about healthy behaviors are a crucial counterpart to home visitation in reducing the risk of infant mortality.

In these times of fiscal and economic challenges, it is important for the city to continue to prioritize and assess the value of investing in the prevention of infant deaths. Our recommendations do not involve spending additional resources on nurse home visitation. Instead, they involve implementing practices that will use the resources of the health department more efficiently in the short term and more effectively. While public priorities may demand more spending on the program over time, the most immediate prospects for expanding program outcomes lie in improving the use of current resources. Collecting better data about the clients that the nurse home visitation serves will help the Milwaukee Health Department be more responsive to the changing environment in which the program operates, while using non-medical personnel will allow the department to make more efficient use of its personnel and to expand its current capacity to address health needs in the community.

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## References

- Barnes-Boyd, Cynthia et al. "Evaluation of an Interagency Home Visiting Program to Reduce Postneonatal Mortality to Disadvantaged Communities." *Public Health Nursing*. June 1996. Vol. 13, No. 3.
- Benbow, N. (editor). *Big Cities Health Inventor*. Washington D.C.: National Association of County and City Health Officials, 2002.
- Dresang, Joel. "A Critical Shortage of Nurses; as changes in profession strain their ranks, scramble to fill shifts at hospitals intensifies." *Milwaukee Journal Sentinel*. February 23, 2003.
- Eckenrode, John et al. "Preventing Child Abuse and Neglect With a Program of Nurse Home Visitation: The Limiting Effects of Domestic Violence." *The Journal of the American Medical Association* September 20, 2000, Vol. 284, No. 11, p.1385.
- Fillmore, Capri-Mara, Kathleen Blair, Karen Michalski, Jill Paradowski, and Sue Sheppard. Presentation: City of Milwaukee Health Department and Health Policy Institute, Medical College of Wisconsin. "Disparities in Infant Mortality Risk Factors: Implications for Public Health Practice." 2002.
- Flynn, Linda. "The Adolescent Parenting Program: Improving Outcomes Through Mentorship." *Public Health Nursing*. June 1999. Vol.16, No.3.
- Gaffeny, Kathleen F. and Lauren B. Altieri. "Mothers' Ranking of Clinical Intervention Strategies Used to Promote Infant Health." *Pediatric Nursing*. September-October, 2001. Vol. 27, No. 5.
- Gibson, Eric, Jay S. Greenspan, Sara Rubin, Cynthia A. Dembofsky. "Infant Sleep Position Practices 2 Years into the 'Back to Sleep' Campaign." *Clinical Pediatrics*. May 2000. Vol. 39, No. 5.
- Hauck, Fern R., Cathryn Merrick Moore, Stanislaw M. Herman, Mark Donovan, Mitra Kalelkar, Katherine Kaufer Cristoffel, Howard J. Hoffman, Diane Rowley. "The Contribution of Prone Sleeping to the Racial Disparity in Sudden Infant Death Syndrome: The Chicago Infant Mortality Study." *Pediatrics*. Oct. 2002. Vol. 110, No. 4.
- Kitzmann, Harriet et al. "Effect of Prenatal and Infancy Home Visitation by Nurses on Pregnancy Outcomes, Childhood Injuries, and Repeated Childbearing: A Randomized Control Trial." *The Journal of the American Medical Association*, August 27, 1997, Vol. 278, No. 8, p. 644.
- Kitzmann, Harriet et al. "Enduring Effects of Nurse Home Visitation on Maternal Life Course: A 3-Year Follow-up of a Randomized Trail." *The Journal of the American Medical Association* April 19, 2000, Vol. 283, No. 15, p. 1983.
- Legislative Audit Bureau. State of Wisconsin. "Wisconsin Works (W2) Program: An Evaluation." April 2001.

