Infant Mortality Differentials in a Large, Urban Prenatal Program*

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*Financial assistance was provided by Cuyahoga Community College, the Cleveland Department of Public Health, MetroHealth Medical Center and a two-year grant from the Saint Ann Foundation. Dr. John Neill, Bruce A. Orr and Jamuna Madhava provided computer programming and Vic Hirsh helped retrieve program files. The assistance of Dr. Claudia Coulton, Dr. Edward Mortimer, Dr. James Quilty, Dr. Douglas Rowland and especially Dr. Joan Mallick and Carolyn Zaremba is gratefully acknowledged.
Using linked birth, infant death and program files for 1985-87 Cleveland, Ohio birth cohorts, this study examines racial and ethnic differences in infant mortality and the effect of a large, comprehensive prenatal program on reducing the level of infant deaths. Overall, the infant mortality rates for Hispanics and non-Hispanic Whites were similar and much lower than for African-Americans. Adjusted for level of risk, participation in the prenatal program was associated with improved survival of newborns among Blacks and probably also Hispanics. However, Non-Hispanic White clients, some of whom may have been of Appalachian background, had an excessively high rate of postneonatal mortality. The possible confounding roles of self-selection and unmeasured risk factors are discussed.
Infant Mortality Differentials in a Large, Urban Prenatal Program*

The tools of applied demography and program evaluation can be used to address long standing racial, ethnic and socioeconomic differences in infant mortality. The strong inverse relationship between economic status and infant mortality has been thoroughly documented (Gortmaker 1979; Stockwell and Goza 1996). The infant mortality rate (IMR) for African-Americans has historically been almost twice as high as for Whites; despite the secular decline for both groups, the racial gap persists and for neonatal mortality (infants less than 28 days old) has recently widened (Carmichael, Iyasu and Hatfield-Timajchy 1998). The IMR for Hispanics as a whole is in-between that of non-Hispanic Whites and African-Americans (Singh and Yu 1996). Hispanics are a heterogeneous population, however, with Cuban-Americans having the most favorable birth outcomes followed by Mexican-Americans and then Puerto Ricans (Hummer, Eberstein and Nam 1992).

Programs offering comprehensive prenatal care -- social and educational services as well as medical care -- have been developed to mitigate the effects of poverty and discrimination (Margolis, Cole and Kotch 1997). Early examples are the Maternity and Infant Care (MIC) projects authorized by Congress in 1963. The projects were designed to provide comprehensive prenatal, delivery and postnatal care to low-income mothers and their infants through the first year of life. While today there are fewer programs formally called MIC, many MIC-type programs continue to operate under Maternal and Child Health Block Grants to
states. In Ohio, for example, a majority of the counties have Comprehensive Family Health Service programs.
The purpose of this study is, first, to describe the racial and ethnic differences in infant mortality in Cleveland, Ohio and the adjoining suburb of East Cleveland, hereafter, Cleveland. We then examine the effect of a large MIC program on birth outcomes for the major racial and ethnic groups in the population. The study is based on 1985-87 resident birth cohorts (N=31,367); little is believed to have changed since the data were collected which would alter our basic conclusions.

Literature Review

Early evaluations of MIC, some studies more methodologically rigorous than others, typically showed that these programs reduced prematurity and infant mortality, especially among populations thought to be at greatest risk which were usually identified as Black or adolescent (Zackler, Andelman and Bauer 1969; Bronstein 1974; Peoples and Siegel 1983). Some recently published evaluations of MIC-type programs report gains in infant survival (Clark, et al. 1993; Baldwin et al.1998), while others have demonstrated increased utilization of prenatal care but no improvement in birth outcomes (Dennis-Peoples, Grimson and Daughtry 1984). Most literature reviews conclude that comprehensive prenatal care reduces infant mortality and, somewhat less frequently, raises birthweights (Institute of Medicine 1988; Fink, Yano and Goya 1992; Bennett and Kotelchuck 1997). Examining many of the same studies but setting higher scientific standards, a smaller number of reviews find the evidence to be inconclusive (Shadish and Reis 1984; Fiscella 1995).
Turning to evaluations of Cleveland's MIC program, Houser (1976) reported that participants had lower perinatal mortality rates than non-participants during the program's initial 1966-72 period. Sokol and his colleagues (1980) examined births delivered during a slightly later period in the city's program, 1976-77. They found that MIC clients experienced substantially fewer neonatal deaths than non-MIC clients who had delivered at the same hospital and were at similar sociodemographic and medical risk. Their study, however, did not report results separately by race or for deaths during the postneonatal period.

