

Demographics and Perinatal Characteristics Associated with Loss to Follow Up Among Children in Michigan with a Failed Hearing Screen, 2016-2021

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Background

- In Michigan, around 95,000 infants pass their initial hearing screen annually, while around 5,000 do not.
- The Michigan Department of Health and Human Services (MDHHS) Early Hearing Detection and Intervention (EHDI) Program strives to ensure additional testing for those who need it. Despite these efforts, over 40% of infants failing their final hearing screen each year do not receive additional testing and are categorized as loss to follow-up.
- Given the invisible nature of hearing loss, timely follow-up testing is crucial. Early detection allows for prompt intervention, preventing potential long-lasting impacts on language and learning.

Purpose

- To analyze differences in demographic and perinatal characteristics associated with loss to follow up (LTF) among Michigan infants, and their families, who failed a hearing screen.

Methods

- This retrospective case control study evaluated differences between populations that followed up with appropriate testing techniques after a failed hearing screen, compared to those who were LTF.
- The infants included within this study were born between January 1, 2016 and December 31, 2021 and failed their final hearing screen.
- EHDI follow up data were obtained from the Michigan Newborn Screening database and linked with birth certificate data from the MDHHS Division for Vital Records and Health Statistics.
- Chi-square analyses were conducted for binary variables, ANOVA analyses were used for categorical variables, and T-tests were conducted to examine differences between cases and controls.
- A multivariate logistic regression was conducted, and odds ratios were obtained.

Results

- 4,083 infants born between January 1, 2016 and December 31, 2021 failed their final hearing screen.
 - 1,636 (40.1%) cases: infants who failed a hearing screen and did not receive follow up with additional testing (i.e., loss to follow-up).
 - 2,447 (59.9%) controls: infants who failed a hearing screen and received adequate follow up with additional testing.
- In the preliminary analysis, there were significant differences ($p \leq 0.05$) between individuals who followed up on a failed screen as compared to those who were LTF for the following characteristics:
 - Maternal education
 - Paternal education
 - Marital status
 - Maternal age
 - Smoking during pregnancy
 - Maternal residence in Macomb, Oakland, or Wayne counties
 - Prenatal care and the trimester initiated
 - Type of hearing screen fail (unilateral/bilateral)
 - Test phase (initial/retest)
 - Race/ethnicity of infant
 - NICU admission
 - Infant birthweight
- After controlling for potential contributing factors within a multivariate logistic regression model, the following groups were more likely to be LTF, when compared to their counterparts:
 - Mothers with lower education.
 - Mothers who are divorced/widowed.
 - Younger mothers.
 - Mothers who started prenatal care in the second trimester.
 - Mothers being a resident of Macomb, Oakland, or Wayne County.
 - Births covered by Medicaid.
 - Mothers not enrolled in WIC at time of birth.
 - Infants failing the screen in only one ear.
 - Infants failing the initial screen and not receiving a retest.
 - Infants of Non-Hispanic Black and Hispanic race.

Public Health Implications

- These findings may:
 - Increase awareness regarding infants at higher risk of LTF after a hearing screen.
 - Allow for development of targeted interventions.
 - Encourage changes that would allow more infants to receive adequate follow up care.

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Results

Table 1. Odds Ratios for Loss to Follow-Up

	Odds Ratio (OR)	95% Wald Confidence Limits	P-Value
Maternal Education			
12th Grade or Less, No Diploma	Ref	Ref	Ref
High School Graduate or GED	0.83	0.66	1.05
Some College, No Degree	0.76	0.59	0.98
Associate Degree	0.38	0.26	0.55
Bachelors Degree	0.38	0.27	0.36
Masters Degree or Higher	0.37	0.24	0.58
Marital Status			
Currently Married	Ref	Ref	Ref
Never Married	1.16	0.96	1.40
Divorced/Widowed	1.78	1.13	2.79
Maternal Age			
	0.98	0.96	0.99
Trimester Prenatal Care Began			
No Care	1.61	1.00	2.58
First Trimester	Ref	Ref	Ref
Second Trimester	1.32	1.10	1.59
Thrid Trimester	1.38	0.99	1.91
Type of Hearing Screen Fail			
Bilateral	0.67	0.57	0.78
Unilateral	Ref	Ref	Ref
Test Phase			
Initial	7.70	6.38	9.29
Retest	Ref	Ref	Ref
Source of Payment			
Medicaid	Ref	Ref	Ref
Private Insurance	0.64	0.53	0.78
Other	0.84	0.55	1.27
WIC Status			
Yes	Ref	Ref	Ref
No	1.22	1.02	1.46
Race/Ethnicity of Infant			
Non-Hispanic White	Ref	Ref	Ref
Non-Hispanic Black	2.70	2.19	3.34
Hispanic	1.46	1.08	1.97
Other Non-Hispanic	1.26	1.00	1.60
NICU			
Yes	0.32	0.26	0.40
No	Ref	Ref	Ref
Smoked During Pregnancy			
Yes	1.52	1.24	1.85
No	Ref	Ref	Ref
Resident of Macomb, Oakland, or Wayne			
Yes	1.99	1.68	2.35
No	Ref	Ref	Ref



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