- Mathews, T.J., Sally C. Curtain and Marian F. MacDorman. "Infant Mortality Statistics from the 1998 Period Linked Birth/Infant Death Data Set." National Center for Health Statistics. Vital Health Stat Series No. 12 (48). 2000.
- Olds, David, et al. "Long-term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior: 15-year Follow-up of a Randomized Controlled Trial." *The Journal of the American Medical Association*, October 14, 1998, Vol. 280, No. 14, p. 1238.
- Olds, David, et al. "Improving the Life-Course Development of Socially Disadvantaged Mothers: A Randomized Trial of Nurse Home Visitation." *American Journal of Public Health*, November 1998, Vol. 78, No.11, p. 1436.
- Olds, David et al. "Preventing Child Abuse and Neglect: A Randomized Trial of Nurse Home Visitation." *Pediatrics*, July 1986, Vol. 78, No. 1, p. 65.
- Quinn, Lois M. and John Pawasarat, University of Wisconsin-Milwaukee Employment and Training Institute. "Impact of Welfare Reform on Child Care Subsidies in Milwaukee County: 1996-1999." 1999.
- Student Mobility Task Force, Milwaukee Public Schools. "Student Mobility Report." 2001.
- U.S. Department of Health and Human Services. Bureau of Health Professions. "Projected Supply, Demand and Shortages of Registered Nurses 2000-2020." July 2002.

## Appendix A

Infant Mortality Rates in Various Cities by Race and Ethnicity, 1998*					
City	Rate**			Overall	Overall Rank out of 47 Biggest Cities in U.S.***
	Non-Hispanic White	Non-Hispanic Black	Hispanic		
Memphis, TN	8.5	19.2	---	16.3	1
Detroit, MI	---	16.0	---	14.7	2
St. Louis, MO	---	17.0	---	13.0	3
Baltimore, MD	---	15.3	---	12.6	4
Washington, DC	---	15.2	---	12.5	5
Cincinnati, OH	8.7	16.2	---	12.3	6
<b>Milwaukee, WI</b>	<b>6.0</b>	<b>18.8</b>	---	<b>12.0</b>	<b>7</b>
Oklahoma City, OK	12.1	18.5	---	11.8	8
Philadelphia, PA	7.2	15.6	9.6	11.8	9
Chicago, IL	6.2	16.0	6.9	11.3	10
Jacksonville, FL	6.5	16.4	---	9.8	13
Columbus, OH	5.8	16.0	---	9.1	14
Nashville-Davidson, TN	5.7	13.0	---	7.7	20
Seattle, WA	---	---	---	6.2	35
El Paso, TX	---	---	5.9	5.9	37
Boston, MA	---	9.5	---	5.8	38
Austin, TX	---	---	5.5	5.3	40
<hr/>					
City Median	5.9	15	5.9	7.4	
U.S. 1998	6.0	13.9	5.8	7.2	
<p>* List includes 13 comparable cities used by the City of Milwaukee's Budget and Management Division and all the cities with the 10 highest overall infant mortality rates.</p> <p>** Rate per 1,000 births.</p> <p>*** Rank 1 corresponds to highest rate.</p> <p>“---” Does not meet reliability standards or data not available.</p>					
<p>Source: <i>Big Cities Healthy Inventory</i>, 2002, National Association of County and City Health Officials, Benbow, N., editor. Washington, D.C.</p>					

**Appendix B: Data on Infant Mortality for the City of Milwaukee, 1989-2001**

Year	Overall	White	African American	Hispanic	Ratio of African American to White	Disparity Between African American and White
1989	13.0	9.8	18.9	8.0	1.9	9.1
1990	12.9	8.1	19.7	5.4	2.4	11.6
1991	11.3	8.2	14.0	9.8	1.7	5.8
1992	10.9	9.3	14.0	8.5	1.5	4.7
1993	11.4	8.4	14.9	7.4	1.8	6.5
1994	13.1	7.9	18.6	9.2	2.4	10.7
1995	12.2	8.4	17.3	9.5	2.1	8.9
1996	12.8	9.1	17.5	7.0	1.9	8.4
1997	10.3	7.6	13.9	7.1	1.8	6.3
1998	12.1	6.2	19.0	6.2	3.1	12.8
1999	10.5	6.9	14.5	11.8	2.1	7.6
2000	11.5	5.9	18.2	6.2	3.1	12.3
2001	11.5	6.9	18.3	7.4	2.7	11.4

Source: City of Milwaukee Health Department.