The large MIC program, which had been operating in Cleveland since 1966, was recently folded into the sponsoring hospital's Child and Family Health Services Program; clients, however, continue to receive essentially the same services. (We retain the name MIC in this report because that was the program's name during our study period.) The county hospital (MetroHealth Medical Center), along with a network of neighborhood clinics, provide clients with medical care and needed social services: health education (including nutrition counseling and parenting guidance), home visits, delinquent appointment follow-up, free dental care and special assistance for adolescents.

DATA AND METHODS

This study is based on linked birth, infant death and program files with data from Ohio annual birth and death tapes, local vital statistics offices, coroner’s reports, hospital information systems, delivery logs and MIC patient ledgers. Another source was the Perinatal Data Base at MetroHealth Medical
Center which contained detailed information for births at that, but only that, hospital. We linked to their birth certificate all 476 resident Cleveland and East Cleveland deceased infants who were born during the 1985-87 study period. Because births under 500 grams are frequently underreported (one of the large area hospitals then routinely classified such births as “abortions”) we deleted 39 decedents weighing less than 500 grams. This left 437 (476-39=437) deaths in our study population.

Record linkage has become an increasing important method for generating sociological and demographic data sets. Using procedures detailed elsewhere (reference) we sought to identify for all Cleveland births which ones were to MIC clients. First, we briefly describe the fairly straightforward procedure for linking MIC deliveries which had occurred at MetroHealth to birth records. We then, in slightly more detail, describe the much more involved procedures for linking city resident MIC births which had occurred at other area hospitals.

We began by keypunching names and dates, from what were then hand maintained lists, for all 12,215 clients who had registered between June 1, 1984 and December 31, 1987. Running this registration file against MetroHealth’s Perinatal Data Base resulted in obtaining birth identifiers for 8,633 deliveries which had occurred at that hospital. Deleting duplicate registrations and births which had occurred outside our study period, we were able to successfully match all 7,011 MetroHealth MIC deliveries to a live or stillbirth record.

This left 3,582 MIC registrations which were not found in MetroHealth’s Perinatal Data Base and presumably had delivered at some other area hospital
or at home (12,215-8,633=3,582). For these registrations we added identifiers, as available, from the hand registration lists and manually verified and augmented this information with data from the Hospital’s patient information system. Deleting 409 ineligible registrations (e.g., miscarriages, induced abortions) we were able to link 62 percent of the remaining 3,173 registrations to at least one plausible live or stillbirth certificate (mean was 4.3 potential matches per client). Common surnames and births clustering in the early childbearing ages made many matches problematical. Which of several possible birth certificates was the correct one was determined by comparing the MIC client’s first name with the baby’s mother’s first name. Mothers’ first names were obtained from delivery logs at area maternity hospitals and local vital statistics offices; (at the time of the study these first names were not included in computerized state birth files). This resulted in linking, with a high degree of confidence, 1,390 out of 3,173 non-MetroHealth clients, or 44 percent, to a live or stillbirth certificate.

