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## Fetal Infant Mortality in Kalamazoo

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FETAL INFANT MORTALITY IN KALAMAZOO

By

Lisa A. Wulschleger, WHNP., RN-C.

A THESIS

Submitted to

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## ABSTRACT

### FETAL/INFANT MORTALITY IN KALAMAZOO

By

Lisa A. Wullschleger

The purpose of this retrospective study was to examine the incidence rates of five, preselected perinatal variables that existed within the white and non-white groups of fetal/infant deaths that occurred in Kalamazoo County between January 1, 1995 and December 31, 1997. The variables were prenatal care, birth weight, estimated weeks of gestation, and maternal/fetal/infant medical complications. The question posed was as follows: Is there a difference in incidence rates of the variables between the white and non-white perinatal deaths in Kalamazoo County?

A sample size of 50 cases was studied. Kotelchuck's instrument tool (1994), the Adequacy of Prenatal Care Utilization Index, was used. The author's Audit Tool was used to collect data from abstract birth certificates and death certificates. Neuman Systems Model (1989, 1995) theoretical framework was utilized. The findings of this study indicated no significant, statistical differences between the non-white and the white population in prenatal care, birth weight, estimated weeks of gestation, and maternal/fetal/infant medical complications.

## DEDICATION

This thesis is dedicated to my husband, Richard, for his never ending love, continual encouragement, support, and perseverance throughout this entire process.

This work is also dedicated to my children, Renee, Dawn, Richie, Robbie and Kelly, for their love, patience and endurance.

Last, but not least, I would like to thank my mother, Florence, and father, Henry, mother-in-law, Gussie, and the many family members and friends who have assisted by helping my family during this entire process.

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## CHAPTER 1

### INTRODUCTION

Despite the numerous prenatal programs currently available in Kalamazoo County, there is a growing disparity in fetal infant mortality between the African American (non-white; black) and the Caucasian (white) populations. In 1995, Kalamazoo County had the highest African American infant mortality rate in the state of Michigan (James & Deibel, 1996). At that time, Kalamazoo County's African American infant mortality rate for 1995 was 29.7 deaths per 1,000 live births as compared to 6.5 deaths per 1,000 live births for the Caucasian community. This resulted in a 4.5 black to 1.0 white ratio (James & Deibel, 1996 & Office of the State Registrar and Division of Health Statistics, 1997).

In the years 1990 through 1997, the overall infant mortality rate for Kalamazoo County fluctuated yearly and ranged from a high of 11.4 in 1991 to a low of 5.1 in 1994. The overall infant mortality rate, as shown in Appendix A, decreased in 1996 and 1997. White infant mortality rate ranged from a high of 8.9 in 1996 to a low of 3.4 in 1994 and the black infant mortality rate ranged from a high of 29.9 in 1991 to a low of 12.9 in 1994 with a major increase in 1995 (Office of the State Registrar and the Division of Health Statistics, 1997 & Division for Vital Records and Health Statistics, 1998).

Due to the yearly fluctuations in both the infant mortality rate and the black to white ratio, the Fetal Infant Mortality Review Task Force of Kalamazoo County

suggested using three year average rates to minimize the risk of interpreting year to year fluctuation as changes in the trend. The Task Force believed three year averages of infant mortality would reveal trends more clearly than would yearly figures (Fetal Infant Mortality Review Task Force, 1997).

The overall infant mortality rate for the state of Michigan for 1995, 1996, 1997 was 8.3, 8.0, and 8.1 respectively (Division for Vital Records and Health Statistics, 1998). The white infant mortality rate ranged from 6 to 6.2 as compared to the black infant mortality rate range of 17.3 to 17.6. (See Appendix B, Division for Vital Records and Health Statistics, 1998). Michigan's overall infant mortality rate of 8.1 for 1997 was higher than the national provisional infant death rate of 7.0, as shown in Appendix A. The 1997 overall infant mortality rate for the nation by race was not available for comparison (Division for Vital Records and Health Statistics, 1998).

In conclusion, the overall infant mortality rate in Kalamazoo County was substantially higher than it was for the state of Michigan or the nation. The non-white infant mortality rate of Kalamazoo County has never been so high for a community with so many medical and social resources. The disparity between the white and non-white communities was a local issue that needed to be resolved.

Perinatal variables contributed more to explaining infant mortality than any other single category of factors according to the Fetal, Infant, Mortality Review Task Force (1997). The contributing perinatal factors were lack of, or late entry into prenatal care, low birth weight, preterm deliveries, smoking, use of addictive substances, lack of adequate nutrition, lack of education, lack of economic and or social support, and poor

general health status (James & Deibel, 1995). These variables were more prevalent among the African American population in the Kalamazoo study. Identifying perinatal variables that have a higher incidence among non-white fetal/infant deaths than among white fetal/infant deaths is an important step toward reducing the disparity between non-white and white fetal/infant deaths.

### PROBLEM STATEMENT

The problem addressed in this study, was the disparity in fetal/infant mortality rates between races in Kalamazoo County, and in the state of Michigan, and in the United States. Why, as a county, state, and nation are we losing so many of our African American population at such a young age? Many researchers have investigated the disparity between races and likewise have identified differences in frequency of perinatal variables between the races (Fowler, 1995; Kogan, Kotelchuck, Johnson, 1993; La Veist, Keith, Gutierrez, 1995; Michielutte et al., 1994). Identifying a source of disparity could lead to a plan for preventing the problems in affected populations.

### PURPOSE

The purpose of this study was to examine the incidence rates of five, preselected perinatal variables that existed within the white and non-white groups of fetal/infant deaths that occurred in Kalamazoo County between January 1, 1995 and December 31, 1997. The data analysis generated may provide a better understanding of the contributing factors of fetal/infant deaths in Kalamazoo County. In addition, this information can be used to develop a program to reduce or eliminate contributing factors to prevent further fetal/infant deaths.

An intensive community review process known as Fetal Infant Mortality Review (FIMR) was a separate study that occurred in Kalamazoo to examine fetal infant mortality specifically in the African American community. Unfortunately, data generated from this study will not be available to the public until it is published. It would be interesting to compare the results of the FIMR study to this one.

## CHAPTER 2

### LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

#### Literature Review

The following comprehensive literature review represents retrospective research that studied several different variables in an attempt to determine the key to disparity among races in fetal infant mortality. Various methods of establishing criteria to measure prenatal care were explored and compared as were the utilization of different instruments.

Factors influencing disparity. During an eleven year period, Herschel et al. (1995) studied the causes of fetal death in a black population with a sample size of 315 in Chicago, Illinois. Of the 315 fetal deaths, the researchers reviewed 253. Herschel et al. examined fetal death and defined criteria for their study as fetal weight to be equal to or greater than 500 grams and gestational age to be equal to or greater than 24 weeks. Herschel et al. found that the black fetal mortality rate was 11.7 per 1000 live births. These researchers compared their results with the results of a Canadian study based on a white population with a sample size of 153. The Canadian study reported the white fetal mortality rate as 5.1 per 1000 live births.

Herschel et al. (1995) determined that complications in pregnancy contributed to a 15% increase in black fetal mortality when compared to the white infant mortality in the Canadian study. In addition, Herschel et al. found that complications involving hypertension were nine times greater for the black population than for the white



population. Abruption placentae was another frequent cause of fetal death. Eighty percent (n=203/253) of the fetal deaths, occurred under 37 estimated weeks of gestation and 38% of those deaths under 28 estimated weeks of gestation. One third of the fetal deaths under 28 estimated weeks of gestation resulted from premature rupture of membranes or premature labor. Another finding was that one tenth of the black mothers in the sample did not receive any prenatal care. Herschel et al.'s work added to the study of contributing factors. This report did not contain data on the quality of prenatal care.

Fowler (1995) investigated barriers which influenced access to, and the participation in, early and ongoing prenatal care in African Americans. Fowler noted the infant mortality rate for African Americans was 2.5 times that of the Caucasian population. This study found that a major cause of infant mortality was low birth weight, which was proportionate to premature delivery. Other findings revealed fewer African Americans than Caucasians received care during the last 3 months of pregnancy or had no prenatal care at all. This finding was especially true among African American teens. Fowler postulated that by receiving early and ongoing prenatal care, African Americans could improve fetal weight and therefore decrease fetal/infant deaths.

In another study examining racial differences of fetal/infant mortality in North Carolina, infant mortality was reported to be 10.5 per 1,000 live births in a sample size of 4,754 (Michielutte, Moore, Meis, Ernest, & Wells, 1994). The researchers used ultrasound surveillance and the date of the last menstrual period as the measurement for gestational age. They defined low birth weight as less than 2,500 grams and very low birth weight as less than 1,500 grams. The researchers found that complications leading to preterm births were hypertension or hemorrhage from abruption placentae. Identified

with these were complications associated with the induction of labor or the birth of the infant. Deaths of black infants, during the first year of life, were slightly less than twice that of white infants from endogenous causes such as genetic make-up or internal physiological processes. The researchers reported that using appropriate prenatal measures along with continuous prenatal care might prevent these endogenous factors. The authors also suggested that a lower mean birth weight might actually reflect a normal birth weight for black infants rather than deprivation or genetic differences.

Michielutte et al. (1994) concluded that a reduction of low birth weight, especially very low birth weight, along with increased prenatal care, would be effective in preventing mortality. Michielutte et al. also concluded race may or may not be a factor. Further study would be needed to determine if this was truly the norm for this particular group.

Adequacy of prenatal care initiation as it relates to mortality. Kogan, Kotelchuck, and Johnson (1993) studied the racial differences in late prenatal care. Their data were based on the Massachusetts Prenatal Care Survey used in an ex post facto study among a sample of 2,349 postpartum women. A measurement tool previously developed by Kotelchuck was compared to the well-known Kessner Measurement Tool (Perloff & Jaffee, 1997). Kogan et al. found the number of prenatal visits for black women, especially in their eighth and ninth month of pregnancy, were less than the number of visits for the white women. Beginning at 37 weeks gestation, the number of prenatal visits increased for white women until week 42, while the number of visits for black women tapered at 39 weeks. In addition, the researchers noted a higher incidence of premature births in the black community as compared to the white community. Eleven

and two-tenths percent of the black women in this study had premature births as compared to 7.4% of the white women.

Differences in prenatal care visits were noted between public versus private funding. The women in publicly funded programs had less prenatal care than did those in privately funded programs. Where Medicaid was solely used for prenatal coverage, black women averaged 4.0 visits in the eighth and ninth month as compared to white women who averaged 5.3 visits.

Kogan et al. (1993) provided valuable information regarding documented differences in the number of prenatal visits, especially in the last months of pregnancy, between black and white women. However, because Kogan et al. used a self-report instrument among women post delivery, one could challenge the memory of the subjects for accuracy. Furthermore, there may be bias among the authors regarding the adequacy of their research instrument and measured results.

Infant mortality. In 1991, a condition was noted in a rural midwestern area that mirrors the increased fetal/infant death rate of Kalamazoo County. The Report of the ad hoc committee on infant mortality of the Calhoun County Board of Health (1991) was a convenience ex post facto study with a sample number of 261. The researchers discovered the black infant mortality rate was 24.8 as compared to 14.1 for white infant mortality. As such, the black infant mortality rate approached seventy-five percent more than whites. The researchers determined that the higher mortality rate among blacks was related to prematurity and low birth weight, age of mother, late entry into prenatal care, prenatal visits of 10 or less, and low income. There were no defining parameters for prematurity. Low birth weight was defined as less than 2,500 grams (5.5 pounds) and very low birth weight as less than 1,500 grams (3.5 pounds). The quantity and quality of

prenatal care were documented as factors at birth. The usefulness of this research to this study was that it was completed in a community adjacent to Kalamazoo County. A follow up study to determine if any other factors could be involved is in progress at this time by the Calhoun County Board of Health.

Adequacy of received services as it relates to mortality. LaVeist, Keith, and Gutierrez (1995) conducted a study on the predisposing and enabling factors that affect African American and Caucasian women in utilization of prenatal care services. The sample of 1,772 women was conducted by the Michigan Department of Public Health. The survey questionnaire was given to all Michigan hospitals that had obstetrical services. Prenatal care utilization was measured by the total number of prenatal contacts, the month care was initiated by the mother, and the adequacy of care received. The predisposing factors included marital status, age, education, and income. The enabling factors included health insurance, distance traveled to receive prenatal care, and the availability of clinics. The researchers found that the enabling factors accounted for differences in the initiation of prenatal care, but not for the total number or the adequacy of care received. The researchers also noted that increased education, greater availability of clinics, and the change from Medicaid to private insurance reduced the disparity between the two races. The researchers suggested further study was needed to determine racial disparity in prenatal care utilization. The focus of this study is important regarding initiation of prenatal care including enabling and predisposing factors. Other areas are left for future study.

Birth weight as it relates to mortality. DeBaun, Rowley, Province, Stockbauer and Cole (1994) investigated the relationship of race, infant weight and infant death to determine prevalent medical complications. Information was retrieved from birth

certificates and maternal hospital discharge data in a sample size of 49,759. Very low birth weight was associated with four maternal medical complications: premature rupture of membranes, preterm labor, hypertensive disorders, and hemorrhage.

DeBaun et al. (1994) discovered very low birthweight ( $< 1,500$  gm.) occurred among 2.4% for black infants and among 0.8% for white infants. Normal birthweight infants ( $\geq 2,499$  gm.) occurred among 87.8% for black infants and among 95.3% for white infants. Black mothers with normal birthweight infants, had a higher rate of gestational diabetes, diabetes mellitus, essential hypertension, pregnancy induced hypertension, and urinary tract infections as compared to white mothers with normal birthweight infants. White mothers with very low birthweight infants, had a higher rate of diabetes mellitus, essential hypertension, pregnancy induced hypertension and urinary tract infections as compared to black mothers with very low birthweight infants.

The researchers reported their study was limited by their inability to define each medical complication and the inability to account for conditions that might have occurred earlier in the pregnancy, but were resolved. DeBaun et al. (1994) concluded that complications do contribute to the risk of very low birth weights and vary in estimated effects by race. Further research was recommended to examine differences in regards to very low birth weight and medical complications in both white and black populations.

Fetal mortality. Ferguson and Myers (1990) used fetal death and altered fetal growth to predict the risk of stillbirth in a sample of 782,430 births. The researchers used two different tools to formulate the risk of a stillborn: the Race Specific Mean Birth Weight and the Denver System. The researchers calculated the number of live births and the number of fetal deaths, as well as statistics on birth weights, for each gestational group. The births and deaths were grouped according to gestational age group, noting

that, as the birth weight decreased, the fetal death rate increased in an exponential manner. The black fetuses demonstrated an increased sensitivity to factors adversely affecting growth than did the white fetuses at 34 estimated weeks of gestation, resulting in an increased risk for stillbirth.