## Appendix C

Study	Target Issue	Target Group	Intervention	Control Group	n (initial): n (final)	Effect
Eckenrode et al. (2000), semirural, New York State; 15-year follow-up of a randomized trial	The limiting effects of domestic violence	Socially disadvantaged, pregnant women with no previous live births	(1) routine care plus nurse home visits during pregnancy (n=100) (2) routine care plus nurse home visits during pregnancy and through child's 2 <sup>nd</sup> birthday (n=116)	(C1) routine prenatal care	400:324	(2) had significantly fewer child maltreatment reports with mother as perpetrator or study child as subject than (C1), but treatment effect decreased as level of domestic violence increased (1) not significantly different than (C1)
Kitzman et al. (2000), Memphis, TN; 3-year follow-up of a randomized trial	Enduring effects of nurse home visitation on maternal life course	Women less than 29 weeks pregnant, no previous live births, primarily black, and at least 2 of the following: unmarried, less than 12 years of education, unemployed	(1) same as (C2) plus nurse home visitation during pregnancy and with 1 postpartum visit before discharge and 1 postpartum visit at home (n=230) (2) same as (1) plus nurse home visits until child's 2 <sup>nd</sup> birthday (n=228)	(C1) free roundtrip taxi to prenatal care (n=166) (C2) same as (C1) plus developmental screening and referral for child at 6, 12, 24 months (n=515)	(C2) 515:443 (2) 228:203	Only groups (2) and (C2) were compared. (2) had fewer subsequent pregnancies, fewer closely spaced subsequent pregnancies, longer intervals between birth of 1 <sup>st</sup> and 2 <sup>nd</sup> child, fewer months of using AFDC and food stamps than (C2)
Kitzman et al. (1997), Memphis, TN; randomized control trial	Effects of nurse home visitation on pregnancy outcomes, childhood injuries, and repeated childbearing	Women less than 29 weeks pregnant, with no previous live births, no specific chronic illnesses thought to contribute to fetal development or preterm delivery, and at least 2 of the following: unmarried, less than 12 years of education, or unemployed	(1) same as (C2) plus nurse home visitation during pregnancy and with 1 postpartum visit before discharge and 1 postpartum visit at home (n=230) (2) same as (1) plus nurse home visits until child's 2 <sup>nd</sup> birthday (n=228)	(C1) free roundtrip taxi to prenatal care (n=166) (C2) same as (C1) plus developmental screening and referral for child at 6, 12, 24 months (n=515)	1139	Prenatal effects: By 36 <sup>th</sup> week of pregnancy, (1) and (2) were more likely to use other community services and be working than (C1) and (C2). They also had fewer yeast infections and fewer instances of pregnancy-induced hypertension (PIH). Of those with PIH, (1) and (2) mean arterial blood pressures were 4.6 points lower during labor than (C1) and (C2). Childhood effects: (Only groups (C2) and (2) compared) (2) had fewer health encounters with detection of injuries or ingestions and were hospitalized for fewer days with injuries and/or ingestions than (C2). (2) reported that they attempted breast-feeding more frequently than (C2) and also had homes that were rated as more conducive to children's development by means of the Home Observation for Measurement of the Environment Scale. Maternal Life Course: (Only groups (C2) and 2 compared) by 24 months postpartum, (2) reported fewer second pregnancies and fewer subsequent live births than (C2).