All told, our linkage procedures were able to match or resolve 10,432 out of the initial pool of 12,215 MIC registrations for an overall match/resolution rate of 85 percent. The intrinsic match rate was probably slightly higher since clients who registered during the second half of 1987 but delivered after our February, 1988 cut-off date were not linked. A chart review for a random sample of 100 non-matched MIC clients showed that in 37 percent of the cases the chart contained no information about the pregnancy, 31 percent resulted in a live birth to a non-Cleveland resident or gave a last name not available to us, 24 percent
miscarried and the remaining 8 percent moved out of state, had an induced abortion or may not have been pregnant.

Our initial population consisted of all 33,060 Cleveland and East Cleveland resident (MIC and non-MIC) live and stillbirths delivered during 1985-87. We excluded 797 plural births, 339 births not identified as African-American or White, 114 births weighing <500 grams and, in order to allow MIC to have some effect, 427 births which had been registered for less than four weeks of MIC antenatal care. In order to focus the study on live births within major racial and ethnic groups, we also excluded stillbirths (N= 204) and the relatively few Black Hispanic (N=48) cases. These overlapping categories reduced our study population to 31,367 live births of which 13,111 (42.1 %) were non-Hispanic White, 16,909 (54.3 %) were African-American and 1,136 (3.6 %) were Hispanic. The large majority of Hispanic births, almost 84 percent, were Puerto Rican. By program status, almost 23 percent of the births in the study population (N=7,100) were to MIC clients.

To ascertain the independent effect of the MIC program on infant survival we controlled for census tract poverty status, mother's age, marital status and prior experience of an infant or fetal death. Low income may affect birth outcomes through poor nutrition, limited access to health care or association with risky behavior such as use of alcohol or drugs. (Moss & Carver 1992). Teen-age mothers, reflecting a very different maternal environment, tend to have higher IMR's than mature women. Being single, with its attendant material and social characteristics, also negatively affects birth outcomes. The experience of a
previous infant or fetal death -- either as a biological predisposition or as an accumulation of past difficulties -- negatively impacts infant survival (Hummer, Eberstein and Nam 1992). Maternal education is shown for descriptive purposes but was not included as a control in our multivariate analyses because it is not as meaningful a measure for teenagers and also because it was missing for a large proportion, 7.8 percent, of Blacks.

The 1985-87 census tract poverty estimates used in this study were generated by George Zeller (personal communication). We imputed values for the relatively few cases where the mother's age, race, marital status, census tract or the infant's birthweight were missing and for the more numerous instances (N=908) of missing gestational age. Odds Ratios were calculated to show the independent effect of race/ethnicity or MIC participation on infant mortality. All analyses were conducted using SPSS, version 6.1.

RESULTS

We begin by comparing racial and ethnic groups across a series of sociodemographic risk factors. Compared to non-Hispanic White mothers, Black mothers were much more likely to live in a high poverty census tract, to be single, under 20 years of age, to have less than completed high school (among those 20 years or older) and to have experienced a prior infant or fetal loss, Table 1. Hispanic mothers were the least

[insert Table 1 about here]
likely to have completed high school but occupied an intermediate position on the other risk factors. These findings generally parallel those reported in the studies previously cited.

Turning to outcome measures, the Black IMR, 15.0 deaths per 1,000 live births, is much higher than the White rate, 9.5 deaths per 1,000. The same is true of the two components of the IMR: the neonatal (deaths under 28 days) and postneonatal (deaths 28 through 364 days) mortality rate. The adjusted Odds Ratio of an infant death (OR=1.12, reference=White) indicates that much of the excess mortality among Blacks is due to their disadvantaged position. The Hispanic IMR is statistically not significantly different from the non-Hispanic White rate; moreover, if Hispanics were at the same level of risk as other Whites, their IMR would only be approximately two-thirds as large (OR=0.62, reference=White). The observed Black-White mortality difference generally parallels that reported in the previously cited literature but the survival rate of Cleveland Hispanic (mainly Puerto Rican) infants was more favorable than typically reported. This issue is taken up again in the discussion section.

