BEGINNING TO ADDRESS HEALTH DISPARITIES WITHIN ILLINOIS EHDI

2021 Health Disparity Analysis Findings

Analyzing the Family's EHDI Journey

The EHDI program followed the steps of identification, analysis and intervention to begin to examine and address potential disparities impacting families throughout the EHDI journey. Data collection, manipulation and statistical modeling enabled the identification and analysis of disparities which will be addressed through focus groups. The program focused on infants born in 2019, race, geographic location, area deprivation index (ADI), and the odds of not reaching the national 1-3-6 goals.

Infants residing in non-metropolitan areas have 15% lower odds of receiving a late screening and 38% lower odds of receiving a late diagnosis compared to infants residing in metropolitan areas.

Black/African American infants' odds of receiving a late screening are 25% greater than Caucasian infants.

Infants residing in areas of high deprivation have 44% higher odds of receiving a late diagnosis.

The odds of enrolling in Part C/ Early Intervention later than six months of age are 3.32 times higher for Other Race*.

*Other Race: Black/ African American, Asian, American Indian/ Alaskan Native, Pacific Islander, Unknown, Other.

EHDI Goals

1 **Screening**
Screen infants no later than 1 month of age

3 **Diagnostic Evaluation**
Diagnose no later than 3 months of age

6 **Early Intervention**
Connect to Part C/ Early Intervention no later than 6 months of age

2021 EHDI
Health Disparity
Analysis
Pg. 1
July 2022

Project Members: Project Leader- Gabrielle Bires, MSHI
Intern- Mary Ann Chanase, MPH

Analysis

The three goals were analyzed separately. 1-3-6 goal achievement was classified as met or not met. Out-of-state births, home births, and home addresses outside of Illinois were excluded due to jurisdiction. Statistical analysis was performed with Stata SE version 16.1. Descriptive statistics, bivariate analyses, and binary logistic regressions were performed to determine the impact of race/ethnicity, geographic level, and ADI on 1-3-6 goals. A p-value of <0.05 was considered statistically significant as well as a confidence interval (CI) that does not include 1 in its range. Associations between covariates were assessed using Chi-Square tests for categorical variables and the Kruskal-Wallis test for continuous variables. Binary logistic regression was performed using factors that were significantly associated in the bivariate analyses to determine predictor variables of not achieving 1-3-6 goals.

Results

1-Month Screening Goal

127,981 infants were included in the 1-month screening goal analysis. Bivariate analyses were performed, and baby birth weight, geographic location, ADI, maternal race, maternal education, and insurance type were statistically significant variables (p-value <0.05). Of the infants that did not meet the screening goal, 86% reside in a metropolitan area and 44% reside in an area with high deprivation. 58% of infants were born to Caucasian mothers, 28% were born to Black/African American mothers, 6% were born to mothers who identified as Other, 3% were born to mothers who identified as Hispanic race, and 2.45% were born to Asian/ Pacific Islander mothers. Regarding ethnicity, 23% of infants were born to mothers who identified as Hispanic/Latino.

The binary logistic regression revealed that infants residing in a non-metropolitan area have 15% lower odds of receiving a late screening compared to infants in a metropolitan location [(AOR = 0.85, (95% CI = 0.74-0.98)]. Thus, infants in a non-metropolitan area are more likely to achieve the goal of receiving a screening no later than 1 month of age. For infants whose mothers belonged to the Black/African American race category, the odds of receiving a late screening are 25% higher than infants born to Caucasian mothers [AOR = 1.25, (95% CI = 1.10-1.43)]. Therefore, infants born to Caucasian mothers are more likely to achieve the 1-month goal than infants born to Black/African American mothers.

The odds for infants born to mothers of Other races are 45% higher compared to infants born to Caucasian mothers for receiving a late screening [AOR = 1.45, (95% CI = 1.19-1.77)]. Regarding ethnicity, the odds of receiving a screening after 1 month of age for infants born to mothers who identify as Hispanic/Latino are 25% higher than infants born to mothers who identify as not Hispanic/Latino ethnicity [AOR = 1.25, (95% CI = 1.10-1.41)]. Thus, infants born to mothers who identify with Hispanic/Latino ethnicity are more likely to receive a screening later than 1 month of age

compared to infants born to mothers who identify as not Hispanic/Latino. The infant's birth weight, sex, and health insurance type were significantly associated with the outcome indicating the presence of these covariates as possible risk factors.

3-Month Diagnostic Goal

1,370 infants were included in the 3-month diagnostic goal analysis. Bivariate analyses were performed, and maternal age, baby birth weight, geographic location, ADI, maternal race, maternal education, maternal ethnicity, maternal education, and insurance type were statistically significant. Of the infants that did not meet the diagnostic goal, 86% of the infants reside in a metropolitan geographical area, and 63% reside in an area with high deprivation. 54% of infants were born to Caucasian mothers, 31% were born to Black/African American mothers, 8% were born to mothers who identified as Other, 4% were born to mothers who identified as Hispanic race, and 2% were Asian. Regarding ethnicity, 29% of infants were born to mothers who identified as Hispanic/Latino.

The binary logistic regression revealed that infants residing in a non-metropolitan area have 38% lower odds of receiving a late diagnosis compared to infants in a metropolitan area [AOR = 0.62, (95% CI = 0.43-0.90)]. The odds of receiving a late diagnosis for infants residing in an area with high deprivation are 44% higher compared to infants residing in an area with low deprivation [AOR = 1.44, (95% CI = 1.08-1.93)]. For infants whose mothers belonged to the Other race category, the odds of receiving a late diagnosis are 2.19 times higher than infants of Caucasian mothers [AOR = 2.19, (95% CI = 1.26-3.80)]. Thus, infants that reside in a metropolitan area, experience high deprivation, and are born to mothers of the other race are more likely to receive a diagnosis after 3 months of age. The infant's birth weight, health insurance type, and maternal education were significantly associated with the outcome indicating the presence of these covariates as possible risk factors.