This study employed an interesting concept to measure fetal weights at various gestational ages in an attempt to predict the number of fetal deaths in both groups. In comparing data from the Race Specific Mean Birth Weight and the Denver System, the researchers were able to make a distinction between the black and the white populations. The homogenous data through the gestational grouping were completed for both races, thereby making the study as neutral as possible. Further research using these tools would contribute to this body of knowledge.

Delke, Hyatt, Feinkind, and Minkoff (1988) conducted a retrospective study of 133 cases (95 stillbirths and 38 neonates) to determine the cause of death in an inner city setting. They divided the cause of death into avoidable and nonavoidable categories. These researchers attempted to determine the criteria of each category. Delke et al. attributed avoidable causes of fetal/infant mortality to maternal or social issues. Avoidable maternal issues were failure to diagnosis obstetric causes, failure to respond to abnormal fetal heart patterns, maternal/social issues, quality of neonatal care and noncompliance. Avoidable social issues included low economic status, lack of utilization of prenatal clinics, general health status where chronic conditions led to anoxia, and inappropriate responses of providers. Nonavoidable death issues were cord prolapse, perinatal asphyxia and group B streptococcal sepsis. The researchers discovered that 71% of the perinatal deaths were stillbirths. Nonavoidable factors accounted for 27% (26/95) of the stillborn deaths. Out of these twenty-six stillbirths, fifteen deaths were

categorized from low-risk clients with adequate prenatal care, six deaths were attributed to acute abruption placentae and five deaths were related to cord accidents.

Delke et al. (1988) found that avoidable causes were more prevalent than nonavoidable in fetal/infant deaths. A bias of this study maybe that all the researchers were physicians. The study focused on the physician's responsibility to meet the needs of the community rather on the responsibility of other community providers, such as nurses for example as part of a community team. Delke et al. concluded that more often than not, there were more causes to fetal/infant death than was at first apparent. Further research is needed.

In summary, this review of literature reveals that there are higher numbers of maternal and fetal predisposing factors to fetal/infant deaths in the non-white population than in the white population. Several studies examined perinatal care as a factor affecting pregnancy outcome. The literature revealed no consistent measurement of prenatal care. The studies used several different instruments, and established criteria for both birth weight and estimated weeks of gestation. Some studies showed an effect of one or more medical complications and their relationship to race. Several studies grouped the variables together, while others focused on a single variable. The studies were retrospective in nature, accomplished by reviewing birth and death certificates, review of medical records, and questionnaires. Researchers examined other variables as well in the attempt to determine the key to fetal/infant mortality.

### Conceptual Framework

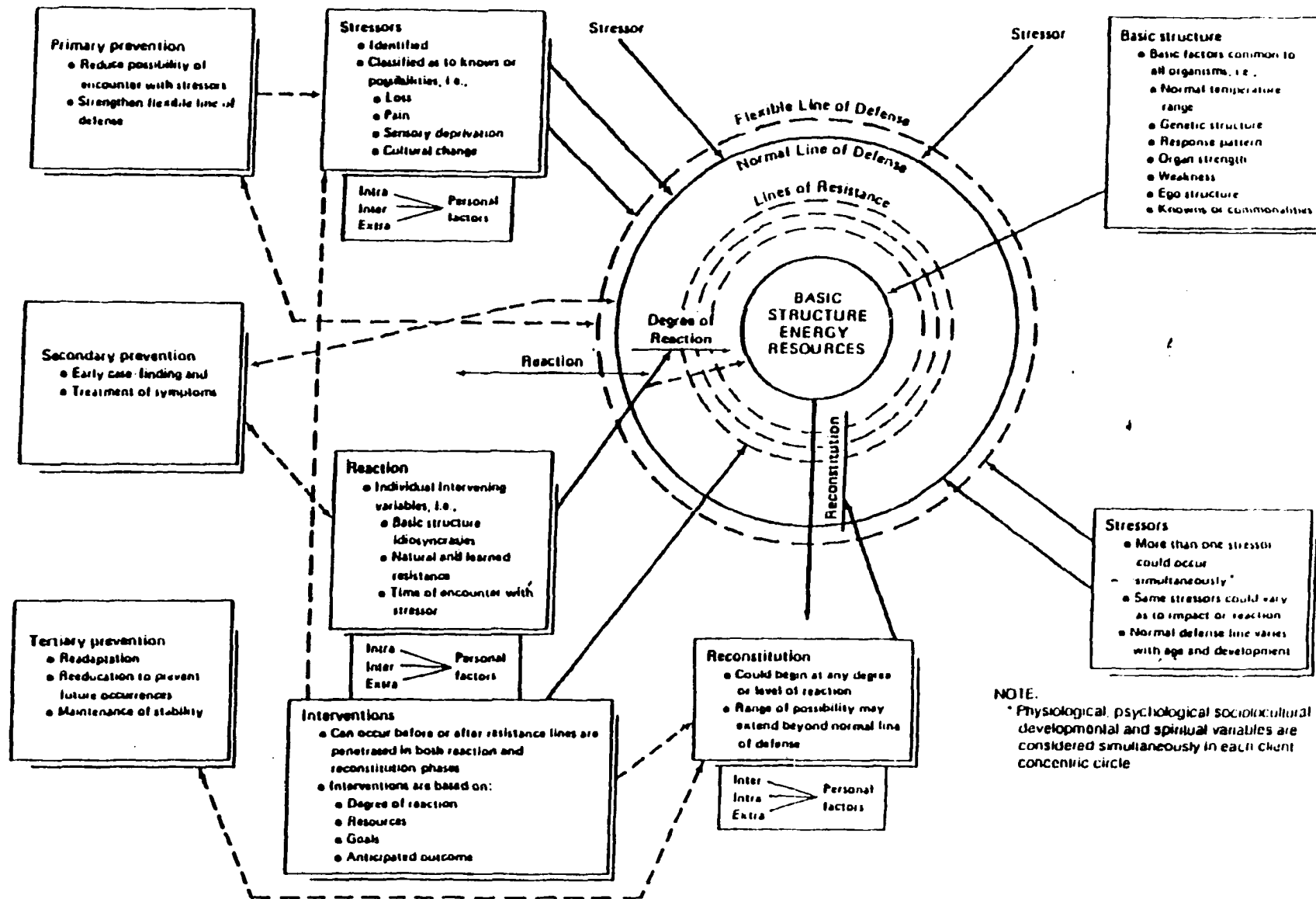
Neuman Systems model. Neuman Systems Model (1989, 1995) was the theory chosen to assist in guiding the research for this project. Permission to use the model was granted by Betty Neuman (Appendix C). The model was applied to the topic of

fetal/infant mortality by viewing the pregnant woman as a system of variables that interact with the surrounding internal and external environment. This combination focused on stressors as they impact on the woman's health. The primary function of the woman's physiological changes of pregnancy is to protect the core or fetus by establishing a series of protective layers or mechanisms. As the stressors are exposed to the fetus/infant, a series of stress reactions and stress reductions occur. When continued stressors occur, the protective layers are activated. When the lines of defense and reactions become exhausted, the fetus/infant has a greater risk of dying if not rescued.

Neuman's major concepts are person, health, illness, environment, and nursing. Person is viewed as an "open system searching for balance and harmony" (Chitty, 1997, p. 223; Neuman 1995). A person's variables include physiological, psychological, sociocultural, developmental, and spiritual aspects. Physiological variables are those that correspond to structure and body function. Psychological variables are the mental processes and relationships. Sociocultural variables are system functions related to social-cultural expectations. Developmental variables are processes concerning life's development. Last are the spiritual variables that are formed by spiritual beliefs according to George (1995).

Neuman defines health as "dynamic equilibrium of the normal line of defense" (Chitty, 1997, p. 223; Neuman, 1995) (Figure 1). Neuman writes that illness is "caused by reaction to stressors with lines of resistance" and the environment is the "internal and external stressors and resistance factors" (Chitty, 1997, p. 223; Neuman, 1989). Nursing is the "reduction of stressors through prevention activities at three levels" (Chitty, 1997, p. 223; Neuman, 1995).





**Figure 1. The Neuman Systems Model.** Original diagram copyright: 1970 by Betty Neuman [Note: From *The Neuman Systems Model*. (2nd Ed.) (p. 26) by B. Neuman, 1989, Norwalk, CT: Appleton & Lange]

The model focuses on stress reaction and stress reduction of the whole person. Included in the model are human variables, basic structure, energy resources, lines of resistance and defense, stressors, and the reaction to these stressors (George, 1995). When these variables are in harmony, there is stability in relationship to internal and external environments. Neuman's Systems Model strives for optimal system stability (George, 1995).

The client system is bombarded constantly by environmental stressors and is represented by Neuman as a "series of concentric buffers" that minimize the impact of the stressors and serve as a safety zone for the core (Alligood & Marriner-Tomey, 1997, p. 110). The healthier the client system, the greater the protection offered by the safety zone.

The basic structure or core and energy resources that supply it represent the client and are surrounded by the series of concentric circles. Each circle represents a line of defense whose main purpose is protection of the core and to assure stability for the system (Reed, 1995).

The flexible line of defense. The ring known as the Flexible Line of Defense is the outer boundary. It protects what is considered the usual state of client wellness from being compromised. It is the first line of defense of environmental stressors and has an "accordion-like effect in the healthy client system" (Alligood, & Marriner-Tomey, 1997, p. 111). The action of the line is expressed by expanding or contracting to the client's needs. The Flexible Line of Defense expands to provide increased protection and it contracts when less protection is needed (Reed, 1995). The amount of buffering exhibited corresponds directly to the type, amount, and strength of the stressors and the amount of energy within. As the number of stressors and the strength increase, the buffer

system becomes “hard pressed” to avoid colliding with the client’s normal functioning (Reed, p. 528). Included in this ring are the variables related to the physiologic, psychologic, sociocultural, developmental, and spiritual aspects.

The normal line of defense. The Normal Line of Defense is considered the client’s baseline or wellness level, which develops over time, varies with age and development, and is affected by internal and external factors. External factors are chronic influences such as pollution and altitude. Internal factors are related to health behaviors, lifestyle, and cultural influences. The Normal Line of Defense is a standard determined by the result of the client’s interaction with environmental stressors and/or coping skills. When a stressor breaks through the Flexible Line of Defense, and makes contact with the Normal (core) Line of Defense, a reaction results within the client’s system. As the reaction continues, instability occurs and symptoms may develop relating to a disease process (Reed, 1995).

Lines of resistance. Lines of Resistance are those rings closest to the core and act as the life-protecting buffer protecting the basic structure or core. An involuntary activation of this line occurs when a stressor invades the Normal Line of Defense. Stressors, as defined by Neuman (1989), are tension producing stimuli with the potential for causing disequilibrium. More than one stressor may be imposed upon the client at any given time. If the Lines of Resistance have effective protection covering the core, reconstitution takes place and the system returns to a steady, healthy state. However, when the Lines of Resistance are ineffective, death of the system may occur (Reed, 1995).

Possible stressors threatening this integrity are known as intrapersonal, interpersonal, or extrapersonal factors. All three may occur at one time. Intrapersonal

stressors are those forces that occur internally or within the boundary of the client. An example would be a medical condition. Interpersonal stressors are those forces, that occur externally, or outside the client's boundary, but at close range. An example is role expectations, such as not receiving early prenatal care. Extrapersonal stressors are also external forces, which occur outside the client's boundary, but at a distal range, for example, social policy, which prevents access to care (Alligood & Marriner-Tomey, 1977; George, 1995; Reed, 1995).

Application of the Neuman Systems model. Pregnancy is a series of events, which focuses on the organized growth and development of a fetus over a period of time. Pregnancy could also be considered a disequilibrium to a woman's physiologic, psychologic, socioculture, developmental, and spiritual aspect. The main function of the maternal system is to protect the integrity of the fetus at all cost. It does so automatically, independently, and indiscriminately.

Pregnancy can also be thought of as disequilibrium of the normal body processes. For example, while various chemical values for a nonpregnant woman would be considered outside the expected range, these same chemical values would be considered inside the expected range for a pregnant woman. As stressors approach the Flexible Line of Defense (Figure 1), their accordion like effect automatically turn on a defensive and a protective action. This action may or may not be effective. As additional stress becomes prevalent, the Flexible Line of Defense begins to limit the lines of re-adjustment. The escalation in stressors causes even further damage to the core or the fetus/infant, which may be beyond repair. The Lines of Resistance, better thought of as the life protection buffer levels, are where the basic survival factors are located. Fetal/infant death now has the opportunity to prevail. The stability of pregnancy, which

has previously protected the fetus/infant, is threatened. As the pregnancy becomes unstable, the energy sources needed to survive decrease. As a series of concentric protective mechanisms falter, the energy and lifeline of the fetus/infant fail.

The study variables, as they relate to Neuman's Systems Model, were prenatal care, birth weight, gestational age, one or more medical complications, race, and fetal/infant death (Figure 2). Neuman's category of stressors also could include pregnancy and prenatal care in this study. The Normal Line of Defense includes race and general health status related to medical complications. Under dynamic equilibrium and core integrity were the following: birth weight, gestational age, and fetal/infant outcome.