We next examine in Table 2 the relationship between participation in the MIC program and infant survival by race and ethnicity. For all three racial/ethnic groups MIC clients, with a single exception, were at higher risk than their non-MIC counterparts, p<.001. This is as expected since the MIC program is targeted to
disadvantaged groups. In addition, the MIC vs. non-MIC difference appears to be most pronounced in the non-Hispanic White group.

How was program participation related to infant survival? Among Blacks, the total infant and neonatal mortality rate were significantly lower for MIC clients than for non-clients, p<.001. Adjusted Odds Ratios show that the probability of an infant or neonatal death for Black clients was approximately one-half that of Black non-clients. Among Hispanics the total infant and postneonatal mortality rates appear to be lower for MICs than non-MICs but, due to the small number of events, do not reach statistical significance. These findings suggest that for Blacks and probably also for Hispanics the MIC program substantially reduces infant mortality.

A very different pattern characterized non-Hispanic Whites. Here, the total MIC infant mortality rate was more than twice as high as the non-MIC rate and the postneonatal mortality rate was over three times as high, p<.001. The adjusted logistic regression coefficient (OR=2.36, p<.01) indicates that MIC participation, net of measured risk factors, is associated with a much greater risk of a non-Hispanic White infant dying during the postneonatal period.

We next consider the possibility that self-selection may account for some of MIC's "effects" on birth outcomes by examining the relationship between receipt of prenatal care and infant mortality. The prenatal care data come from two self-report items on the birth certificate: month in which prenatal care began and total number of prenatal visits. These data need to be interpreted with some caution because of reliability problems (Kleinman 1991) and because of the high
proportion of missing values, ranging from 11.1 to 28.2 percent, for all except the non-MIC, non-Hispanic White subgroup. A recently developed measure of the adequacy of prenatal care is the Revised GINDEX (Alexander and Kotelchuck 1996) which compares the number of recommended visits (adjusted for gestational age) with the trimester in which prenatal care began and the total number of visits. For economy of presentation and in order to minimize the number of cells with small N's, we collapsed the first three GINDEX categories (intensive, adequate, intermediate) into "adequate" and the latter three (inadequate, no care, missing) into "inadequate". Our basic findings were not substantially altered by using collapsed categories.

Note first the seemingly low proportions of MIC clients, ranging from 56.7 % to 64.3 %, who received adequate prenatal care, Table 3. This may partly be explained by

[insert Table 3 about here]

the fact that the only available measure of MIC participation was the date on which women registered for the program; many clients apparently had little involvement with MIC after initial registration. The most important comparison for our purposes, however, is within MIC and within non-MIC groups by race/ethnicity. Among the non-MIC groups, the difference in the IMR between adequate and inadequate prenatal care is substantial and statistically significant for non-Hispanic Whites and Blacks, p<.001; for Hispanics the infant mortality difference is as expected but, owing to a small N, does not reach statistical significance. Regarding MIC clients, within the non-Hispanic White group the
adequate vs. inadequate care comparison yields an infant mortality difference which barely misses the significance mark, (t=-1.5, p=.13) as does a comparison by trimester registered for MIC (t=-1.2 , p=.23). This suggests that infant mortality is somewhat responsive to the amount of prenatal care received by non-Hispanic White clients. A similar conclusion may be warranted for Hispanic MICs, at least as measured by trimester of MIC registration. Within the African-American MIC group, however, the corresponding infant mortality differences are minor and statistically non-significant. In other words, it seems to matter little at what point in their pregnancy Black woman entered the MIC program or how much care they received; that self-selection, then, may account for some of the favorable program "effects" observed among these clients.

**Summary**  For 1985-87 Cleveland and East Cleveland birth cohorts African-American mothers were most likely to live in a high poverty census tract, to be single, young and to have experienced a previous infant or fetal death; they were followed by Hispanics (mainly Puerto Ricans) and then non-Hispanic Whites. The highest IMR was observed among the Black population and was largely due to that group’s disadvantaged position. Adjusted for level of risk, the Hispanic IMR was approximately two-third's as large as the non-Hispanic White rate.