Olds et al. (1998), semirural New York State; randomized clinical trial	Life-course development of socially disadvantaged mothers	Pregnant women before the 30 <sup>th</sup> week of pregnancy, no previous live births and one or both of the following: less than 19-yrs-old, low socioeconomic status. Also any woman who asked to participate who was bearing her first child.	(1) same as (C2) plus nurse home visitation during pregnancy (n=100) (2) same as (1) plus nurse home visitation during first 2 years of life (n=116)	(C1) sensory and development screening and referrals at 12 and 24 months (n=90) (C2) same as (C1) plus free transportation to regular prenatal and well-child visits (n=94)		(C1) and (C2) were combined for comparison. During 4 years after delivery, nurse visited women who had not completed high school at the start of the study returned to school more rapidly than the control group, and the nurse visited women who were poor and unmarried were employed 82 percent more of the time, had 43 percent fewer subsequent pregnancies, and delayed the birth of their 2 <sup>nd</sup> child an average of 12 months longer
Olds et al. (1998), semirural New York State; 15-year follow-up of a randomized trial	Long-term effects of nurse home visitation on children's criminal and antisocial behavior	Women less than 25 weeks pregnant with no previous live births, who were one or more of the following: younger than 19 years, low socioeconomic status, or unmarried. Also any woman who asked to participate who had no previous live births.	(1) same as (C2) plus nurse home visitation during pregnancy (n=100) (2) same as (1) plus nurse home visitation during first 2 years of life (n=116)	(C1) sensory and development screening and referrals at 12 and 24 months (n=94) (C2) same as (C1) plus free transportation to regular prenatal and well-child visits (n=90)	400:315	(C1) and (C2) were combined for comparison. (2) who were unmarried and had low socioeconomic status reported fewer incidence of running away, fewer arrests, fewer convictions and violations of probation, fewer lifetime sex partners, fewer cigarettes smoked per day and fewer days having consumed alcohol in the previous 6 months than (C1/2) (1) and (2) parents reported fewer behavioral problems related to alcohol or drug use than (C1/2)
Olds et al. (1998), semirural New York State; 15-year follow-up of randomized trial	Long-term effects of nurse home visitation on maternal like course and child abuse and neglect	Women less than 25 weeks pregnant with no previous live births, who were one or more of the following: younger than 19 years, low socioeconomic status, or unmarried. Also any woman who asked to participate who had no previous live births.	(1) same as (C2) plus nurse home visitation during pregnancy (n=100) (2) same as (1) plus nurse home visitation during first 2 years of life (n=116)	(C1) sensory and development screening and referrals at 12 and 24 months (n=94) (C2) same as (C1) plus free transportation to regular prenatal and well-child visits (n=90)	400:324	(C1) and (C2) were combined for comparison. (1) and (2) unmarried, low socioeconomic status women had fewer subsequent pregnancies and live births and greater spacing between first and second births and used AFDC and food stamps fewer months than (C1/2) unmarried women with low socioeconomic status. They also reported being impaired in fewer domains by alcohol or drug use, having been arrested fewer times, having been convicted fewer times, and having spent fewer days in jail since the birth of their first child as well as fewer actual arrests and convictions. (2) was identified as perpetrators of child abuse and neglect in fewer verified reports than (C1/2).

## **Appendix D: Home Visitation Programs in Other Cities**

### ***Philadelphia’s Health Intervention Program, Tina McMichael, Director of Maternal and Child Health***

The City of Philadelphia’s Health Intervention Program (HIP) staffs both nurses and lay home visitors. It is a voluntary program for new mothers and infants. Anyone in the community can refer the mothers or a mother can request to participate. The mother receives an initial visit from a public health nurse who evaluates the child. If there are no additional medical concerns, a social worker may be referred to the family as well as a drug and alcohol counselor, if needed. A lay home visitor, a well-connected woman within the community with parenting experience, also visits the family at least once a month. The goal of this program is to identify at-risk families and put community resources in place to ensure that they do not become more involved in “the system.” Two teams of nurses and lay home visitors currently staff the program and divide the cases into two groups by zip code. Tina McMichael, Director of Maternal and Child Health, identifies the nursing shortage as a problem and indicates that they are understaffed. She also says there are problems with working moms and mobility, which make home visits more difficult. One of the biggest problems the program faces is the prevalence of drug-use by its clients and the instability that this activity produces. She says that they rarely receive a referral for a “normal” family. Most clients are teenage mothers and single mothers.