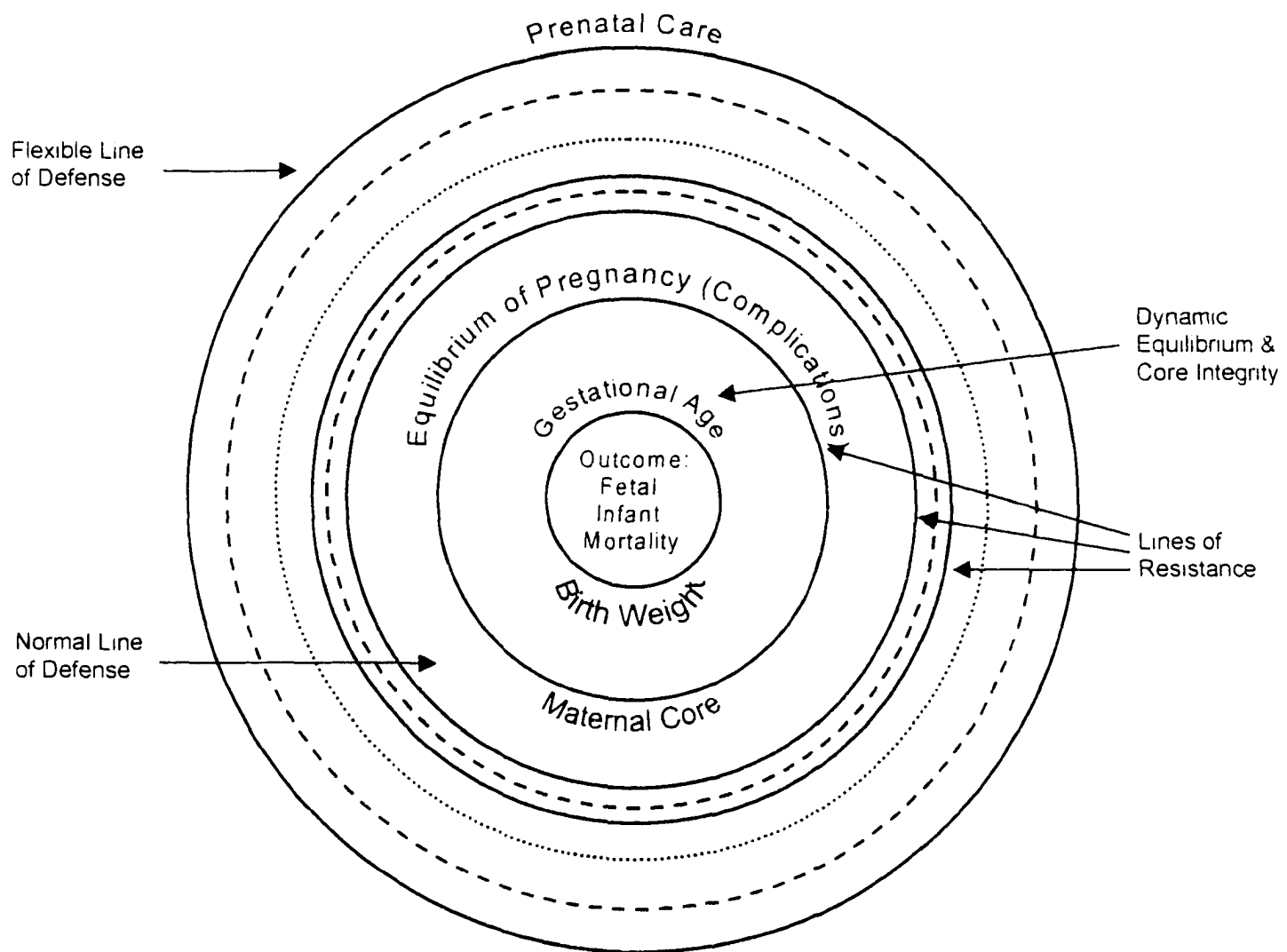


Figure 2: Study variables applied to Neuman's Conceptual Model

Neuman postulates that reducing external and internal stressors will reinforce the flexible line of defense and promote health. For this study, receiving adequate prenatal care will promote a healthy pregnancy and lead to a healthy delivery. More specifically, adequate prenatal care can reduce the number of complications during pregnancy for individuals who are African American or Caucasian and lead to normal gestational age and weight at birth, thereby reducing the incidence of fetal infant death (See Table 1).

In summary, the previous review of the literature supports the need to examine the relationship of those stressors that penetrate the flexible line of defense, lines of defense, and lines of resistance, leading to fetal death. Once these factors have been identified for Kalamazoo County, intervention studies should be developed to reduce fetal infant deaths in African Americans residing in Kalamazoo.

Table 1

#### Neuman's Application of Theory

##### Neuman's Theory

↓ Internal and External Stressors	↑ Flexible Line of Defense	Promotes Health
↓	↓	↓
↑ Prenatal Care to African American Women	Reduce Maternal Fetal Infant Complications	Reduce Fetal Infant Deaths
↓	↓	↓
Review Abstract Birth and Death Certificates Note date of initiation of prenatal care and number of visits Note date of death	Review Maternal Fetal Infant Complications	Gestational Age Birth Weight

### Research Problem

The research problem addressed in this study was the disparity in fetal/infant mortality rates between African American and Caucasian races in Kalamazoo County. Specifically, this study will examine prenatal care, birth weight, estimated weeks of gestation (age), and maternal/fetal/infant medical complications, as they occurred in cases of fetal/infant mortality in the non-white population as compared to their rate of occurrence in the white population of Kalamazoo County.

### Research Questions

1. Is there a significant difference in adequacy of prenatal care initiation between non-white and white fetal/infant deaths in Kalamazoo County during the three year period of 1995 through 1997?
2. Is there a significant difference in adequacy of received services (visits) between non-white and white fetal/infant deaths in Kalamazoo County during the three year period of 1995 through 1997?
3. Is there a significant difference in birth weights between non-white and white fetal/infant deaths in Kalamazoo County during the three year period of 1995 through 1997?
4. Is there a significant difference in estimated weeks of gestation (age) between non-white and white fetal/infant deaths in Kalamazoo County during the three year period of 1995 through 1997?



5. Is there a significant difference in numbers of maternal/fetal/infant medical complications between non-white and white fetal/infant deaths in Kalamazoo County during the three year period of 1995 through 1997?

#### Variable Definitions

Prenatal Care: Care initiated during the first 4 to 11 weeks of gestation.

Late Prenatal Care: Care initiated after the first 12 weeks of gestation.

No Prenatal Care: No care initiated by the mother during pregnancy prior to labor.

Adequacy of Prenatal Care Utilization Index (APNCU Index): A prenatal care utilization instrument developed by Dr. Milton Kotelchuck (1994).

Adequacy of Prenatal Care Initiation: The adequacy of the timing of initiation of prenatal care, in terms of months (Kotelchuck, 1994).

Adequacy of Received Services: The adequacy of received prenatal visits during the time period after prenatal care is begun until the delivery, in terms of number of visits (Kotelchuck, 1994).

Summary of Adequacy of Prenatal Care Utilization Index: The combined results of adequacy of prenatal care initiation and adequacy of received services.

Birth Weight: The fetal/infant weight at birth measured in grams.

Estimated Weeks of Gestation: The number of completed weeks in fetal development counting from the first day of the last normal menstrual cycle (Lowdermilk, Perry & Bobak, 1997).

Maternal/Fetal/Infant Medical Complications: Medical risk factors occurring during pregnancy in which the life of the mother, fetus or neonate, is jeopardized by a disorder coincidental with or unique to pregnancy (Lowdermilk, Perry & Bobak, 1997).

Race: White (Caucasian) and non-white (African American (black) & Asian).

Fetal/Infant Mortality: Death of a fetus/infant after 24 weeks gestation through the first 364 days of life.

Abstract Birth Certificate: A Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics Hospital Worksheet for birth information.

Abstract Death Certificate: A Michigan Department of Public Health, Office of the State Registrar and Center for Health Statistics Hospital worksheet for death information.

## CHAPTER 3

### METHODOLOGY

#### Design

This descriptive study was designed to examine the incidence rates of five, preselected perinatal variables that existed within the white and the non-white groups of fetal/infant deaths that occurred in Kalamazoo County. Fetal/infant mortality rates were determined for each of the two races. The incidence rates of prenatal care, birth weight, estimated weeks of gestation, and multiple medical complications were calculated within each racial group. An ex post facto design was used in a retrospective search to focus on the past life experience of African American and Caucasian pregnant women who experienced a fetal/infant death in Kalamazoo County from 1995 to 1997. Abstract birth certificates of all African Americans and Caucasians during the years studied were collected at the Kalamazoo County Human Services Department and reviewed. Since abstract birth certificates and death certificates were a matter of public knowledge, these were accessible. The use of the abstract birth certificates eliminates threats to internal validity such as recall bias and transcription error.

A problem identified was that the components of the abstract birth certificate may be subject to reporting bias. Bias can result from the person completing the abstract birth certificate, although she/he has usually been educated on the correct procedure, or the

parent providing the information. For the purposes of this study, however, the information on the abstract birth certificates was regarded as correct.

Another problem may be the possibility of insufficient information on the abstract birth certificate. Alexander, Tompkins, Pererson, and Weiss (1991) suggested that it is "unwise to categorize cases with missing prenatal care or gestational age data in the inadequate care group" (p.1015). Adequate care may have been provided, but just not documented. The researchers suggested against categorizing these cases as having inadequate prenatal care. Therefore, for purposes of this study, abstract birth certificates with more than two areas of data missing were to be eliminated from the study. No abstract birth or death certificates needed to be eliminated.

### Sample

All white and non-white fetal/infant deaths from January, 1995 through December, 1997, in Kalamazoo County, were selected for the study population. Criteria for selection in this sample were single gestations, fetal deaths that occurred at 24 estimated weeks of gestation or later, and infant deaths up to 364 days of life after birth.

There were a total of thirty fetal/infant deaths in 1995: sixteen were white, and fourteen were non-white. In 1996, Michigan Department of Community Health statistics listed 28 fetal/infant deaths, twenty-three of which were white and five were non-white. However, only 24 abstract birth and death certificates were located. A computer search for the missing four abstract birth and deaths certificates was completed by the director of the Fetal Infant Mortality Review (FIMR) but none were found. Michigan Department of Community Health statistics for 1997 listed 27 fetal/infant deaths, consisting of

twenty-one whites, five non-whites, and one “other.” However, 29 abstract birth and death certificates were located. A total of 83 abstract birth and death certificates were reviewed. Of these reviewed, 31 were eliminated from the study because they were less than 24 estimated weeks of gestation and two more were eliminated because of multiple gestations over 24 gestational weeks. The resulting number of fetal/infant deaths which fit the study criteria was 50 (n).

### Instruments

The audit tool. The first instrument, an audit tool developed by the author after a review of literature, was used and contained all the study variables as well as additional demographic variables (Appendix D). The study variables were adequacy of prenatal care initiation, adequacy of received services, birth weight, estimated weeks of gestation at birth and or at time of death, maternal, fetal, and neonatal medical complications, and race of infant documented at birth.

The demographic variables studied were infant gender, infant date of birth, maternal date of birth, maternal race, maternal education, payment of services, date of last normal menses, month pregnancy prenatal care began, total prenatal visits, date of last birth, number of live births, number of terminations, date of last termination, medical risk factors, use of tobacco, alcohol, and drugs, method of delivery, abnormal condition of newborn, date of death, and age at death.

The audit tool was categorically coded so that no identifiable information would be listed and no possible link would exist to identify the name of any individuals with the data. To insure reliability of the audit tool, a second researcher was asked to audit 10

birth certificates using the same audit tool. Data from the second researcher was analyzed and revealed inter-rater reliability of 100 percent.

Prenatal care utilization instrument. The Adequacy of Prenatal Care Utilization (APNCU) Index was developed by Dr. Milton Kotelchuck to characterize prenatal care utilization on two independent and distinctive dimensions, the Adequacy of Prenatal Care Initiation and the Adequacy of Received Services. The two dimensions combined form The Summary of Adequacy of Prenatal Care Utilization Index (Alexander et al., 1991; Kogan, Kotelchuck, Johnson, 1993; Kotelchuck, 1994) (Figure 3). Permission to use the instrument was obtained (Appendix E).

The first dimension, the Adequacy of Prenatal Care Initiation, specifically addresses the time prenatal care was initiated. Time is documented according to the gestational month prenatal care begins and is consolidated into four categories as follows:

Adequate Plus	1 <sup>st</sup> and 2 <sup>nd</sup> month
Adequate	3 <sup>rd</sup> and 4 <sup>th</sup> month
Intermediate	5 <sup>th</sup> and 6 <sup>th</sup> month
Inadequate	7 <sup>th</sup> through 9 <sup>th</sup> month, or no prenatal care

The second dimension, the Adequacy of Received Services, addresses the adequacy of the prenatal care visits once care began. The dimension is calculated by the observed number of visits divided by the expected number of visits (Figure 3).

## ADEQUACY OF PRENATAL CARE UTILIZATION INDEX

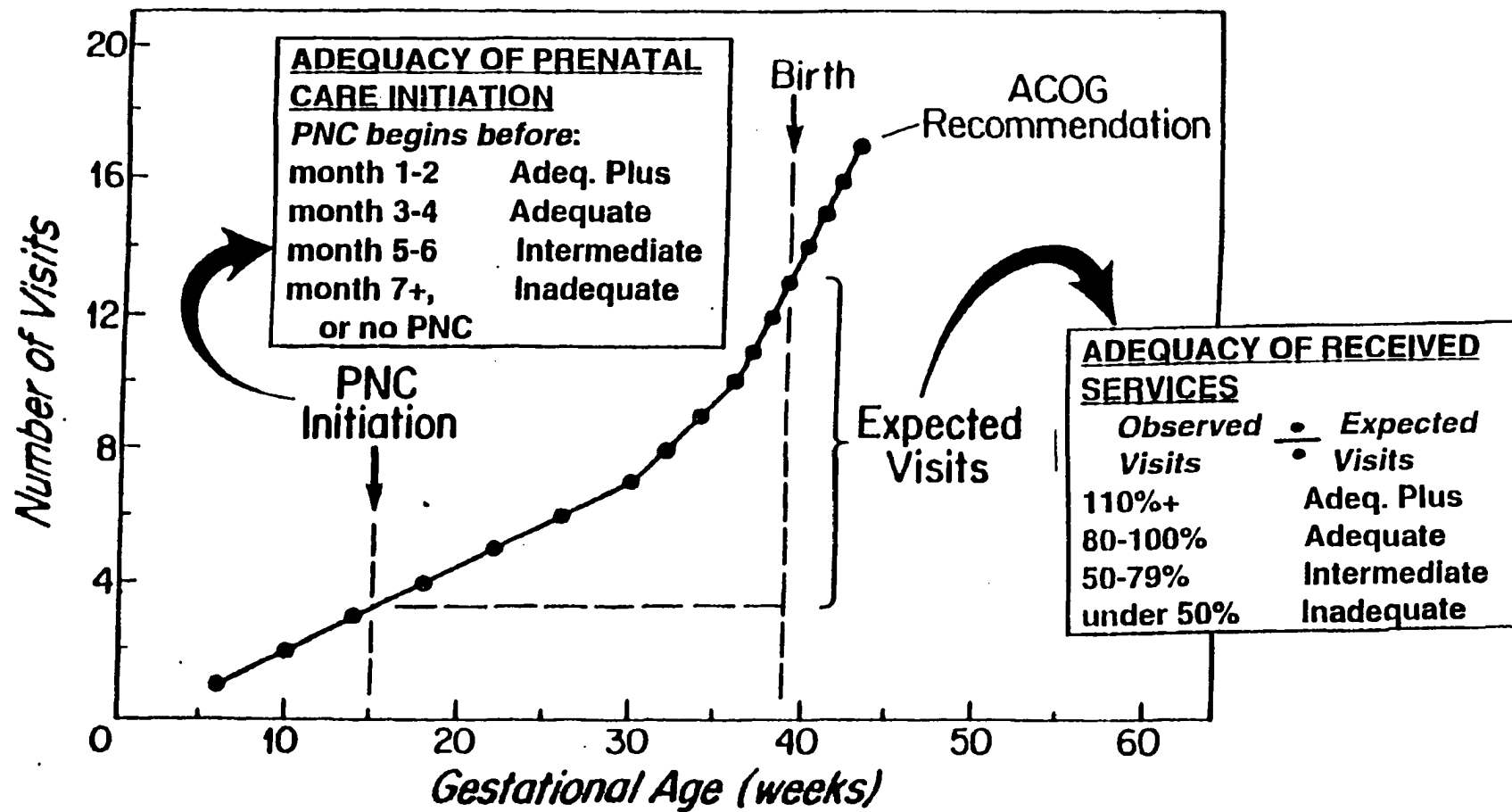


Figure 3 Adequacy of Prenatal Care Utilization Index, 1994 by M. Kotelchuck.