MIC participation was associated with substantially reduced total infant and neonatal mortality among Blacks. This relationship may have partly been due to self-selection since the IMR for those who reported receiving inadequate prenatal care was about at low as for those who received adequate care.
Unexpectedly, MIC participation was associated with an elevated level of infant mortality among non-Hispanic Whites, especially during the postneonatal period. Among Hispanics the MIC program appeared to be associated with improved survival, especially during the postneonatal period but, due to the small number of events, the relationship was not statistically significant.

**DISCUSSION**

Our findings regarding overall racial and ethnic differentials in infant mortality generally parallel those reported in the literature with the exception of the unusually low level of infant mortality observed among Cleveland's mostly Puerto Rican Hispanics relative to the rest of the city. This may partially be due to the fact that the socioeconomic position of the non-Hispanic White population in Cleveland, as is true in many other older, industrial cities, is not very high to begin with. For example, only 9.8 percent of all non-Hispanic White Cleveland residents who delivered an infant during our study period were college graduates.

One limitation of our evaluation of Cleveland's MIC program is that we have no way of knowing, except through the limited data on birth certificates, what kind of care was received by women who were not in the program. The major limitation of our evaluation, though, is the thorny issue of self-selection. The finding that infant mortality for Black clients was relatively low, regardless of how much (or how little) prenatal care they received, suggests that these women may have possessed healthy lifestyles and supportive social networks before they entered the MIC program. This is not to totally discount the importance of
MIC, however, since such programs provide services that otherwise would not be available to poor women and their families. The stronger relationship between infant mortality and prenatal care observed among non-Hispanic White and Hispanic clients could indicate a stronger program effect or, once again, selection bias. Given the ethical problems of conducting randomized trials in this area of health care, however, it is very difficult to isolate the effect of self-selection.

As previously noted, most published studies of comprehensive prenatal care report beneficial effects. We have also found beneficial program effects, or at least a positive association, with one important exception. The lack of a protective MIC effect for non-Hispanic Whites was unexpected and has not been previously reported. It would be useful to further identify this group. MIC personnel, in conversations with the author, believed that many of their non-Hispanic White clients were of Appalachian backgrounds but this is difficult to verify independently; the birth certificate asked for mother’s state of birth but it was not then coded in the state birth files.

Nonetheless, what factors might account for the very high rate of postneonatal mortality among non-Hispanic White (Appalachian ?) clients? The strong extended family ties characteristic of rural Appalachian communities appear to weaken among migrants to the city (Obermiller and Maloney, 1994). Along this line, some area nurses and social workers have told the author informally that non-Hispanic White mothers receive less support from their kin than African-American or Hispanic mothers. Poor nutrition, smoking and domestic violence may also contribute to the excess postneonatal mortality
among low-income, non-Hispanic Whites (Dye et al 1995; McFarlane, Parker and Soeken 1996; Land and Stockbauer 1993). These issues, along with the presence of poor sanitary conditions, have also been mentioned by MIC professionals. As is generally true, most of the postneonatal deaths in our study were due to exogenous factors (not shown); the above observations would not be inconsistent with these causes of death. Resting on anecdotal evidence, however, the Appalachian hypotheses are largely speculative and would require further testing.

The infant mortality rate observed in our Hispanic population was relatively low. Adjusted for sociodemographic factors, the overall Hispanic IMR was approximately two-third's the White rate and one-half the Black rate; among MIC clients the corresponding differences were even more pronounced. Frequently mentioned as one of the reasons for favorable birth outcomes among otherwise poor Hispanics is the presence of strong family and extended kinship ties which provide material, social and emotional support (Moss and Carver 1992; Wilkinson 1999).