### ***City of Nashville/Davidson County Health Department’s Help Us Grow (HUG) Program, Sandra Kaylor, Director of Help Us Grow***

The City of Nashville/Davidson County Health Department’s Help Us Grow (HUG) program targets infants that are at high-risk socially, not just for infant mortality. The infants are identified through referrals from doctors, social workers, and child protective services. Public health nurses visit the families once a week for two to four months and then the visits slow to every other week and once a month at the nurses’ discretion. The visits can last from six months to several years. Four full-time nurses and one part-time social worker staff this program. The goal of the visits is to provide information to the families on how to get intervention for any development issues, ensure that the children get their immunizations, and to educate mothers regarding childcare. Sandra Kaylor, Director of HUG, identified drugs as the biggest challenge to this program. She stated that drug use makes the mothers unpredictable and distrustful of any visitors because they are afraid of getting into trouble.

### ***City of Cincinnati Health Department, Pat Handel, Head Nurse***

The City of Cincinnati Health Department has a team of 12 nurses that specialize in performing home visits to newborns. The team receives about 95 percent of its referrals from hospitals. One of the Department’s overall goals is to see each baby that is referred to its home visiting program within 48 hours after discharge from the hospital. When a doctor believes a family may need assistance with their newborn, he or she makes a referral to the health department. Nurses that perform home visits also work over

the weekends when a home visit is necessary to see infants within the 48-hour period after they were discharged.

***City of Baltimore Health Department, Sharon Runber, Director of Maternal and Child Health***

The Baltimore Health Department starts with clients before the baby is born and case manages moms for up to two years. Most of the referrals to the program come from primary care providers. The Department also tries to identify families that may need a home visit through data collection about the mother. Public health nurses act as case managers and work with the families' primary care providers. Each nurse is in charge of a census tract in the City. The Department also uses licensed social workers as resource people for families receiving home visits.

***Boston Public Health Commission (BPHC), Heavenly Mitchell***

The Boston Public Health Commission (BPHC) has 20 public health nurses and 13 public health advocates that perform home visits for newborns through its Healthy Baby/Health Child program. Referrals to the program come through health care providers, social services, and directly from families that believe they could benefit from a home visit. The public health advocates act as case managers for the families they visit and are not mandated to have a bachelor's degree in nursing. The BPHC, however, does require public health advocates complete a health education program that the Commission operates through their community health education center. The public health advocates work with the families to create a service plan, while the public health nurses administer the health screenings and provide medical services when necessary. The services they provide are very comprehensive and are provided free to children through age three. The success of their program depends upon active participation by its clients.

***City of Chicago Public Health Department.***

The Chicago Public Health Department employs around 70 public health nurses and conducts two types of home visits targeting high-risk infants. The first type of home visit occurs as part of a state-mandated program called the Adverse Pregnancy Outcome Reporting System (APORS). Hospitals statewide are required to report at-risk births, such as those involving low birth weight or congenital abnormalities, to local health departments. In Chicago, APORS cases are given six home visits over two years. A second type of home visit specifically targets certain high-risk neighborhoods, and is intended to address further risk factors based on referrals from hospitals and community health agencies. For APORS cases, home assessments and initial contacts are made by public health assistants and supported by public health nurses as necessary. For referral cases, a public health nurse or MSW must conduct the initial assessment and provide case management.

***City of Jacksonville/Duval County Public Health Department***

The Duval County Public Health Department, covering the city of Jacksonville, employs about 60 staff in its Healthy Start Program. This includes about 40 case managers and about 20 nurses. Either nurses or case managers can conduct home visits. The program is predominantly prevention oriented, focusing on teaching, referrals and family support. Healthy Start, while administered by the joint City-County Health

Department, is a statewide initiative. The State of Florida mandates universal screening for newborns with Health Department contact and collects data on infant mortality and program effectiveness. The program relies on referrals and community contacts through its five health centers to identify at-risk babies.