The scale for the 2<sup>nd</sup> dimension was as follows:

OBSERVED VISITS divided by the EXPECTED VISITS

Adequate Plus	$\geq 110\%$
Adequate	80-109%
Intermediate	50-79%
Inadequate	$\leq 50\%$

The Summary of Adequacy of Prenatal Care Utilization Index, which was not used for this study, combined the above two measures into four categories:

Adequate Plus: Prenatal care begun by the 4<sup>th</sup> month and 110 % or more of recommended visits received.

Adequate: Prenatal care begun by the 4<sup>th</sup> month and 80%-109% of recommended visits received.

Intermediate: Prenatal care begun by the 4<sup>th</sup> month and 50%-79% of recommended visits received.

Inadequate: Prenatal care begun after the 4<sup>th</sup> month or less than 50% of recommended visits received.

It is important to note that the APNCU Index is in the third edition and researchers continue to compare the results with five other widely known tools measuring prenatal care. The APNCU Index is consistent with the 1985 American College of Obstetricians and Gynecologist recommendations for prenatal care utilization (Kotelchuck, 1994). (Figure 3). As this tool continues to be widely used, the reliability and validity will be defined.



Wise (1994) reviewed the APNCU Index and compared it to other indices as having several technical improvements. The first improvement Wise noted was that the APNCU Index examined the time prenatal care was initiated as well as the frequency of prenatal visits. Second, the APNCU Index defined each area of prenatal service, the initiation of prenatal care and received services, in terms of the specific impact on adequacy on prenatal care utilization. Third, the APNCU Index paid attention to the care received late in pregnancy. The APNCU “index’s use of a nonlinear visitation standard captures the asymmetric rhythms of gestation far better than the Kessner Index, which treats the needs and risks of pregnancy as uniformly distributed throughout the pregnancy” (p.1374). Fourth, the APNCU Index is consistent with the American College of Obstetricians and Gynecologists 1985 recommendations for prenatal care utilization. Wise preferred the APNCU Index as the more refined prenatal care utilization instrument and viewed the linking of the index to both public and clinical domains as an important contribution.

Perloff and Jaffee (1997) stated the APNCU Index took a conceptualizing approach to measuring and refining prenatal care utilization. According to Perloff and Jaffee, the APNCU Index assesses and measures the adequacy of observed patterns of prenatal care utilization. When compared to the widely-used Kessner Index, the APNCU Index captures important dimensions that are missing on the Kessner Index. First, the Kessner Index “does not distinguish between inadequacy because of late initiation and inadequacy because of insufficient number of visits” (p.62). Second, the proportion of women obtaining inadequate prenatal care for births that occurred later than 36 estimated weeks of gestation was more than doubled when the APNCU Index was used rather than

the Kessner Index. Measurement of inadequate care went from 18% with the Kessner Index to 35% with the APNCU Index using the same data. Finally, insufficient documentation on the Kessner Index instrument itself “has resulted in great variability in how users define and calculate the Kessner Index” (p. 62). In comparison, the APNCU Index is well documented. Clearly, according to the literature reviewed, the Kessner Index understates the risk for women.

Kogan, Kotelchuck, and Johnson (1993) went beyond the Kessner Index when using the APNCU Index to determine potential racial differences in terms of late prenatal care. Kogan, Kotelchuk and Johnson found racial differences in social-demographic factors in marital status, high school education, and the women’s age at the time of birth. The researchers acknowledged that “racial disparity in use of late prenatal care at the end of pregnancy may have implications for the health care delivery system in the United States” (p.20). In their study, the incidence of premature births was higher within the non-white community (11.2%) than in the white community (7.4%). The researchers noted that racial barriers to receipt of prenatal care occurred throughout pregnancy and needed to be studied at various times during a pregnancy, not just at one specific time.

### Procedure

A letter of introduction and an abstract of the research project were sent to the Kalamazoo County Human Services Department (Appendix F & G). The research statement, problem, and questions were included. Permission was requested to collect data on all fetal/infant deaths occurring from 24 weeks of gestation through the 364th day of life from 1995 through 1997. Data was to be obtained from abstract birth and death

certificates. A copy of approval of this research by the Human Research Review Committee at Grand Valley State University (Appendix H) was sent to the Kalamazoo County Human Services Department. The researcher was given permission by the Kalamazoo County Board of Commissioners to collect data only from abstract birth and death certificates. The abstract birth and death certificates contained all the information needed for this study (Appendix I). This researcher was the only person to enter the data on the prepared audit tool (Appendix D).

The data were obtained from information documented on Kalamazoo County abstract birth certificates and death certificates for the entire Kalamazoo County population for the years 1995 through 1997 at the Kalamazoo County Human Services Department. A total of 50 fetal/infant deaths were recorded. Ten records were rechecked by the FIMR coordinator for a comparison as an indicator of inter-rater reliability of the audit. As previously stated, all information on the abstract birth certificate was considered to be accurate. Since this was a retrospective descriptive study, no interventions were expected during the course of the study.

#### Human Subject Risk

There was no contact with human subjects. Confidentiality on all information obtained from abstract birth and death certificates gathered at the Kalamazoo County Human Services Department was maintained. Each certificate was numbered for identification. Names were excluded.

The Fetal Infant Mortality Review (FIMR) project of Kalamazoo requested that the researcher complete FIMR's protocol for data collection. First, the researcher obtained approval from the Kalamazoo County Board of Commissioners. At this time, a

working agreement between Grand Valley State University Kirkhof School of Nursing and the Kalamazoo County Human Services Department, dealing directly with the FIMR project of Kalamazoo County, was developed (Appendix J). Next, permission to do the study was granted by the Chief Executive and Medical Officer of Community Health of the State of Michigan, and was designated as a medical research project entitled "Fetal Infant Mortality In Kalamazoo" (Appendix K, L, & M). Finally, completion of this process and this designation allowed the researcher access to certain State and local Human Services Department data, which would otherwise not be available. Information collected was confidential and protected under Section 2631 and 2632 of the Michigan Public Health Code, P.A.368 of 1978 (Appendix N).

## CHAPTER 4

### DATA ANALYSIS

The purpose of this research was to examine the incidence rates of five, preselected perinatal variables that existed within the white and non-white groups of fetal infant deaths that occurred in Kalamazoo County between January 1, 1995 and December 31, 1997. This research examined the differences among prenatal care, birth weight, estimated weeks of gestation (age), and maternal/fetal infant medical complications between white and non-white fetal infant deaths in Kalamazoo County.

#### Research Questions

Data were analyzed to answer the following questions:

1. Is there a significant difference in adequacy of prenatal care initiation between non-white and white fetal infant deaths in Kalamazoo County during a three year period of 1995 through 1997?
2. Is there a significant difference in adequacy of received services (visits) between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997?
3. Is there a significant difference in birth weight between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997?

4. Is there a significant difference in the estimated weeks of gestation (age) between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997?
5. Is there a significant difference in numbers of maternal/fetal/infant medical complications between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997?

#### Data Analysis Procedures

The data analyses were completed by using the Statistic Package for the Social Sciences (SPSS). The level of significance was set at  $p < .05$  for all statistical tests. Data analysis included independent t-tests to examine differences in gestational age and maternal/fetal/infant medical complications by race. Chi Square analyses were used to evaluate the differences between birth weight and prenatal care by race.

Maternal characteristics. Of the 50 cases reviewed, 41 (82%) were white and 9 (18%) were non-white. The ages of the mothers ranged from 20 to 47 years ( $M = 29.30$ ;  $SD = 6.54$ ) at the time of the infant's birth. The majority of the mothers ( $n = 33$ ) had a primary school education, with 17 having attended or completed college. Twenty-seven (54%) of the mothers had private insurance while the remaining 23 had either Medicaid ( $n = 22$ ) or another source of payment for their prenatal care services.

Prenatal care. Forty-one (82%) of the mothers initiated prenatal care by the fourth month of pregnancy, with 28 mothers initiating prenatal care within the first two months. Eight mothers did not seek prenatal care until their pregnancy had exceeded five months, while two mothers waited until the 7<sup>th</sup> to 9<sup>th</sup> month to initiate prenatal care. One mother did not obtain any prenatal care services during her pregnancy (Table 2). The number

of prenatal visits ranged from 0 to 20, with an average of 10 prenatal visits ( $M = 9.96$ ;  $SD = 4.96$ ).

Table 2

Initiation of Prenatal Care

Time Period	Frequency	Percentage
1-2 months	28	56
3-4 months	13	26
5-6 months	6	12
7-9 months	2	4
none	1	2

Forty-eight percent ( $n = 24$ ) of women in the sample had no previous live births. Fifty-two percent ( $n = 26$ ) of the women had one or more live births prior to this birth that was reviewed for this study. The average number of previous live births was one. Sixty-four percent ( $n = 32$ ) of the mothers had never had a pregnancy terminated and 90% of the mothers had never had a deceased child. A summary of the maternal pregnancy history is presented Table 3.

Table 3

Maternal Pregnancy History

Characteristic	Range	Mean	SD
Live Births	0 – 6	1.24	1.59
Living Children	0 – 6	1.20	1.58

Sixty-eight percent (n = 34) of the mothers had either zero or one medical complication. Twenty-four percent (n = 12) had two medical complications while 6% (n = 3) had a total of three medical complications. There was only one mother (2%) who had a total number of five medical complications. A summary of the data appears in Table 4.

Table 4

Number of Maternal Medical Complications

Characteristic	Range	Mean	SD
Medical Complications	0 - 5	1.08	1.08

Thirty-six percent (n = 18) of the mothers were free of medical complications. Of the mothers who had medical complications, pregnancy induced hypertension occurred among 8% (n = 4), eclampsia occurred among 4% (n = 2), diabetes occurred among 12% (n = 6), uterine bleeding occurred among 14% (n = 7), Rh sensitivity occurred among 8% (n = 4), and anemia occurred among 2% (n = 1). A group of "other" medical complications were documented and resulted at 60% (n = 30). A few examples of "other" complications were oligohydramnios, dysfunctional labor, hemolysis/elevated liver function/low platelet level/syndrome (HELLP), pre-term labor, and incompetent cervix. Results are shown in Table 5.



Table 5

Maternal Medical Complications

Maternal Complications	Frequency	Percentage
Hypertension, Chronic	0	0
Hypertension, Pregnancy Induced	4	8
Eclampsia	2	4
Diabetes	6	12
Uterine Bleeding	7	14
Rh sensitivity	4	8
Anemia	1	2
Other Complications	30	60

Infant characteristics. Of the fifty cases reviewed, all births occurred at a hospital, where the majority (52%) of the births were by vaginal deliveries. Forty-one (82%) of the infants were white and 9 (18%) of the infants were non-white. Estimated weeks of gestation at birth ranged from 25 to 47 weeks, with a mean of 35 weeks and a standard deviation of 5.72. Forty percent (n = 20) of the infants weighed less than 2,000 grams at birth. Thirty-four percent (n = 17) of the infants weighed between less than 2,500 and 3,500 grams. Fourteen percent (n = 7) of the infants weighed less than 4,000 grams while 10% (n = 5) was greater than 4,000 grams. Summary of the data appears in Table 6.

Table 6

Infant Birth Weights

Birth Weight	Frequency	Percentage
< 1,500 g	16	32
< 2,000 g	4	8
< 2,500 g	4	8
< 3,000 g	5	10
< 3,500 g	8	16
< 4,000 g	7	14
< 4,000 g	5	10

Sixteen percent (n = 8) of the fetal infants had no medical complications. Seventy-four percent (n = 35) of the fetal infants in the sample had one or two complications. Eight percent (n = 4) of the fetal infants had three complications, while six percent (n = 3) of the fetal infants had a total of four medical complications. Summary of these results is presented in Table 7.

Table 7

Number of Fetal/Infant Medical Complications

Characteristic	Range	Mean	SD
Fetal/Infant Complications	0 – 4	1.52	1.05

Fetal/Infant medical complications included moderate/heavy meconium (14% ; n = 7), premature rupture of membranes (28% ; n = 14), and fetal distress (34% ;

n = 17). A group of “other” medical complications were documented (72% ; n = 36) including heart malformations, short cord, birth defects, gestational prematurity, and respiratory distress (Table 8).

Table 8

Fetal/Infant Medical Complications

Characteristic	Frequency	Percentage
Febrile	0	0
Meconium, heavy, moderate	7	14
Premature Rupture of Membranes	14	28
Abruptio Placentae	1	2
Placenta Previa	1	2
Seizure during labor	0	0
Cord Prolapse	0	0
Fetal Distress	17	34
Other Complications	36	72

On average, fetal/infant deaths frequently occurred at 33.52 estimated weeks of gestation and at 60.7 days after birth (Table 9). Eight (16%) fetal/infants died during the first hour of life. An additional five (10%) fetal/infants died during the first day of life. Nineteen (38%) fetal/infant deaths occurred during the first week of life. Twenty-seven

(54%) fetal infant deaths occurred during the first month. The remaining deaths sporadically occurred up to the 286<sup>th</sup> day of life.

Table 9

Length of Infants' Life

Characteristic	Range	Mean	SD
Number of Days Lived	1-286	60.77	73.87
Estimated Week of Gestation at Death	25-42	33.52	5.15

Adequacy of Prenatal Care

According to Kotelchuck's Tool, the Adequacy of Prenatal Care Initiation has four areas for initiation of prenatal care. Eighty-two percent (n = 41) of the mothers initiated prenatal care during the first four months of their pregnancy, falling into the "adequate plus" and the "adequate" areas. However, 18% (n = 9) of the mothers fell into the "intermediate" and the "inadequate" areas. Only one mother (2%) received no prenatal care and data regarding this area were collapsed into the area of inadequate 7+ months due to low numbers. The intermediate and the inadequate areas represent the less than expected standard set by both the American College of Obstetricians and Gynecologists (ACOG) and Kotelchuck's Tool, (Appendix O). These results are shown in Table 10.

Table 10

Adequacy of Prenatal Care Initiation (N=50)


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Prenatal Care Initiation	Frequency	Percent
Adequate plus Month 1-2	28	56
Adequate Month 3-4	13	26
Intermediate Month 5-6	6	12
Inadequate 7 + months, or no prenatal care	3	6

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Adequacy of Received Services

The observed number of visits ranged 0 to 20, with a mean of 9.96 and a standard deviation of 4.96. Kotelchuck and ACOG referenced the expected number of prenatal visits at 14 per 40 gestational weeks (Appendix P). The analysis revealed that 33 women or 66% of the study group had adequately received services in either the "Adequate Plus" or the "Adequate" category, while 17 (34%) fell below the standard set by ACOG. Table 11 lists the results.

