

# Addressing Maternal and Child Health Disparities Through Perinatal Home Visiting

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## ABSTRACT

**Introduction:** Perinatal home visiting is a popular strategy for promoting maternal and child health in the United States. Despite considerable research on home visiting programs, little is known about the extent to which they engage populations that are disproportionately affected by health inequalities and their social determinants.

**Methods:** Administrative data were obtained for 6327 households served by Wisconsin's Family Foundations Home Visiting (FFHV) program from October 1, 2016, to September 30, 2023. Analyses were performed to calculate the proportion of households representing priority populations at risk of poor maternal and child health outcomes, yielding comparisons with similar estimates in the general population. A service saturation analysis also was performed to explore the extent to which evidence-based home visiting services reach low-opportunity communities across Wisconsin.

**Results:** The findings confirmed that the FFHV program largely directs resources toward disadvantaged and marginalized populations. For instance, nearly two-thirds of the households served were below the federal poverty level, more than a third had a history of substance misuse, and more than half had a current tobacco user—exceeding comparative estimates in the general population by roughly 3-fold to 5-fold. Primary caregivers served were twice as likely to be Black or Hispanic and 5 times as likely to be American Indian or Alaska Native as they were to be White. Whereas 36.5% of Wisconsin ZIP codes were categorized as low-opportunity areas, 69.1% of families served were living in a low-opportunity ZIP code.

**Conclusions:** The FFHV program targets services to populations and communities at risk of maternal and infant health disparities. Additional strategies should be considered to bring home visiting to scale in Wisconsin and nationwide.

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## INTRODUCTION

Perinatal home visiting is a popular strategy for promoting maternal and child health in the United States, as evidenced by strong bipartisan support for the federal Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program that subsidizes evidence-based home visiting programs nationwide.<sup>1,2</sup> While there are many home visiting models with different curricula, most programs offer voluntary, comprehensive, and flexible services that can be tailored to suit the diverse needs of expectant and new parents. In aggregate, these programs have been linked to modest but measurable benefits, including improved outcomes in maternal and infant health, parenting, and child development.<sup>3,4</sup> Yet, despite their impact and wide reach, little is known about the extent to which these programs foster health equity at scale.

Home visiting programs may reduce health disparities, in part, because they typically take a selective approach to prevention. That is, they often target services to populations that are at risk of poor maternal and child health outcomes. For example, around two-thirds of families that are served by MIECHV-subsidized programs are at or below 100% of the federal poverty level.<sup>5</sup> Home visitors help these families achieve a wide range of goals by offering education, guidance, and encouragement. Home visitors also strengthen family connections to health care providers, human service agencies, and economic resources, thereby addressing modifiable conditions associated with structural social determinants of health that are believed to be root causes of health inequities.<sup>6</sup>

Since 2011, Wisconsin has used MIECHV funds to sustain the Family Foundations Home Visiting (FFHV) program, a robust home visiting network administered by the state Department of Children and Families in partnership with the Department of Health Services. The FFHV program supports 4 evidence-based home visiting models: Healthy Families America, Nurse-Family Partnership, Parents as Teachers, and Early Head Start. Each of these programs provides services that can begin prenatally and last for multiple years after a child is born. As of this writing, the FFHV program's local implementing agencies deliver these programs across more than half of Wisconsin's 72 counties and 11 federally recognized tribal regions. In accordance with MIECHV policy,<sup>7</sup> a statewide home visiting needs assessment was completed with the aim of directing the FFHV program's resources toward communities with high levels of adverse perinatal outcomes and other risk indicators, such as poverty and substance abuse.<sup>8</sup> Among its key findings, the needs assessment confirmed that there are significant racial/ethnic differences in perinatal outcomes and sizeable service gaps in certain communities. To the extent that these disparities in access and outcomes can be addressed, the FFHV program may act as a lever for promoting maternal and child health equity.

Despite considerable research on the impact of home visiting programs, little is known about the extent to which they reach populations that are disproportionately affected by health inequalities and their social determinants. Therefore, the current study uses household- and community-level data to assess the FFHV program's capacity and whether it serves priority populations and communities. By making comparisons to the general population of families with children, we are able to draw inferences about the extent to which program resources have been distributed equitably.