Some social scientists (Lazarus 1994) maintain that poverty is the underlying reason for negative birth outcomes among disadvantaged racial and ethnic minorities. Others (Boone, 1987) have argued that in addition of poverty, sociocultural factors need to be considered. Among the broad category of sociocultural factors, however, it is not clear which distinctly cultural characteristics, especially as related to race or ethnicity influence behavior during pregnancy or caring for an infant (Small 1995). A more promising route may be
the literature on social structure, particularly studies investigating the role of supportive social networks (Rogers, Peoples-Sheps and Suchindran 1996; Rumbaut and Weeks 1989; Shiono et al. 1997).

Does comprehensive prenatal and infant care eliminate the inequities imposed by poverty and racism? This question is difficult to answer through a straightforward statistical comparison but the bulk of the evidence reported here suggests that such care narrows but does not completely eliminate differentials in infant mortality. We also need fundamental changes in our social and economic institutions in order that newborns from all economic, racial and ethnic subgroups have a good start on life.
REFERENCES


### TABLE 1

RISK FACTORS AND INFANT MORTALITY RATES FOR CLEVELAND BIRTH COHORTS BY RACE AND ETHNICITY (N=31,367)

<table>
<thead>
<tr>
<th>Variable</th>
<th>White</th>
<th>Hispanic</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Factors&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High poverty census tract (%)</td>
<td>7.6</td>
<td>21.3</td>
<td>55.2</td>
</tr>
<tr>
<td>High school graduate (%)&lt;sup&gt;b&lt;/sup&gt;</td>
<td>74.5</td>
<td>59.4</td>
<td>72.4</td>
</tr>
<tr>
<td>Maternal age &lt;20 (%)</td>
<td>15.2</td>
<td>23.4</td>
<td>24.6</td>
</tr>
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<td>Out-of-wedlock birth (%)</td>
<td>27.2</td>
<td>51.7</td>
<td>75.5</td>
</tr>
<tr>
<td>Prior infant or fetal loss (%)</td>
<td>4.8</td>
<td>6.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Inadequate or no care (%)</td>
<td>8.9</td>
<td>12.6</td>
<td>17.1</td>
</tr>
<tr>
<td>Infant mortality rate&lt;sup&gt;c&lt;/sup&gt;</td>
<td>9.5</td>
<td>7.9</td>
<td>15.0</td>
</tr>
<tr>
<td>Neonatal mortality rate&lt;sup&gt;c&lt;/sup&gt;</td>
<td>5.0</td>
<td>3.5</td>
<td>8.6</td>
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<td>Postneonatal mortality rate</td>
<td>4.6</td>
<td>4.4</td>
<td>6.5</td>
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<tr>
<td>Adjusted OR of infant death&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.0</td>
<td>0.62</td>
<td>1.12</td>
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<tr>
<td>N</td>
<td>13,053</td>
<td>1,132</td>
<td>16,765</td>
</tr>
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</table>

<sup>a</sup>Chi-square value for all risk factors, p < .001.

<sup>b</sup>Women 20 years and older.

<sup>c</sup>F-ratio, p < .001.

<sup>d</sup>Adjusted for census tract poverty, maternal age, marital status and previous fetal or infant death. Reference group is non-Hispanic White.
# TABLE 2

RISK FACTORS AND INFANT MORTALITY RATES FOR CLEVELAND BIRTH COHORTS BY RACE/ETHNICITY AND MIC STATUS (N=31,367)