Table 11

Adequacy of Received Services (n=50)

Received Services	Frequency	Percent
Adequate plus 110 % +	21	42
Adequate 80-100 %	12	24
Intermediate 50-79 %	7	14
Inadequate < 50 %	10	20

Note. Received Services = observed visits/expected visits.

Comparison between White and Nonwhite Groups

T-tests and chi-square procedures were performed to determine statistical differences among white (n = 41) and non-white (n = 9) groups. The data were collapsed to include the "other" racial category among the non-white group due to low numbers in the sample.

Prenatal care initiation by race. The first research question was: Is there a significant difference in adequacy of prenatal care initiation between non-white and white fetal-infant deaths in Kalamazoo County during a three year period of 1995 through 1997? To answer this question, a Chi-square procedure was completed on adequacy of prenatal care initiation and race. The analysis indicated no significant difference in adequacy of prenatal care initiation by race ( $X^2 = 5.33$ ;  $df = 2$ ;  $p = .07$ ).

Received services by race. The second research question was: Is there a significant difference in adequacy of received services (visits) between non-white and white fetal infant deaths in Kalamazoo County during a three year period of 1995 through 1997? A Chi-square procedure was completed on adequacy of received services and race. The analysis indicated no significant difference in adequacy of received services by race ( $X^2 = .04$ ;  $df = 2$ ;  $p = .98$ ).

Birth weight by race. The third research question was: Is there a significant difference in birth weight between non-white and white fetal infant deaths in Kalamazoo County during a three year period of 1995 through 1997? Prior to conducting a Chi-square procedure to compare the adequacy of prenatal care initiation and birth weight, the data were collapsed because of insufficient numbers. As a result, four areas of birth weight were created:  $< 1,500$  grams,  $< 3,000$  grams,  $< 4,000$  grams, and  $> 4,000$  grams. However, the analysis revealed no significant difference in adequacy of prenatal care initiation by birth weight ( $X^2 = 9.15$ ;  $df = 6$ ;  $p = .16$ ).

A Chi-square procedure was also completed on the adequacy of received services and birth weight, using the collapsed categories of birth weight. Based on the results of this analysis ( $X^2 = 6.55$ ;  $df = 6$ ;  $p = .36$ ), no significance difference in adequacy of received services by birth weight was noted.

A third Chi-squared test was completed to explore any differences in birth weight by race. The analysis indicated no significant difference in birth weight by race ( $X^2 = .23$ ;  $df = 3$ ;  $p = .97$ ) was present in this sample.

Estimated weeks of gestation by race. The fourth research question was: Is there a significant difference in the estimated weeks of gestation (age) between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997? As previously stated, the t-test for estimated weeks of gestation between non-white and white was nonsignificant. In addition, an analysis of variance for the estimated weeks of gestation (age) and adequacy of received services indicated that there were no significant differences.

Medical complications by race. The fifth research question was: Is there a significant difference in numbers of maternal/fetal/infant medical complications between non-white and white fetal/infant deaths in Kalamazoo County during a three year period of 1995 through 1997? T-test for the number of maternal medical complications by race indicated no significant difference ( $t = -.92$ ;  $df = 48$ ;  $p = .36$ ). In addition, an analysis of variance for the number of maternal complications and adequacy of received services indicated that no differences were apparent by race.

The number of fetal/infant medical complications per a t-test indicated no significant differences ( $t = -.24$ ;  $df = 48$ ;  $p = .81$ ). An analysis of variance for the number of infant medical complications and adequacy of received services also indicated that no two groups were significantly different.

Overall there were no statistical differences at the  $p < .05$  level among the white and non-white groups among the variables of interest in this study. Table 12 displays a summary of these results.



Table 12

Test for Independent Samples by Race (n=50)

Variables	White		Non-white		T	df	p
	M	SD	M	SD			
Number of days infant lived	63	75	46	66	-.62	48	.54
Estimated weeks of gestation at birth	35	5.8	34	5.5	-.51	47	.61
Number of maternal substances	.56	.78	.33	.71	-.81	48	.42
Number of maternal complications	1.14	1.13	.77	.83	-.92	48	.36
Number of fetal/infant complications	1.53	1.07	1.44	1.01	-.24	48	.81

Additional Findings

Additional maternal findings included maternal use of substances and the total number of maternal substances taken by the mother during the pregnancy. Thirty-two percent (n = 16) of the mothers used tobacco during the pregnancy, while 10% (n = 5) consumed alcohol, and 10% (n = 5) consumed drugs (Table 13).

Table 13

Maternal Use of Substances

Substances	Frequency	Percentage
Tobacco	16	32
Alcohol	5	10
Drugs	5	10

The total number of maternal use of substances was also collected. Summaries of the data are represented in Table 14.

Table 14

Total Number of Maternal Substances

Characteristic	Range	Mean	SD
Number of Maternal Substances	0 - 3	.52	.76

Additional fetal/infant findings. T-tests were performed to determine the statistical difference between gender and the number of days the infants lived, the infant age in gestational weeks at birth, the number of maternal substances, and the number of maternal and fetal/infant complications. A Chi-square procedure was completed on gender and adequacy of prenatal care initiation. The analysis indicated no significant difference in adequacy of prenatal care initiation by gender ( $X^2 = 1.36$ ;  $df = 2$ ;  $p = .51$ ).

A Chi-square procedure was also completed on gender and adequacy of received services. The analysis indicates no significant difference in adequacy of received services by gender ( $X^2 = 2.41$ ;  $df = 2$ ;  $p = .29$ ).

Of the variables tested, there were no significant differences at  $p \leq .05$  level when comparing the variables of interest by gender. A summary of these results are presented in Table 15.

Table 15

Tests for Independent Samples of Gender (n=50)

Variables	Male (n = 29)		Female (n = 21)		t	df	p
	M	SD	M	SD			
Number of days infant lived	56	79	64	66	-.37	48	.71
Estimated weeks of gestation at birth	35	5.8	33	5.4	1.32	47	.19
Number of maternal substances	.62	.86	.38	.59	1.10	48	.28
Number of maternal complications	1.13	1.12	1.00	1.04	.44	48	.66
Number of fetal/infant complications	1.48	1.12	1.57	.978	-.29	48	.77

In conclusion, there was no significant difference in the adequacy of prenatal care initiation, or in the adequacy of received services (visits) between the non-white and the white fetal/infant deaths in Kalamazoo County during 1995 through 1997. No significant differences were found in birth weight, in estimated weeks of gestation (age), or in the

type or number of maternal/fetal/infant medical complications between non-white and white fetal/infant deaths. In addition, there were no significant differences which occurred with the infant's gender and the number of days the infant lived, the gestational age at birth, the number of maternal substances, and the number of maternal and infant complications in Kalamazoo County during the three year period of 1995 through 1997.

## CHAPTER 5

### DISCUSSION AND IMPLICATIONS

#### Discussion

The research problem for this descriptive, retrospective study addressed the disparity in fetal/infant mortality rates between the non-white and white population in Kalamazoo County. Specifically, the variables studied were prenatal care, birth weight, estimated weeks of gestation (age), and maternal fetal/infant medical complications.

The findings of this study indicated no significant, statistical difference between the non-white and white population in the adequacy of prenatal care initiation, received services, birth weight, estimated weeks of gestation, and medical complications for the mother and/or fetus/infant. Additional areas studied included the maternal use of substances such as alcohol, tobacco and drugs, the number of maternal substances used, infant's gender, length of infant's life, and gestational age at birth as possible links to fetal/infant death. There were no statistical differences found among these additional variables.

The findings of this study did not support the study variables as factors in contributing to fetal/infant mortality in Kalamazoo County for the three year period of 1995 through 1997. A follow up study is needed to investigate other possible variables which affect fetal/infant mortality. The follow up study should examine any social

aspects that may be related to maternal and child health care which were not included in this study.

Although the findings indicated no difference between factors by race, fetal infant deaths nevertheless occurred. Unknown factors had an affect on the fetal/infants causing their demise. While these variables are not clear, this study did identify complications experienced by both the mothers and fetal infants that may have contributed to the demise of the fetal infant.

In this study, the infant mortality rate decreased for the non-white population, but increased for the white population. A possible reason for this decrease may be due to extra attention directed at the non-white population by providers and the wide use of available social services. The overall infant mortality rate for Kalamazoo County decreased from 1995 to 1997. Perhaps this decrease resulted due to the positive actions undertaken by the community health care programs. Continued emphasis on the early initiation of prenatal care services and the continuation of these services appears to be directly related to the decrease of fetal/infant mortality in Kalamazoo County. Education of the mother, family, friends and health care professionals surrounding factors that may contribute to fetal/infant mortality have the potential to further reduce the fetal/infant mortality rates.

Currently, the Fetal Infant Mortality Review (FIMR) study in Kalamazoo County is investigating other possible causes of fetal/infant mortality. Publication of the Kalamazoo County FIMR study will not occur until sometime after its last year of data collection in 1999. The results of FIMR and this study will provide data to continuously support improvement in the maternal/fetal/infant health care provided in Kalamazoo

County. Since community health care programs of Kalamazoo County provided adequate prenatal care to both populations, perhaps the quality of prenatal care, or the access to prenatal care, needs to be investigated.

#### Relationship of Findings to the Conceptual Framework

Neuman Systems model (1989, 1995) was used to provide a framework to demonstrate how the maternal/fetal/infant system responds to stressors and how the maternal/fetal/infant system reacts to the development of stress. The study variables prenatal care, birth weight, estimated weeks of gestation, and maternal/fetal/infant medical complications, were stressors that continuously attacked the flexible line of defense of the pregnant woman and in turn affected the basic structure or the fetal/infant core. When the flexible line of defense is no longer able to withstand the forces of the stressors, the lines of defense are now vulnerable and the maternal/fetus/infant system becomes compromised. When the lines of defense are penetrated, the lines of resistance are all that is available to protect the maternal/fetal/infant system from disease or complications. Once a stressor penetrates the lines of resistance and attacks the central core, death occurs.

Neuman's model demonstrates how the maternal/fetal/infant system is affected by its internal and external environment. Neuman postulates that decreasing internal and external environmental stressors reinforces the flexible line of defense and therefore promotes a healthy maternal/fetal/infant unit. The findings of this study indicated that there were no differences by race in prenatal care, birth weight, estimated weeks of gestation and medical complications, yet other unknown internal and external

environmental stressors challenged the flexible lines of defense and resulted in fetal/infants deaths for Kalamazoo County.

#### Relationship to Findings in Previous Research

Kogan, Kotelchuck, and Johnson (1993) studied how racial differences impacted the initiation of prenatal care in a sample size of 2,349 postpartum women. The researchers found that racial differences existed in the initiation of prenatal care among the non-white population when compared to the white population. The researchers also found differences which existed in both the frequency and quality of care provided where Medicaid was the source of payment when compared to private insurance.

The findings of this study did not support the findings of Kogan et al. (1993) possibly because 54% of mothers had private insurance. Also, there were no statistically significant differences in the initiation and frequency of prenatal care provided among the non-white and white sample. Although the findings are desirable, perhaps a sample size of 50 was not large enough to distinguish racial differences in the initiation of prenatal care or the adequacy of received services in this study.

The study by Michielutte, Moore, Meis, Ernest and Wells (1994) examined birth weight and gestational age and medical complications in both the black and white populations in a sample size of 4,754. Preterm and low birth weight infants were at a higher risk of mortality when compared to term infants with a birth weight of 3,500 grams or greater. The researchers found maternal medical complications, such as hypertension or hemorrhage from abruptio placenta, reflected in preterm births. The researchers also found that the black infants were less likely to be premature or have low birth weight as compared to white infants. However, low birth weights for black infants



were consistently found to have a slightly lower mortality risk as compared to low birth weight white infants. The researchers inquired if the higher overall black infant mortality risk was partly due to lower economic status or to some other variable.

The findings of this study supported, to some degree, the Michielutte et al. (1994) study in terms of the effect of gestational age, birth weight, and medical complications on mortality. Preterm and low birth weight infants were more at risk for infant mortality. The white infant mortality rate in this study occurred at 82% as compared to the non-white mortality rate at 18%. In addition, this study identified conditions such as hypertension and uterine bleeding present prior to fetal death. However, this study was unable to document whether a lower mean birth weight for the non-white infants reflects the normal birth weight rather than the effects of deprivation or genetic differences.

Herschel et al. (1995), in a sample size of 315, determined that below 37 weeks of fetal gestation, one or more maternal complications relating to fetal infant mortality occurred among the black population as compared to the white population. Certain maternal complications such as hypertension and abruptio placentae were more prevalent for the black population, especially for those clients receiving late prenatal care.

In comparison to the Herschel et al. (1995) study, the findings of this study determined the mean estimated weeks of gestation to be 35 weeks. The majority (68%) of the women in this study had either zero or one maternal medical complication. There were no differences between the non-white and white population in terms of estimated weeks of gestation and in the type, as well as the number of maternal medical complications present.

Delke, Hyatt, Feinkind, and Minkoff (1988) researched factors related to fetal/infant complications and the incidence of fetal/infant mortality. The researchers found that complications occurred with low risk clients who had adequate and appropriate prenatal care and attributed the fetal/infant mortality to maternal and social issues. In the Delke et al. study, social issues included avoidable causes of death or misdiagnosis, missed prenatal visits, failure to comply with medical advice, low socioeconomic status, and exposure to personal risk factors (tobacco, alcohol, and drugs).

Similar to the Delke et al. (1988) study, this study noted adequate prenatal care initiation and adequate received services which indicated no significant differences by race. The majority (74%) of the fetal/infants in this study had one or two medical complications which preceded fetal/infant death. Social issues included in this study were payment of services, level of education, and exposure to tobacco, alcohol and drugs. Further investigation in other social issues is encouraged for future study.

#### Limitations and Recommendations

The findings of this study were based on a three year period of time from 1995 through 1997 per a review of abstract birth certificate and death certificates. The resulting number of cases studied was 50. A limitation was the inability to use data from the year 1998, as requested by the FIMR contact. A recommendation would be to include 1998 data, when published by the state, as this would have resulted in a larger sample to study, which would be more representative of the population. Therefore, a replication of the study is indicated.

Another recommendation would be to compare the results from this study to the results of the Kalamazoo County's Fetal Infant Mortality Review (FIMR) study. Both

studies have occurred in the same county, over a similar time period, and may have investigated similar study variables.

A limitation may be the actual size of the county in terms of available fetal/infant mortality cases. A recommendation would be to repeat the study in a similar county such as Calhoun County, Michigan. Calhoun County is a neighboring county to Kalamazoo County and has a history of increased fetal/infant mortality. The overall infant death rate for Calhoun County in 1997 was 9.3 per 1,000 live births (Division for Vital Records and Health Statistics, 1998). A comparison of the results from two neighboring counties will provide additional information regarding fetal/infant mortality.