## METHODS

### Data and Sample

The current study was conducted as part of a MIECHV-coordinated state evaluation focused on family engagement and health equity. In alignment with a federally approved evaluation plan, an analysis was completed to explore whether Wisconsin's FFHV program is working effectively toward health equity goals by enrolling disadvantaged and marginalized families and communities. Administrative data housed at the Wisconsin Department of Children and Families were obtained for all families served by the FFHV program from October 1, 2016, through September 30, 2023. The begin date corresponds with a transition to the use of DAISEY (Data Application and Integration Solutions for the Early Years), a dedicated FFHV database that records standard performance indicators for each family served. Access to these data was granted by the Wisconsin Department of Children and Families pursuant to a data sharing

agreement and approval of study protocols by the institutional review board at the University of Wisconsin-Milwaukee (protocol 14.286).

The primary study sample includes 6327 primary caregivers, with 96.2% identifying as women and 3.8% as men (nonbinary gender data were unavailable). At the point of enrolling in a home visiting program, more than half the participants (56.7%) were single and had never married, and more than a quarter (25.2%) had less than a high school diploma or GED equivalent. Statewide ZIP code-level data representing variation in levels of community opportunity were obtained from public records and matched to household address records for 4490 participants served from October 1, 2021, through September 30, 2023, with valid ZIP codes. The community-level analysis was restricted to this 2-year period to minimize the influence of changes to the composition of the FFHV program due to the occasional discontinuation of local implementing agencies and onboarding of new local implementing agencies.

### Measures

**Priority Populations:** Program data housed in DAISEY were used to create indicators that correlate with maternal and infant health outcomes, including 4 measures that represent MIECHV priority populations: (1) low-income household (ie, <100% of federal poverty guidelines), (2) primary caregiver under 20 years of age at the birth of the child associated with the home visiting service episode (ie, index child), (3) household member with a history of substance misuse or need for treatment, and (4) household tobacco use. Although race and ethnicity are not explicit priority population categories for the MIECHV Program, we also examined the FFHV program's engagement of different racial/ethnic groups given that many health disparities in the US fall along racial/ethnic lines. Primary caregivers associated with a service episode were coded as Hispanic/Latino or one of the following non-Hispanic categories: American Indian or Alaska Native, Asian, Black or African American, White, and Other.

Comparative data indicating the statewide prevalence of different priority populations were obtained from multiple sources, including the US Census, Centers for Disease Control and Prevention, and Wisconsin Department of Health Services.<sup>9-11</sup> State-level data were unavailable for household substance use; these data points were obtained from the National Surveys on Drug Use and Health.<sup>12</sup>

**Priority Communities:** Publicly available ZIP code-level information for participating households was obtained from the Child Opportunity Index 2.0 (COI 2.0), which indexes variation in community resources and conditions on a 5-point scale ranging from very low to very high child opportunity.<sup>13</sup> The COI 2.0 captures 29 indicators in 3 domains: (1) Education, (2) Health and Environment, and (3) Social and Economic. For this study, the total COI 2.0 score for each ZIP code in Wisconsin