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<thead>
<tr>
<th>Variable</th>
<th>White non-MIC</th>
<th>White MIC</th>
<th>Hispanic non-MIC</th>
<th>Hispanic MIC</th>
<th>Black non-MIC</th>
<th>Black MIC</th>
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<td>High poverty census tract (%)</td>
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<td>29.9</td>
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<td>High school graduate (%)</td>
<td>80.3</td>
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<td>76.0</td>
<td>60.0</td>
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<td>Maternal age &lt;20 (%)</td>
<td>11.1</td>
<td>33.1</td>
<td>15.8</td>
<td>31.5</td>
<td>23.0</td>
<td>29.3</td>
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<td>Out-of-wedlock birth (%)</td>
<td>20.9</td>
<td>54.7</td>
<td>40.9</td>
<td>63.2</td>
<td>72.8</td>
<td>83.6</td>
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<tr>
<td>Prior infant or fetal loss (%)</td>
<td>3.8</td>
<td>9.1</td>
<td>6.1</td>
<td>6.0</td>
<td>5.7</td>
<td>10.4</td>
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<tr>
<td>Infant mortality rate</td>
<td>7.7</td>
<td>17.6***</td>
<td>10.2</td>
<td>5.5</td>
<td>16.5</td>
<td>10.2***</td>
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<tr>
<td>Neonatal mortality rate</td>
<td>4.5</td>
<td>7.0</td>
<td>3.4</td>
<td>3.6</td>
<td>9.8</td>
<td>4.6***</td>
</tr>
<tr>
<td>Postneonatal mortality rate</td>
<td>3.2</td>
<td>10.7***</td>
<td>6.8</td>
<td>1.8</td>
<td>6.8</td>
<td>5.6</td>
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<tr>
<td>Adjusted Odds Ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Infant mortality</td>
<td>1.0</td>
<td>1.42</td>
<td>1.0</td>
<td>0.64</td>
<td>1.0</td>
<td>0.58***</td>
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<tr>
<td>Neonatal mortality</td>
<td>1.0</td>
<td>0.84</td>
<td>1.0</td>
<td>1.95</td>
<td>1.0</td>
<td>0.45***</td>
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<tr>
<td>Postneonatal mortality</td>
<td>1.0</td>
<td>2.36**</td>
<td>1.0</td>
<td>0.24</td>
<td>1.0</td>
<td>0.76</td>
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<tr>
<td>N</td>
<td>10,73</td>
<td>2,447</td>
<td>589</td>
<td>551</td>
<td>12,90</td>
<td>4,142</td>
</tr>
</tbody>
</table>

*a All within race/ethnic M&I versus non-M&I risk comparisons statistically significant, p<.001, except Hispanic prior infant or fetal loss.

*b Women 20 years and older.

*c Adjusted for census tract poverty, maternal age, marital status and previous fetal or infant death.

**p<.01, ***p<.001 for t-values comparing M&I versus non-M&I within race/ethnic groups.
TABLE 3
INFANT MORTALITY RATE AND DISTRIBUTION OF BIRTHS BY ADEQUACY OF PRENATAL CARE AND TRIMESTER OF MIC REGISTRATION FOR CLEVELAND BIRTH COHORTS (N=31,367) CLASSIFIED BY RACE/ETHNICITY AND MIC STATUS

<table>
<thead>
<tr>
<th>Category</th>
<th>Non-Hispanic White</th>
<th>Hispanic</th>
<th>African-American</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>non-MIC IMR (%)</td>
<td>MIC IMR (%)</td>
<td>non-MIC IMR (%)</td>
</tr>
<tr>
<td>Adequate care</td>
<td>5.8 (87.7)</td>
<td>14.6 (64.3)</td>
<td>11.0 (77.2)</td>
</tr>
<tr>
<td>Inadequate care</td>
<td>21.3 (17.3)</td>
<td>23.0 (35.7)</td>
<td>7.5 (22.8)</td>
</tr>
<tr>
<td>t-value</td>
<td>-6.1***</td>
<td>-1.5</td>
<td>0.4</td>
</tr>
<tr>
<td>1st Trimester MIC</td>
<td>- - 14.5 (51.0)</td>
<td>- - 0.0 (55.0)</td>
<td>- - 9.4 (43.8)</td>
</tr>
<tr>
<td>2nd or 3rd Tri. MIC</td>
<td>- - 20.9 (49.0)</td>
<td>- - 12.1 (45.0)</td>
<td>- - 10.8 (56.2)</td>
</tr>
<tr>
<td>t-value</td>
<td>-1.2</td>
<td>-1.9*</td>
<td>-0.4</td>
</tr>
</tbody>
</table>

*p<.05, ***p<.001.