A limitation may be the unequal number of fetal/infants deaths per race in this study. Deaths occurred in 41 (82%) white fetal/infants as compared to 9 (18%) non-white fetal/infants. Perhaps the quality of prenatal care or access to prenatal care is the issue, not the adequacy of prenatal care. Recommendations are to assess the quality of prenatal care or the access to prenatal care using strategies such as an interview with the mother, providers and their staff, and a medical chart review. Another recommendation would be to investigate other fetal/infant mortality studies pertaining to minority populations and identify areas of similarities and differences.

The next limitation noted was the type of research design used in this study. This study used a retrospective research design where all the information was collected after the death of the infant. A future research design recommendation would be to follow the course of each pregnant woman as well as to follow the course of each infant up to the 364<sup>th</sup> day life to collect prospective data. The researcher would need to evaluate, through a literature review, if this new method of data collection would be both cost and time

effective. Another area to investigate is the economics of this design. Perhaps the use of state and national funding should be investigated.

The following limitation concerns the method of data collection. Data collection for this study was limited solely to information obtained from both the abstract birth certificate and death certificate. A recommendation would be to expand the methods of data collection to include a medical record review and a follow-up interview with the mother and/or family either by telephone or home visit.

A further limitation was the issue of missing maternal social data from the abstract birth certificate. A recommendation would include maternal-social data in the next study such as marital status, level of social support, financial status, and nutritional status, and the status of the pregnancy as a planned or an unplanned event. An interview with the mother to gather such maternal/social data would be necessary.

The final limitation could be the investigation of alternative causes leading to fetal/infant demise. A recommendation for a future researcher would be to investigate the cause of fetal/infant morbidity instead of fetal/infant mortality. According to Mosby's Medical, Nursing & Allied Health Dictionary, (1998, p.1050), the definition of morbidity is the rate at which an illness occurs in a particular area or population. In Mosby's Medical, Nursing & Allied Health Dictionary, (1998, p.1052), the definition of mortality is the death rate, which reflects the number of deaths per unit of population in any specific region, age group, disease or other classification (1052). Perhaps changing the study focus from mortality to that of morbidity would be beneficial in determining why these fetal/infants die.

### Methodological Implications

Obtaining access to abstract birth certificates and death certificates from the Kalamazoo County Human Services Department (KCHSD) involved following the proper channels over an extended period of time. Approval was granted by the Fetal Infant Mortality Review (FIMR) project, and a working agreement between Grand Valley State University and KCHSD was completed. Approval was next granted by the State of Michigan as a designated medical research project, followed by approval from Kalamazoo County Board of Commissioners.

Inasmuch as the approval process to conduct a study such as this one can involve multiple stages, it will be important to identify the appropriate avenues to facilitate the data accessibility. Moreover, the methodological design must include strategies to ensure the confidentiality of the data collected. Once the data are obtained, it should be placed in a secured location until it is destroyed at the end of the research investigation.

### Implications for Nursing

Clinical nursing practice. Results of this study have implications for nursing. In clinical nursing practice, a fetal kick count protocol needs to be implemented once fetal movements have been established and documented by a provider. The fetal kick count protocol is one of the best ways to assess fetal viability (Lowermilk et al., 1997). Furthermore, it is an inexpensive procedure that can be done easily and quickly performed by the mother. Fetal kick counts should be completed twice daily and as needed when mother suspects a decrease or absence in fetal movement. A low fetal kick count or a decrease in the normal pattern of fetal movement or an absence of fetal movement may be an early warning sign of fetal

distress and must be brought to the attention of a provider for further assessment and evaluation.

Nurses must become aware of all potential internal and external stressors that cause maternal/fetal/infant distress. Assessment of actual or potential stressors should include factors such as social issues, client's perceptions of barriers to prenatal care, exposure to personal risk factors, infections, and complications. Nurses need to expertly perform further fetal assessments such as a nonstress test, biophysical profile or contraction stress test. After the birth, nurses need to complete maternal and infant physical assessments, family bonding assessments and if necessary, appropriate social service referrals. Once stressors are identified, nurses should implement plans of care to decrease the effect of each stressor on the flexible line of defense, the lines of defense, and the lines of resistance. These interventions may prevent further fetal/infant mortality.

Educating the mother and or family to prevent fetal/infant mortality is an integral component of each preconception and prenatal care visit. Ongoing maternal and family education needs to include fetal/infant growth and development, the warning signs of preterm labor, decreasing personal risk factors, signs and symptoms of infections and complications to name just a few. Client perceptions of prenatal care and the health care professional who is responsible for care provision should be taken into account in order to maximize the experience for the pregnant mother.

Health care providers in the community also need to be educated on the resources available within the community to recognize maternal and fetal/infant stressors and the effects these stressors may have on the health and welfare of the fetus/infant. Prior to this

study, involvement in the Kalamazoo County's FIMR study, acquainted the researcher with all the accessible community resources available to pregnant women and their children. As a nurse practitioner, this researcher was then able to incorporate these community resources in nursing practice. In addition to educating health care providers, the nursing profession needs to educate the community so together, action against fetal/infant mortality can be taken. Educating the community could be accomplished by various local nurses such as school nurses and the parish nurse ministry of local churches.

Nursing education. A new method of educating nurses needs to be established. The nursing curriculum needs to establish a short course to address the issue of fetal/infant mortality. The course would be open to nurses from the community as well as nursing students of the institution. Neuman's model (1989, 1995) would serve as the framework for the course and the course could use a case study approach. Six fetal/infant mortality cases, three non-white and three white, would be presented. Students would learn how to extrapolate data from the medical record, abstract birth certificate, death certificate, and home interview. The student would be taught to determine in each fetal/infant mortality case the actual stressors and how the stressors were managed. Community resources would be identified to assist with the goal of decreasing the stressors, and prevention strategies would be developed. Community nurses would then return to their workplace with the education needed to address fetal/infant mortality.

Nursing administration. The results of this study revealed no significant statistical difference in adequacy of prenatal care initiation, adequacy of received services, birth weight, estimated weeks of gestation, and maternal/fetal/infant medical complications

between non-white and white fetal/infant deaths in Kalamazoo County. In light of these findings, in addition to the reductions in the overall infant mortality rate, it will be important for nurse administrators to acknowledge this progress among their staff. Additionally, recognition for the development of collaborative efforts and effective interventions in the reduction of complications during pregnancy, may have contributed to the decrease in fetal/infant mortality must be given to the participants, as well as the community.

Nurse administrators also need to evaluate the potential health care problems of the community and to develop further programs to decrease fetal/infant mortality. Administrators need to be aware of the available community resources and to assist their staff in providing additional resources as they become aware of the need.

Nursing research. In the review of literature for this study, the majority of the research on fetal/infant mortality was conducted by disciplines other than nursing such as medicine, sociology, and psychology. It is a nursing responsibility to study nursing problems, and research on fetal/infant mortality should be based more on a nursing focus rather than another school of wisdom. Further nursing research should focus on the special contributions that nurses provide. Areas for future research include the nurse/client relationship or interaction, the client's experience with the nurse, and the client's level of satisfaction with the nurse. Additional areas of research would include the nursing focus on problem solving, the coordination of community resources, assessment of community needs, political activism for funding (grants), and advocacy programs directed toward the prevention of fetal/infant mortality.



The Kalamazoo community is fortunate to have the support of several major medical and nursing educational institutions located within the County. Further research by this large student population, including master's and doctoral nursing students, as well as other students from other disciplines, who have the interest and time to devote to the study of fetal/infant mortality, is readily accessible. Moreover, this is a phenomenon that is crucial for exploration by nurse scientists. It is vital that factors that contribute to the negative outcomes of pregnancy be identified and interventions implemented that will result in optimal outcomes for mothers and their fetal/infants.

In conclusion, the focus of this study was to investigate if a disparity in fetal/infant mortality rates between the non-white and the white population existed in Kalamazoo County. Analysis of the data indicated no significant racial differences. Yet, something unexpected occurred in Kalamazoo County. The non-white fetal/infant mortality rate for 1996 and 1997 diminished to less than six deaths per each year! The white fetal/infant mortality rate slightly increased in 1996 and then slightly decreased in 1997 (Appendix A). Perhaps the white fetal/infant mortality rate was actually unchanged when compared to such a decline in non-white fetal/infant mortality rate. Further nursing research is needed to investigate how this decrease in fetal/infant mortality rate has occurred.

## APPENDICES

## APPENDIX A

Appendix A  
National, State, and County Infant Mortality 1990-1997.

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Year	National Overall IMR	MI Overall IMR	Kalzoo. Overall IMR	Kalzoo. White IMR	Kalzoo. Black IMR	Kalzoo. Black to White Ratio
1990	●	10.7	8.2	6.9	16.9	2.4 to 1
1991	●	10.4	11.4	7.9	29.9	3.8 to 1
1992	●	10.2	10.0	6.6	28.0	4.2 to 1
1993	●	9.5	8.6	6.6	18.7	2.8 to 1
1994	●	8.6	5.1	3.4	12.9	3.8 to 1
1995	7.6	8.3	10.0	6.5	29.7	4.5 to 1
1996	7.2	8.0	9.0	8.9	*	*
1997	7.0	8.1	8.6	8.2	*	*

---

Note.

IMR = Infant Mortality Rate deaths per 1,000 live births.

Kalzoo = Kalamazoo County

MI = Michigan

\* = Less than 6 deaths, unable to calculate IMR and Ratio

● = Not available

From "Michigan Department of Community Health 1996 Infant Death Statistics"  
 by the Office of the State Registrar and the Division of Health Statistics, 1997.

Also from "Michigan Department of Community Health 1997 Infant Death Statistics" by  
 the Division for Vital Records and Health Statistics, 1998.

## APPENDIX B

## Appendix B

### Kalamazoo County Infant Mortality Rates As Compared to Michigan Infant Mortality Rates

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Date	Number Kalzoo. Deaths per number of live births	Kalzoo. White IMR	Kalzoo. Black IMR	Kalzoo. Black to White Ratio	Kalzoo. "Other"	MI. White IMR	MI Black IMR	MI "Other" IMR
1995	30,301	6.5	29.7	4.5 : 1	0	6.2	17.3	6.1
1996	28,312	8.9	*	*	0	6	17.5	6.4
1997	27,312	8.2	*	*	*	6.1	17.6	4.7

---

#### Note.

Kalzoo. = Kalamazoo County

MI. = Michigan

IMR = Infant Mortality Rate deaths per 1,000 live births

\* = Less than 6 deaths, unable to calculate IMR

From "Michigan Department of Community Health 1996 Infant Death Statistics," by  
Office of the State Registrar and Division of Health Statistics, 1997.

Also from "Michigan Department of Community Health 1997 Infant Death Statistics," by  
Division for Vital Records and Health Statistics, 1998.

## APPENDIX C

Dr. Betty Neuman  
Theorist-Consultant  
Post Office Box 488  
Beverly, Ohio 45715

Lisa Wullschleger  
10400 Roger Street  
Portage, MI 49002  
October 21, 1998

Dear Dr. Betty Neuman,

As a graduate-nursing student at Grand Valley State University in Grand Rapids, Michigan, I am working on my master's level thesis. My study is to examine the relationships between prenatal care, birth weight, gestational age, medical complications, race and the incidence of fetal/infant mortality among the African American population when compared to the Caucasian American population of Kalamazoo, Michigan.

I would like permission to utilize your theory, The Neuman Systems Model, as the conceptual framework for this study. In addition, I would like to include your schematic diagram of your model in the thesis. Enclosed is a copy of the schematic diagram that I have adapted to include the above study variables. Please contact me if you are opposed to the use of your model and diagram in my thesis research.

Sincerely,

  
Lisa Wullschleger

11/2/98

*Permission, as requested above, is granted*





## APPENDIX D

ID # \_\_\_\_\_

## AUDIT TOOL

1. Maternal Date of Birth \_\_\_\_\_
2. Infant Date of Birth \_\_\_\_\_
3. Gender 1. Male  
2. Female
4. Maternal Race 1. Black  
2. White  
3. Other
5. Maternal Education 1. Elementary -- Secondary (0-12)  
2. College 1 -- 4, 5 +
6. Payment of Services 1. Private Insurance  
2. Medicaid  
3. Other (specify) \_\_\_\_\_
7. Date of Last Normal Menses \_\_\_\_\_
8. Month Pregnancy Prenatal Care Began 1. Months 1 & 2  
2. Months 3 & 4  
3. Months 5 & 6  
4. Months 7 through 9  
5. None
9. Number of Prenatal Visits \_\_\_\_\_
10. Live Births (not including this one) \_\_\_\_\_
11. Now Living \_\_\_\_\_
12. Now Dead \_\_\_\_\_
13. Terminations: Number \_\_\_\_\_
14. Date of Last Other Terminations \_\_\_\_\_
15. Birth Weight 1. Less than 1,500 grams  
2. Less than 2,000 grams  
3. Less than 2,500 grams  
4. Less than 3,000 grams  
5. Less than 3,500 grams  
6. Less than 4,000 grams  
7. More than 4,000 grams

16. Estimated Weeks of Gestation \_\_\_\_\_

17. Place of Birth	1. Hospital	18. Method Of Birth	1. Vaginal
	2. Clinic/Office		2. Vaginal after previous C-S
	3. Residence		3. Primary C-S
	4. Other specify		4. Repeat C-S
			5. Forcep
			6. Vacuum

19. Use of

- 1. Tobacco
- 2. Alcohol
- 3. Drugs

20. Maternal Complications	1. Hypertension, chronic	Y	N
	2. Hypertension, associated with pregnancy	Y	N
	3. Eclampsia	Y	N
	4. Diabetes	Y	N
	5. Uterine Bleeding	Y	N
	6. Rh sensitization	Y	N
	7. Anemia (Hct < 30, Hgb < 10)	Y	N
	8. Other		
	9. None		

21. Infant Complications	1. Febrile	Y	N
	2. Meconium moderate/heavy	Y	N
	3. Premature Rupture of Membranes	Y	N
	4. Abruptio Placenta	Y	N
	5. Placenta Previa	Y	N
	6. Seizures during labor	Y	N
	7. Cord Prolapse	Y	N
	8. Fetal Distress	Y	N
	9. Other _____		
	10. None		

22. Date of Death \_\_\_\_\_

23. Age at Death \_\_\_\_\_

24. Gestation at Death \_\_\_\_\_

## APPENDIX E



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UNC at Chapel Hill

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September 9, 1998

Lisa Wullschleger  
10400 Roger Street  
Portage, MI 49002

Dear Ms. Wullschleger:

Thank you for your inquiry about the Adequacy of Prenatal Care Utilization (APNCU) Index. I have enclosed three documents about the Index.