**Figure 1.** Child Opportunity Levels by Wisconsin ZIP Code

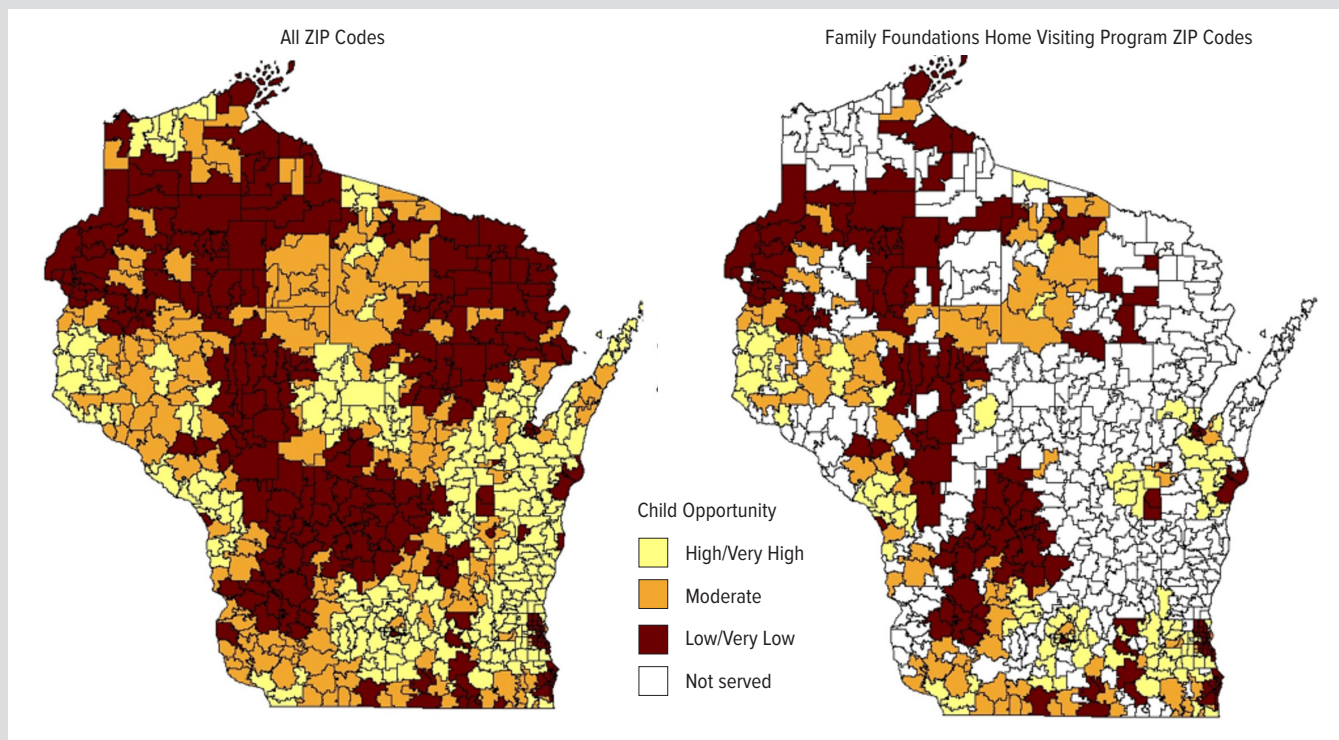


Figure displays variation in community resources and conditions at the ZIP code level according to data from the Child Opportunity Index 2.0. The map on the left distinguishes opportunity levels across all ZIP codes in Wisconsin, and the map on the right distinguishes opportunity levels across ZIP codes where families were served by the Family Foundations Home Visiting Program (FFHV). ZIP codes shown in white were not served by the FFHV program between October 1, 2021, and September 30, 2023.

was ranked initially into quintiles representing different levels of opportunity (very low, low, moderate, high, very high). To avoid small cell sizes, the ZIP codes were then recoded into 3 categories of community opportunity: (1) low (ie, low or very low), (2) moderate, (3) high (ie, high or very high). The maps shown in Figure 1 present the distribution of opportunity levels across all ZIP codes in Wisconsin and the ZIP codes served by the FFHV program.

**Analysis Plan**

Descriptive analyses were performed to calculate the proportion of the FFHV sample composed of different priority populations (eg, living in poverty, substance misuse). Similar rates were obtained from public data sources to facilitate descriptive comparisons with the general population statewide or nationally.<sup>9-12</sup> Cross-tabulations were performed to produce a risk ratio (RR) for each metric, with an RR above 1.00 indicating that a priority population is overrepresented in the FFHV sample. Separate cross-tabulations were performed to explore the distribution of MIECHV priority population categories among racial/ethnic groups in the FFHV sample. Chi-square tests were conducted to produce RR estimates, indicating whether these priority categories were overrepresented or underrepresented among racial/ethnic minority participants compared to non-Hispanic White

**Table 1.** Demographic Comparison of Families Served by the Family Foundations Home Visiting (FFHV) Program to the General Population (N=6327)

	FFHV Program	General Population	Risk Ratio
Low-income household	65.0%	12.9% <sup>a</sup>	5.0
Under age 20 at child's birth <sup>a</sup>	20.9%	7.8% <sup>d</sup>	2.7
History of substance misuse or treatment needs	36.9%	12.3% <sup>c</sup>	3.0
Tobacco use	50.9%	10.1% <sup>d</sup>	5.2
Race and ethnicity			
American Indian or Alaska Native	5.6%	1.1% <sup>b</sup>	5.1
Asian	4.7%	4.4% <sup>b</sup>	1.1
Black/African American	20.3%	10.1% <sup>b</sup>	2.0
Hispanic/Latino	22.8%	11.2% <sup>b</sup>	2.0
Other	3.3%	2.7% <sup>b</sup>	1.2
White	43.3%	71.5% <sup>b</sup>	0.6

<sup>a</sup>The federal MIECHV Program prioritizes serving individuals who give birth before age 21. This study uses a lower age threshold for early childbearing (<20) because comparable state-level data are available. The prevalence of early childbearing among FFHV participants is underestimated because some participants who gave birth to the index child after age 20 also gave birth previously before age 20.