6-Month Intervention Goal

173 infants were included in the 6-month intervention goal analysis. Bivariate analyses were performed, and maternal race (p-value 0.002) was the only significant variable. Of the infants that did not meet the intervention goal, 84% of infants reside in metropolitan locations, and 64% reside in an area with high deprivation. 52% of infants were born to Caucasian mothers, 28% were born to black/African American mothers, 12% were born to mothers who identified as Other, and 8% were born to mothers who identified as Hispanic race. Regarding ethnicity, 24% of infants were born to mothers who identified as Hispanic/Latino.

The binary logistic regression revealed that the odds of being enrolled in Early Intervention later than six months of age for infants whose mothers belonged to the Other race category are 3.32 times higher compared to infants born to Caucasian mothers. [AOR = 3.32, (95% CI: 1.2-9.2)]. Due to the sample size, the Other race

category for this goal analysis includes the following races: Black/ African American, American Indian/ Alaskan Native, Asian American/ Pacific Islander, Hispanic, and Other.

Discussion

Racial, geographic, and neighborhood factors impact an infant's ability to achieve the 1-3-6 goals. This highlights the importance of using multilevel approaches and methods for each specific goal to identify disparities. This goal-specific approach can enable EHDI programs to analyze, address, and work towards reducing inequities.

Maternal race was a consistent predictor variable across all three goals. Compared to infants of Caucasian mothers, infants born to mothers who identified as Other and Black/ African American were less likely to reach the 1-month goal. Compared to infants of Caucasian mothers, infants born to mothers who identified as Other were less likely to reach the 3-month goal. Compared to infants of Caucasian mothers, infants born to mothers of the following racial categories: African American, American Indian/Alaskan Native, Asian American/Pacific Islander, Black or African American (ethnicity), Caucasian, Hispanic, and Other were less likely to reach the 6-month goal. These findings mirror many other infants and maternal health studies that show minority races face health outcome and utilization disparities. Importantly, they show that infant hearing loss follows this same trend and is impacted by racial factors. While the context of this research only brushes the surface of these inequities, merely identifying the disparities can be beneficial for the progression and improvement of infant hearing health outcomes.

The findings from the statistical methods will enable the creation of race-specific interventions. As there are varying cultures, norms, and historical traumas endured by different minority groups, different approaches should be taken for individual races. Analyzing the three goals separately and acknowledging that different factors impact infants through the newborn hearing screening process will allow programs to pinpoint areas of need. Goal-specific interventions could then be created which can be instrumental in improving infant hearing health outcomes and supporting families throughout the newborn hearing screening process.

Geographic location was a predictor variable for the 1-month screening and 3-month diagnostic goals. Infants residing in non-metropolitan areas were more likely to reach the 1-3 goals on time compared to infants residing in metropolitan areas. These findings were unexpected and can lead to further research into this geographic disparity. As metropolitan areas generally have more hospitals and pediatric audiologists, the findings indicate that there may be other factors besides access to care that influence infant hearing health, utilization of services, and process through the EHDI journey. In this study, residential areas play a role in newborn hearing screening outcomes. For example, healthcare facilities and audiologists may not be plentiful in high population areas, services may not be in locations that are accessible by those who need it most, and facilities may not be accessible by public transportation. Therefore, understanding the spatial distribution of an infant's

residence can be conducive to planning interventions for increasing 1-3-6 goal achievement. The results of our study showed that analyzing spatial areas at a more granular level generates new insights as well.

ADI was a predictor for the 3-month diagnostic goal. This highlights the importance of understanding spatial distribution, neighborhood context, and how it relates to audiology service utilization and EHDI programs. Infants residing in areas of high ADI are less likely to achieve the 3-month diagnostic goal. Therefore, social determinants of health such as income, education, employment, and housing quality all influence families navigating the newborn hearing screening program. Neighborhood disadvantage, socioeconomic disadvantage, lack of resources, and distress should be taken into consideration and further analyzed when developing policy and program interventions.

By addressing racial disparities and structural factors of disadvantaged neighborhoods, fundamental changes could be seen which would impact families and EHDI outcomes. Disparities can begin to be addressed by offering resources, advocating for family policies, and leveraging parent-to-parent support groups. While it is outside the scope of EHDI programs to provide, for example, affordable housing or free education, it may be advantageous to identify disadvantaged families and provide educational resources about newborn hearing, transportation, mobile audiology units, telehealth, and payment programs. Since families may not have access to childcare or family leave, programs could advocate for overarching policies that will trickle down and impact families utilizing healthcare services. Parent-to-parent support groups could also be leveraged to improve social cohesion throughout areas with high ADI to improve the number of infants receiving diagnostic evaluations on time. A partnership with a parent-to-parent support group could allow EHDI programs to refer infants residing in high deprivation areas to the parent-to-parent support group and act as a link to the community. Furthermore, qualitative studies in the form of focus groups and conversations could be held which will allow EHDI programs to engage and get proximate with groups of families that have higher odds of not reaching the 1-3-6 goals. The mix of identification of disparities through quantitative analysis and the use of qualitative analysis to provide experiences can further the understanding of disparities in infant hearing health outcomes.

Project Members: Project Leader- Gabrielle Bires, MSHI
Intern- Mary Ann Chanase, MPH