1. An Overview of Adequacy of Prenatal Care Utilization Index, and the Technical Details and Rationale of the Index construction (University of North Carolina, 1994).
2. The SAS program for the APNCU Index (Version 3) on a 3 1/2 IBM Compatible disk, and a printed version of the program. (The filename is APNCU994.SAS).
3. The key bibliographic reference: An Evaluation of the Kessner Adequacy of Prenatal Care Index and a Proposed Adequacy of Prenatal Care Utilization Index. American Journal of Public Health, 1994; 84(9):1414-1420.

You have my permission to use the APNCU Index.<sup>C</sup> The Index has been widely disseminated. It is now being used in many research projects and by several state Vital Statistics agencies. I am maintaining a list of current users so that any (future) enhancements of the APNCU Index can be shared with all users. I would appreciate if you would let me know of any publications which use this Index. For bibliographic reference, please cite the 1994 article in the American Journal of Public Health.

The current version (3) of the APNCU Index clarifies the coding of no and missing prenatal care in the APNCU index, allows the user to adjust the computer program to more accurately reflect the missing and no prenatal care coding conventions in their data sets, and creates a "No Prenatal Care" variable for those interested in isolating this subset of the Inadequate Care group. Version (2) of the APNCU Index corrected minor typo's in the original SAS program and allowed for a division of the Summary "Adequate" rating into an "Adequate" and an "Adequate Plus" rating. Please do not make any other substantive modifications to the APNCU Index, except simple adaptations to interface with your specific data base

Do not hesitate to contact me directly via phone, (919 966-2010), or INTERNET, (KOTELCHUCK@UNC.EDU), if you are having any difficulties implementing the APNCU Index or interpreting its results in your analyses.

Sincerely yours,

A solid black rectangular box used to redact the signature of Milton Kotelchuck.

Milton Kotelchuck, Ph.D., M.P.H.  
Professor

MK/ph

Enclosures

## APPENDIX F

Christine Wallace  
FIMR Coordinator  
Kalamazoo County Human  
Services Department  
3299 Gull Road,  
Nazareth, MI. 49074

Lisa Wullschleger  
10400 Roger Street  
Portage, MI 49002  
323-7788  
November 10, 1998

Dear Christine,

I am a graduate-nursing student at Grand Valley State University in Grand Rapids, Michigan working on my master's level thesis. Last year, we had discussed via telephone the potential of studying the topic of Fetal Infant Mortality. Your suggestion was to use data from birth certificates, as information from the Fetal Infant Mortality Task Force was confidential. I would like permission to review and collect data from all fetal infant birth certificates and death certificates which resulted in demise from 24 weeks of gestation through the 364 Th day of life from 1996 through 1998.

The research problem for this study is to examine the relationships between prenatal care, birth weight, gestational age, medical complications, race and the incidence of fetal infant mortality among the African American population when compared to the Caucasian American population of Kalamazoo, Michigan.

The research question is: What are the differences in prenatal care, birth weight, gestational age, medical complications by race among fetal infant deaths in Kalamazoo County?

I will be entering the data from the birth/death certificates on a prepared audit tool. The tool will be categorically coded so that no identifiable information will be listed and no possible link will exist to identify the certificates with the data. To insure reliability of the rater, a second researcher as an indicator of inter-rater reliability, will audit the same 10 birth/death certificates using the same audit tool.

There will be no contact with the subjects. Names will be excluded. All information gathered at the Kalamazoo Health Department will be held in confidence. A copy of approval of the research project will be sent by the Human Research Review Committee at Grand Valley State University will be sent to you.

Sincerely,

A black rectangular box redacting the signature of Lisa Wullschleger.

Lisa Wullschleger



## APPENDIX G

Christine Wallace  
FIMR Coordinator  
Kalamazoo County Human  
Services Department  
3299 Gull Road  
Nazareth, MI. 49074

Lisa Wullschleger  
10400 Roger Street  
Portage, MI. 49002  
(616) 323-7788  
January 6, 1999

Dear Christine,

Thank you for your assistance towards my thesis project. I appreciate your guidance. Enclosed is a copy of a letter from Dr. David R. Johnson, Deputy Director for Public Health and Chief Medical Executive, granting my study as a Medical Research Project. Will I need to furnish KCHSD with another contract from Grand Valley State University? Will the contract need to go to the departmental board? I am anxious to start the data collection. Please let me know if there is anything else that I should be working on to facilitate the process. Thankyou for your time.

Sincerely,

A solid black rectangular box used to redact the signature of Lisa Wullschleger.

Lisa Wullschleger

## APPENDIX H



! CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

November 11, 1998

Lisa Wullschleger  
10400 Roger St.  
Portage, MI 49002

Dear Lisa:

Your proposed project entitled "*Fetal Infant Mortality in Kalamazoo*" has been reviewed. It has been approved as a study which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,

Paul Huizenga, Chair  
Human Research Review Committee

## APPENDIX I

# HOSPITAL WORKSHEET

1. CHILD NAME		FIRST	MIDDLE	(LAST)
2. SEX	3a. PLURALITY SINGLE TWIN TRIPLET ETC (SPECIFY)	3b. IF NOT SINGLE BORN 1ST 2ND 3RD ETC (SPECIFY)	4a. DATE OF BIRTH (Month, Day, Year)	4b. TIME OF BIRTH <b>M</b>
5a. HOSPITAL NAME (If not hospital give street and number)	5b. CITY VILLAGE OR TOWNSHIP OF BIRTH		5c. COUNTY OF BIRTH	
6. NAME AND TITLE OF ATTENDANT AT BIRTH (If other than certifier)		6b. CERTIFIER'S NAME & TITLE (print or type)		
7a. MOTHER'S NAME (FIRST MIDDLE LAST)		7b. SOCIAL SECURITY NO.	7c. STATE OF BIRTH NAME (COUNTRY IF NOT USA)	7d. DATE OF BIRTH (Month, Day, Year)
7a. MOTHER'S SURNAME BEFORE FIRST MARRIED	7b. RESIDENCE (check one box and specify INSIDE CITY OR VILLAGE OF TWP. OF	7c. COUNTY	7d. STATE	
8a. FATHER'S NAME (FIRST MIDDLE LAST)		8b. SOCIAL SECURITY NO.	8c. STATE OF BIRTH NAME (COUNTRY IF NOT USA)	8d. DATE OF BIRTH (Month, Day, Year)

## CONFIDENTIAL INFORMATION FOR PUBLIC HEALTH USE ONLY

9. ANCESTRY Mexican Puerto Rican Cuban Central or South American, etc. and other Hispanic Affri American A ab English French Finnish etc. (Specify below)	10. RACE American Indian Black White etc. Asian Jpn nationality etc. Chinese Filipino Asian Indian etc. (Specify below)	11. EDUCATION (Specify only highest grade completed) Elementary Secondary (0-12) College (13-16) or 5+
11a	12a	13a
11b	12b	13b

**MOTHER**

**FATHER**

14. EXPECTED SOURCE OF PAYMENT FOR MEDICAL SERVICES (Private Insurance Medicaid etc.)		15. MOTHER'S MAILING ADDRESS (STREET NUMBER, CITY OR VILLAGE, STATE, ZIP)	
16a. MEDICAL RECORD NO. OF MOTHER	16b. MEDICAL RECORD NO. OF CHILD	17. DATE LAST NORMAL MENSES BEGAN (Month, Day, Year)	18. MONTH OF PREGNANCY PRENATAL CARE BEGAN
20. LIVE BIRTHS (Do not include this Child)	20d. OTHER TERMINATIONS (Spontaneous and induced at any time after conception)	21a. MOTHER TRANSFERRED PRIOR TO DELIVERY? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, enter name of facility transferred from	22. ATTENDANT AT BIRTH  1 <input type="checkbox"/> MD 2 <input type="checkbox"/> D.O. 3 <input type="checkbox"/> NURSE 4 <input type="checkbox"/> MIDWIFE 5 <input type="checkbox"/> CERTIFIED NURSE MIDWIFE <input type="checkbox"/> OTHER (Specify)
20a. NOW LIVING Number <input type="checkbox"/> None <input type="checkbox"/>	20b. DEAD Number <input type="checkbox"/> None <input type="checkbox"/>	21b. INFANT TRANSFERRED? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, name facility transferred to.	23. INFANT ADMITTED TO NICU? <input type="checkbox"/> Yes <input type="checkbox"/> No
20c. DATE OF LAST LIVE BIRTH (Mo - Year)	20e. DATE OF LAST OTHER TERMINATION (Mo - Year)		
24. BIRTHWEIGHT (Specify Unit)	25. ESTIMATED WEEKS GESTATION	26. APGAR SCORE 1 MIN 5 MIN	27. PLACE OF BIRTH <input type="checkbox"/> HOSPITAL <input type="checkbox"/> FREESTANDING BIRTH CENTER <input type="checkbox"/> CLINIC/DOCTOR'S OFFICE <input type="checkbox"/> RESIDENCE <input type="checkbox"/> OTHER (Specify)

SIGNATURE OF MOTHER OR INFORMANT: \_\_\_\_\_

73

**MEDICAL RISK FACTORS FOR THIS PREGNANCY**  
(Check all that apply)

Anemia (Hct <30/Hgb <10)	01
Cardiac disease	02
Acute or chronic lung disease	03
Diabetes	04
Genital Herpes	05
Hydramnios/Oligohydramnios	06
Hemoglobinopathy	07
Hypertension chronic	08
Hypertension pregnancy associated	09
Eclampsia	10
Incompetent cervix	11
Previous infant 4000 + grams	12
Previous preterm or small for gestational age infant	13
Renal disease	14
Rh sensitization	15
Uterine bleeding	16
None	00
Other	17

(Specify)

**OTHER RISK FACTORS FOR THIS PREGNANCY**  
(Complete all items)

Tobacco use during pregnancy	Yes	No
Average number cigarettes per day		
Alcohol use during pregnancy	Yes	No
Average number drinks per week		
Weight gained during pregnancy		lbs

**OBSTETRIC PROCEDURES**  
(Check all that apply)

Amniocentesis	01
Electronic fetal monitoring	02
Induction of labor	03
Stimulation of labor	04
Tocolysis	05
Ultrasound	06
None	00
Other	07

(Specify)

**COMPLICATIONS OF LABOR AND OR DELIVERY**  
(Check all that apply)

Fever (>100°F or 38°C)	01
Meconium moderate/heavy	02
Premature rupture of membrane (>12 hours)	03
Abruptio placenta	04
Placenta previa	05
Other excessive bleeding	06
Seizures during labor	07
Precipitous labor (<3 hours)	08
Prolonged labor (>20 hours)	09
Dysfunctional labor	10
Breech/Malpresentation	11
Cephalopelvic disproportion	12
Cord prolapse	13
Anesthetic complications	14
Fetal distress	15
None	00
Other	16

(Specify)

**METHOD OF DELIVERY**  
(Check all that apply)

Vaginal	01
Vaginal birth after previous C section	02
Primary C section	03
Repeat C section	04
Forceps	05
Vacuum	06

**ABNORMAL CONDITIONS OF THE NEWBORN**  
(Check all that apply)

Anemia (Hct <39/Hgb <13)	01
Birth injury	02
Fetal alcohol syndrome	03
Hyaline membrane disease/RDS	04
Meconium aspiration syndrome	05
Assisted ventilation <30 min	06
Assisted ventilation ≥30 min	07
Seizures	08
None	00
Other	09

(Specify)

**CONGENITAL ANOMALIES OF CHILD**  
(Check all that apply)

Anencephalus	01	<input type="checkbox"/>
Spina bifida/Meningocele	02	<input type="checkbox"/>
Hydrocephalus	03	<input type="checkbox"/>
Microcephalus	04	<input type="checkbox"/>
Other nervous system anomalies		
(Specify)	05	<input type="checkbox"/>
Heart malformations	06	<input type="checkbox"/>
Other circulatory/respiratory anomalies		
(Specify)	07	<input type="checkbox"/>
Rectal atresia/stenosis	08	<input type="checkbox"/>
Tracheo esophageal fistula/Esophageal atresia	09	<input type="checkbox"/>
Omphalocele/Gastroschisis	10	<input type="checkbox"/>
Other gastrointestinal anomalies		
(Specify)	11	<input type="checkbox"/>
Malformed genitalia	12	<input type="checkbox"/>
Renal agenesis	13	<input type="checkbox"/>
Other urogenital anomalies		
(Specify)	14	<input type="checkbox"/>
Cleft lip/palate	15	<input type="checkbox"/>
Polydactyly/Syndactyly/Adactyly	16	<input type="checkbox"/>
Club foot	17	<input type="checkbox"/>
Diaphragmatic hernia	18	<input type="checkbox"/>
Other musculoskeletal/integumental anomalies		
(Specify)	19	<input type="checkbox"/>
Down's syndrome	20	<input type="checkbox"/>
Other chromosomal anomalies		
(Specify)	21	<input type="checkbox"/>
None	00	<input type="checkbox"/>
Other	22	<input type="checkbox"/>

(Specify)

## APPENDIX J





# GRAND VALLEY STATE UNIVERSITY


1 CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

January 25, 1999

## Working Agreement

This is a working agreement between Grand Valley State University Kirkhof School of Nursing and the Kalamazoo County Human Services Department, dealing directly with the Fetal Infant Mortality Review Project of Kalamazoo County. This agreement is to allow Lisa Wullschleger, coordinator of the "Fetal Infant Mortality In Kalamazoo" study to collect data from abstract birth and death certificates. This study has been designated a Medical Research Project by Dr. David R. Johnson, Chief Executive and Medical Officer of Community Health of the state of Michigan dated on December 23, 1998 (Copy enclosed).


The data collected will be used for Ms. Wullschleger's thesis project and will be reported in aggregate. No identifiable information will be listed. There will be no contact with the subjects. All information will be held in confidence.

  
Lorraine Rodrigues-Fisher, EdD, RN  
Dean  
Kirkhof School of Nursing

  
Lorence Wenke, Chair  
Board of Commissioners

Date

2/16/99

  
Timothy Snow  
County Clerk/Registrar

Date

2/16/99

## APPENDIX K

Dr. David R. Johnson  
Maternal & Child Health Bureau  
3423 N. Martin Luther King Blvd.  
Lansing, MI. 48909

Lisa Wullschleger  
10400 Roger Street  
Portage, MI 49002  
(616) 323-7788  
November 29, 1998

Dear Dr. Johnson,

I am a graduate-nursing student at Grand Valley State University (GVSU) in Grand Rapids, Michigan working on my master's level thesis. My topic is Fetal/Infant Mortality in Kalamazoo. In a discussion of the above with Christine Wallace, the Kalamazoo Fetal, Infant, Mortality, Review (FIMR) Coordinator at Kalamazoo County Human Services Department, it was suggested that I apply for a medical research designation access. Christine lends her support of my project and will submit a letter to you shortly.