<sup>b</sup>Source: US Census, American Community Survey.<sup>9</sup>

<sup>c</sup>Source: Centers for Disease Control and Prevention.<sup>10</sup>

<sup>d</sup>Source: Comparative estimate unavailable for Wisconsin population. Estimate from the US population was calculated using data from National Surveys on Drug Use and Health.<sup>12</sup>

<sup>e</sup>Source: Wisconsin Department of Health Services, Wisconsin Interactive Statistics on Health.<sup>11</sup>

**Table 2.** Priority Populations Served by the Family Foundations Home Visiting Program, Variation by Race/Ethnicity (N = 6314)

Priority Population Indicators	American Indian/ Alaska Native, n=353	Asian n=295	Black/African American, n=1281	Hispanic n=1441	Other n=207	White n=2737
	%	%	%	%	%	%
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR
Low-income household	72.6% <b>1.21 (1.12–1.30)</b>	64.6% 1.07 (0.98–1.18)	76.4% <b>1.27 (1.21–1.33)</b>	61.7% 1.03 (0.97–1.08)	71.2% <b>1.18 (1.08–1.30)</b>	60.1%
< Age 20 at child's birth	17.8% 0.90 (0.71–1.13)	8.8% <b>0.44 (0.30–0.64)</b>	23.6% <b>1.19 (1.05–1.34)</b>	23.4% <b>1.18 (1.04–1.33)</b>	22.0% 1.10 (0.84–1.44)	19.9%
Substance misuse or treatment needs	65.8% <b>1.33 (1.22–1.45)</b>	7.8% <b>0.16 (0.11–0.23)</b>	25.3% <b>0.51 (0.46–0.57)</b>	21.6% <b>0.44 (0.39–0.49)</b>	38.2% <b>0.77 (0.65–0.92)</b>	49.5%
Tobacco use	68.8% 1.07 (0.99–1.15)	33.9% <b>0.53 (0.45–0.62)</b>	45.3% <b>0.71 (0.66–0.75)</b>	29.2% <b>0.45 (0.42–0.50)</b>	55.1% <b>0.86 (0.76–0.97)</b>	64.3%

A risk ratio (RR) and CI is listed below each prevalence estimate (%). RRs compare the prevalence of priority population indicators reported by White caregivers to the prevalence reported by caregivers of other racial/ethnic groups served by the FFHV program. RRs in bold denote statistically significant contrasts ( $P < .05$ ). Sample sizes are reduced due to missing data for race/ethnicity (n=13).

participants. Missingness for priority populations ranged from 0.2% (under age 20 at child's birth) to 6.6% (low-income household); 0.2% of the sample (n=13) were missing race/ethnicity. Missing cases were omitted from corresponding analyses via listwise deletion.

A service saturation analysis was conducted to explore whether the FFHV program reaches priority communities across Wisconsin. To operationalize service saturation—or the extent to which the FFHV program penetrated different communities—we calculated the number of families served in all 864 Wisconsin ZIP codes and classified each ZIP code into 1 of 3 categories: (1) FFHV service area, families served; (2) FFHV service area, no families served; and (3) non-FFHV service area. Across all 3 service area categories, we described the proportion of ZIP codes that were low-opportunity, moderate-opportunity, and high-opportunity areas. We then used household-level data to conduct a within-group analysis of FFHV-served families to determine the proportion that lived in low-, moderate-, and high-opportunity areas. The analysis was conducted in SPSS version 28.0, and corresponding maps were generated using ArcGIS 10.8.

## RESULTS

### Priority Populations Served

Table 1 presents household demographics for FFHV program participants along with comparative population estimates. Nearly two-thirds (65.0%) of FFHV households served were below the federal poverty level, which is about 5 times higher than the poverty rate among all Wisconsin households with children under age 18 (12.9%; RR 5.0). More than 1 out of 5 (20.9%) index children served by the FFHV program had a primary caregiver under the age of 20, which is nearly 3 times the rate of teen childbearing in Wisconsin (7.8%; RR 2.7). Over a third of FFHV households had

**Table 3.** ZIP Codes Served by Child Opportunity Level, Family Foundations Home Visiting Program (FFHV), 2021-2023

ZIP Code Categories	Child Opportunity Level			Total % (N)
	Low % (N)	Moderate % (N)	High % (N)	
FFHV service area, ZIP codes served	42.8% (154)	26.9% (97)	30.3% (109)	100.0% (360)
FFHV service Area, ZIP codes not served	37.5% (93)	21.4% (53)	41.1% (102)	100.0% (248)
ZIP codes outside FFHV service area	26.6% (68)	25.4% (65)	48.0% (123)	100.0% (256)
Total	36.5% (315)	24.9% (215)	38.7% (334)	100.0% (864)

an identified history of substance misuse or need for treatment (36.9%), which is roughly 3 times the estimated proportion of US children who live with a parent who has a substance use disorder (12.3%; RR 3.0). Signs of tobacco use were present in over half of FFHV households (50.9%), which is more than 5 times the estimated proportion among all Wisconsin households with children (10.1%; RR 5.2). The racial/ethnic composition of primary tablecaregivers in the FFHV sample was 43.3% White, 22.8% Hispanic/Latino, 20.3% Black/African American, 5.6% American Indian/Alaska Native, 4.7% Asian, and 3.3% Other. Compared to the general Wisconsin population of adults with children, the FFHV program was 1.1 times as likely to serve Asian adults, 1.2 times as likely to serve adults classified as Other race, 2.0 times as likely to serve both Black/African American and Hispanic/Latino adults, and 5.1 times as likely to serve American Indian/Alaska Native adults.

### Racial/Ethnic Comparison of Priority Populations Served

Table 2 displays how priority populations are distributed among racial/ethnic groups. Compared to the 60.1% of White primary caregivers from households living below the poverty level, Black/African American caregivers were more likely to be poor (76.4%; RR 1.27), as were American Indian/Alaska Native caregivers (72.6%; RR 1.21). Compared to the 19.9% of White caregivers who were less than age 20 at the index child's birth, teen child-



bearing was more prevalent among Black/African American caregivers (23.6%; RR 1.19) and Hispanic/Latino caregivers (23.4%; RR 1.18), and less prevalent among Asian caregivers (8.8%; RR 0.44). Substance misuse was more prevalent in households with American Indian/Alaska Native caregivers compared to White caregivers (65.8% vs 49.5%; RR 1.33). Conversely, lower rates of substance misuse were present among households with caregivers who were Asian (7.8%; RR 0.16), Hispanic/Latino (21.6%; RR=0.44), Black/African American (25.3%; RR 0.51), and Other race (38.2%; RR 0.77). Compared to the 64.3% of White caregivers living in a household with tobacco use, lower rates of tobacco use were present in households with caregivers who were Hispanic/Latino (29.2%; RR 0.45), Asian (33.9%; RR 0.53), Black/African American (45.3%; RR 0.71), and Other (55.1%; RR 0.86).

### Service Saturation Analysis

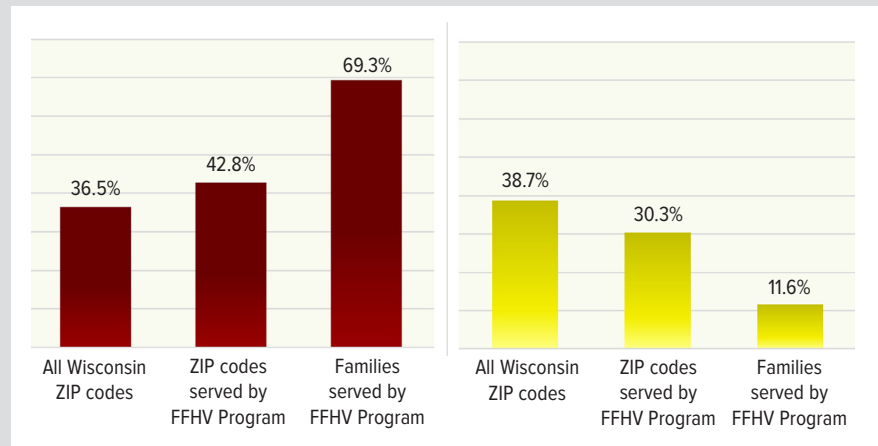
Out of 864 Wisconsin ZIP codes, 608 (70.4%) were within the service coverage area of the FFHV program (see Table 3). Among these 608 ZIP codes, 360 (59.2%) had at least 1 family served during the 2-year analysis period. Out of the 360 ZIP codes that were actively served by the FFHV program, 154 (42.8%) were a low-opportunity area, 97 (26.9%) were a moderate-opportunity area, and 109 (30.3%) were a high-opportunity area. Out of the 256 ZIP codes that were outside the FFHV Program's coverage area, 68 (26.6%) were a low-opportunity area, 65 (25.4%) were a moderate-opportunity area, and 123 (48.0%) were a high-opportunity area.