I will be using data collected from the abstract birth certificates and death certificates of all fetal/infant which resulted in demise from 24 weeks of gestation through the 364<sup>th</sup> day of life from 1995 to the present date. All data will be categorically coded so that no identifiable information will be listed and no possible link will exist to identify the certificates with the data. There will be no contact with the subjects. All information will be held in confidence. GVSU has given approval of this project through its Human Research Review Committee.

Please consider my request for a medical research designation access. Feel free to call if I can be of further assistance in answering your questions.

Sincerely,

A solid black rectangular box used to redact the signature of Lisa Wullschleger.

Lisa Wullschleger, R.N., MSN student

## APPENDIX L



JOHN ENGLER, Governor

**DEPARTMENT OF COMMUNITY HEALTH**  
JAMES K. HAVEMAN, JR., Director

**COMMUNITY PUBLIC HEALTH**

DAVID R. JOHNSON, MD MPH, Chief Executive and Medical Officer  
3423 N. MARTIN L. KING JR. BLVD.  
PO. BOX 30195  
LANSING, MI 48909

December 7, 1998

Lisa Wulschleger, R.N.  
10400 Roger Street  
Portage, Michigan 49002

Dear Ms. Wulschleger:

Thank you for your November 29, 1998 letter requesting designation of your research as a state-recognized Medical Research Project. I am pleased that you are conducting research in the important area of fetal and infant mortality.

To grant the Medical Research Project designation, I need you to fill out the enclosed form and return it to me at your earliest convenience. I assume that you have already arranged for access to the birth and death certificates that you need. If you have not yet made such arrangements, please contact Glenn Copeland, Manager of the Data Development Section of our Division for Vital Records and Health Statistics, at 517-335-8678.

Best wishes for a success research project

Sincerely,

A black rectangular box redacting the signature of David R. Johnson.

David R. Johnson, MD, MPH  
Deputy Director for Public Health  
and Chief Medical Executive

Enclosure

cc: Christine Wallace  
Glenn Copeland

## Michigan Department of Community Health

### Application for Designation as a Medical Research Project Under the provision of MCL333.2631-2635

Submit application to:

David R. Johnson, MD, MPH  
Deputy Director for Public Health and  
Chief Medical Executive  
Michigan Department of Community Health  
P.O. Box 30195  
3423 North Martin Luther King Blvd  
Lansing, MI 48909

Office Use Only	
Application Number	_____
Date Received	_____
Date Reviewed	_____
Reviewer	_____
Recommendation Date	_____
Approval Yes	_____ No _____ Date _____

#### I. ORGANIZATION OR INDIVIDUAL MAKING THE REQUEST

a. Project Director

Elsa A. Wullschlaeger

b. Title

RN

c. Organization (Include branch, division, department, etc.)

Grand Valley State University - Health Sciences

d. Street Address or P.O. Box

e. City/State/Zip Code:

f. Telephone

#### II. SUMMARY OF STUDY PROTOCOL OR PROJECT ACTIVITIES

a. Title of Study or Project:

Fetal Infant Mortality in Kalamazoo

b. Name and address of sponsor(s) for this project (if any):

NONE

c. Specify all sources of funding for this project *none*

d. Protection of Human Subject:

Has this project been reviewed by an institutional review board for the protection of human subjects?

☒ Yes *Grand Valley State University - copy enclosed*  
☐ No Indicate Reason: \_\_\_\_\_

e. Informed Consent:

Is there a written informed consent for use in this study?

☐ Yes Attach sample copy of consent form to this application

☒ No

f. Attach a Copy of the Study Protocol or an Abstract of the Protocol

Include the following information in the description of your study:

1. Primary focus. State the specific health or medical problems addressed or other conditions or concerns of the study.
2. Objectives. State the hypotheses to be tested if any.
3. Analyses to be performed.
4. Linkage, if any, with other data files. Specify the source of these files.

5. How will the results be released, including interim and final reports and publications. Copies are to be sent to the department upon completion.

III.

### CONFIDENTIALITY OF IDENTIFIABLE DATA

- a. How is the confidentiality of identifiable data obtained as part of this research project to be maintained? Identifiable data refers to any information which would permit, directly or indirectly, the identification of any individual or establishment.

*Thesis presented as part of requirements for completion of MSN.  
Copy to library  
Copy to Nursing theorist - Betty Neum.  
possible published @ later date*  
*Data collection sheet enclosed. No ID information note*  
Include an explanation of how such data will be stored as well as how and when you plan to dispose of the data after your study is completed.

*Store data on collection sheet in my home and  
will shred after study is completed.*

- b. Will your study require "follow back" investigations to obtain additional information from the individuals, next-of-kin, physicians, and/or other individuals or institutions.

☒ No (proceed to part IV)

☐ Yes (answer questions 1 and 2 below):

1. Briefly describe the following:
  - A. Types of respondents to be contacted.
  - B. Information to be obtained from respondents.
  - C. Methods to be used in conducting such investigations.
  - D. Other organizations, co-investigators or consultants, if any, conducting the investigations.
  
2. How will you maintain the confidentiality of identifiable data obtained from the follow back investigations? Include an explanation of how such data will be stored as well as how and when you plan to dispose of the data after your study is completed.

#### **IV. OTHER DATA AND USES**

- a. For the purpose of this research project as described in the protocol, will any of identifiable data obtained from this project be used by other organizations; e.g., other divisions, agencies, consultants, contractors and/or subcontractors?

☒ No

☐ Yes      Indicate the name of the organization(s) and role(s) in this research project. If the name is unknown at this time, indicate the type of organizations(s). Describe the safeguards that exist (or will be implemented) to ensure that the data will be used solely for the purposes of this research project: 80



- b. Will any of the identifiable data obtained for this project be used as a basis for legal, administrative, or other actions which may affect particular individuals or establishments as a result of their specific identification in this project?

☒ No

☐ Yes      Indicate how the data will be used.

- c. Will the identifiable data be used either directly or indirectly for any research project other than the one described in the study protocol?

☒ No

☐ Yes      Briefly describe the other research project(s) or purpose(s) for which the data will be used.

(Note: A separate application must be submitted for each research project.)

Human Subject Risk:

There will be no contact with the subjects. All data obtained from the certificates gathered at the Kalamazoo Health Department and documented on the audit tool will be held in confidence. No human subject risks are expected.

The above research involves the collection of existing data from public available records and will be documented in such a manner that the subjects cannot be identified directly or through identifiers linked to the subjects.

Thankyou for your consideration.

Sincerely,

A black rectangular redaction box covering the signature of Lisa Wullschleger.

Lisa Wullschleger.

## APPENDIX M



JOHN ENGLER, Governor

**DEPARTMENT OF COMMUNITY HEALTH**  
JAMES K. HAVEMAN, JR., Director

**COMMUNITY PUBLIC HEALTH**

DAVID R. JOHNSON, MD, MPH., Chief Executive and Medical Officer  
3423 N. MARTIN L. KING JR. BLVD  
PO BOX 30195  
LANSING, MI 48909

December 23, 1998

Lisa A. Wulschleger  
10400 Roger Street  
Portage, Michigan 49002

Dear Ms. Wulschleger:

This letter is to designate the study entitled "Fetal Infant Mortality in Kalamazoo" as described in your application as a Medical Research Project.

Such designation is done under the authority provided in Section 2631 and 2632 of the Michigan Public Health Code, P.A. 368 of 1978. This assures that information collected during the study from participating parties can be kept confidential.

Sincerely,

A black rectangular box redacting the signature of David R. Johnson.

David R. Johnson, MD, MPH  
Deputy Director for Public Health  
and Chief Medical Executive

## APPENDIX N

**Public Health Code  
(Public Act 368 of 1978)**

**Section 333.2631 Data concerning medical research project; confidentiality, use.**

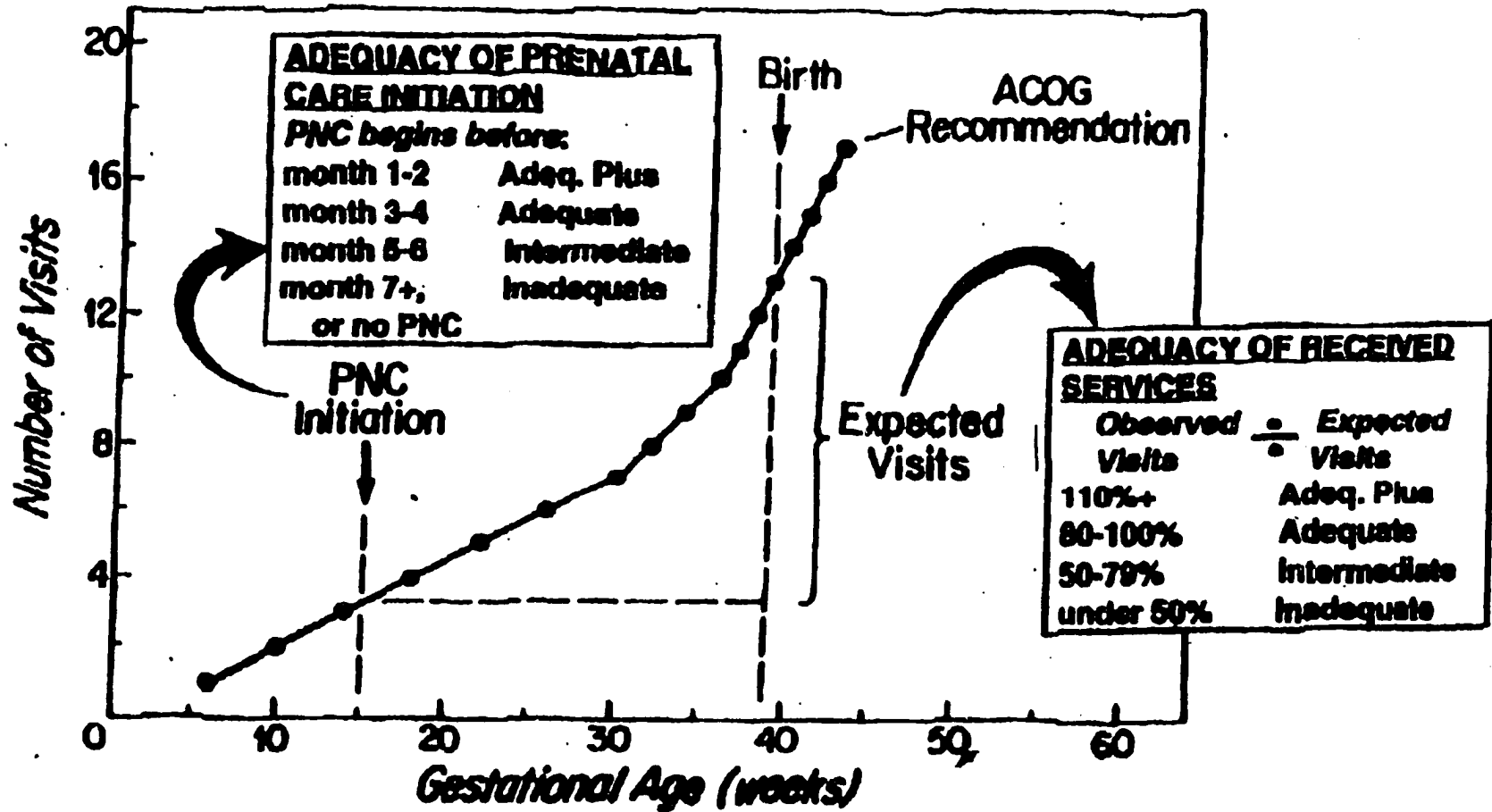
The information, records of interviews, written reports, statements, notes, memoranda, or other data or records furnished to, procured by, or voluntarily shared with the department in the conduct of a medical research project, or a person, agency, organization which has been designated in advance by the department as a medical research project which regularly furnishes statistical or summary data with respect to that project to the department for the purpose of reducing the morbidity or mortality from any cause or condition of health are confidential and shall be used solely for statistical, scientific, and medical research purposes relating to the cause or condition of health.

**Section 333.2632 Data concerning medical research project; inadmissible as evidence; exhibition or disclosure.**

The information, records, reports, statements, notes, memoranda, or other data described in section 2631 are not admissible as evidence in an action in a court or before any other tribunal, board, agency, or person. Furnishing the data to the department in the conduct of a medical research project or to a designated medical research project does not result in the loss of any privilege which the data may otherwise have making them inadmissible as evidence. The information, records, reports, notes memoranda or other data shall not be exhibited nor their contents disclosed in any way, in whole or in part, by the department or its representative or by any other person, agency, or organization, except as is necessary for the purpose of furthering the medical research project to which they relate consistent with section 2637 and the rules promulgated under section 2678. A person participating in a designated medical research project shall not disclose the information obtained except in strict conformity with the research project.

## APPENDIX O

# ADEQUACY OF PRENATAL CARE UTILIZATION INDEX



Adequacy of Prenatal Care Utilization Index, 1994 by M. Kotelchuck.



## APPENDIX P

Appendix P  
Recommended Visits by Weeks of Gestation

<u>Months Gestation</u>	<u>Weeks Gestation</u>	<u>Recommended Visits</u>
10+	45*	19*
	44	18
	43	17
	42	16
9	41	15
	40	14
	39	13
	38	12
8	37	11
	36	10
	35	9
	34	9
	33	8
7	32	8
	31	7
	30	7
	29	6
6	28	6
	27	6
	26	6
	25	5
5	24	5
	23	5
	22	5
	21	4
	20	4
4	19	4
	18	4
	17	3
	16	3
3	15	3
	14	3
	13	2
	12	2
2	11	2
	10	2
	9	1
	8	1
	7	1
1	6	1
	5	0
	4	0
	3	0
	2	0
	1	0

# Appendix P

## Adequacy of Prenatal Care Utilization Index (For Hand Calculations)

### Expected Number of Visits

Month Prenatal Care Began	Gestational Age																	
	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	
9th month	-	-	-	-	-	-	-	-	-	-	-	1	1	2	3	4	5	
8th month	-	-	-	-	-	-	1	1	1	2	3	4	5	6	7	8	9	
7th month	-	-	1	1	1	1	2	2	3	4	5	6	7	8	9	10	11	
6th month	1	1	1	1	2	2	3	3	4	5	6	7	8	9	10	11	12	
5th month	1	1	2	2	3	3	4	4	5	6	7	8	9	10	11	12	13	
4th month	3	3	4	4	5	5	6	6	7	8	9	10	11	12	13	14	15	
3rd month	4	4	5	5	6	6	7	7	8	9	10	11	12	13	14	15	16	
2nd month	5	5	6	6	7	7	8	8	9	10	11	12	13	14	15	16	17	
1st month	6	6	7	7	8	8	9	9	10	11	12	13	14	15	16	17	18	
No info, 0	6	6	7	7	8	8	9	9	10	11	12	13	14	15	16	17	18	

Kotelchuck, M. (1994). Adequacy of prenatal care utilization index: Technical details and rationale. (Technical Report). NC: University of North Carolina at Chapel Hill.

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