There were 4490 families served by the FFHV program during the analysis period, 69.3% of whom resided in a low-opportunity area (see Figure 2, Panel 1). By comparison, 36.5% of all Wisconsin ZIP codes were low-opportunity areas. Among all FFHV-served families, 11.6% lived in a high-opportunity area, whereas 38.7% of all Wisconsin ZIP codes were high-opportunity areas (see Figure 2, Panel 2).

## DISCUSSION

Demonstrating Wisconsin's evidence-based home visiting service capacity, agencies supported by the FFHV program enrolled more than 6300 families over a 7-year period ending in September 2023. Nearly two-thirds of the households served were at or below the federal poverty level, more than a third had a history of substance misuse, and more than half had a current tobacco user—these figures exceed comparative estimates in the general population by roughly 3-fold to 5-fold. Primary caregiv-

**Figure 2.** Variation in Child Opportunity Levels



In each panel, the first two bars denote the proportion of ZIP codes that were classified as low opportunity and high opportunity. The third bar in each panel denotes the proportion of families served by the Family Foundations Home Visiting (FFHV) program that resided in low-opportunity and high-opportunity areas.

ers served by the FFHV program were twice as likely to be Black or Hispanic and 5 times as likely to be American Indian/Alaska Native as they were to be White. Compared to their White counterparts, Black and Indigenous caregivers were more likely to be poor, while Black and Hispanic caregivers were more likely to be a teen parent at enrollment. Taken together, these findings signal that the FFHV program largely directs resources toward disadvantaged and marginalized populations at an elevated risk of maternal and infant health disparities.

It is also notable that rates of substance misuse and tobacco use were higher among low-income White and Indigenous households than among low-income Black and Hispanic households. These results reinforce research indicating that health disparities and their upstream correlates do not cleave neatly along racial/ethnic lines within the FFHV service population.<sup>14,15</sup> Variability in racial/ethnic disparities may be partly related to differences between urban environments, where most of Wisconsin's Black and Hispanic families receive home visiting services, and more rural environments, where most White and Indigenous families are served. Supporting this hypothesis, prior research has documented rural-urban discrepancies in health behaviors and health outcomes.<sup>16-18</sup>

We performed a service saturation analysis to evaluate the extent to which the FFHV program reaches families and communities at risk of poor maternal and child health outcomes. At present, 70% of Wisconsin's ZIP codes lie within the FFHV coverage area, although only 42% of the state's ZIP codes had at least 1 family served from October 2021 through September 2023. As expected, the FFHV program dedicated much of its resources to less advantaged community areas. Less than 27% of ZIP codes outside the FFHV program's coverage area were classified as low-opportunity, whereas nearly 43% of the ZIP codes actively ser-

vised by the program were low-opportunity. Moreover, 69% of all families that received services from one of the FFHV program's local implementing agencies were living in a low-opportunity ZIP code. These findings suggest that the state FFHV program supports agencies that disproportionately serve low-opportunity ZIP codes and that these agencies further redistribute resources toward families residing in more disadvantaged ZIP codes within their service area.

### Limitations

This study has multiple limitations. Chief among them is our reliance on available public records with inconsistent operational definitions for drawing comparisons between the FFHV sample and the general population. Although we are reasonably confident in the overall accuracy of our conclusions, the risk ratio estimates presented are imprecise. Additionally, inferences related to variations in community opportunity should be interpreted with caution, as ZIP codes are coarse geographic designations that have shortcomings for investigations of spatial and demographic variation.<sup>19</sup>

### Implications and Future Directions

Perinatal home visiting programs occupy a special position in the health and human services landscape because they engage families in their natural environments during a sensitive period of the life course. These programs may promote health equity by enhancing maternal and child health outcomes among some of society's most disadvantaged families and communities. Results from this study suggest that the FFHV program successfully targets resources toward priority populations, including low-income households, racial/ethnic minority groups, and low-opportunity community areas. Given their broad and flexible service array, home visiting programs can address a variety of health inequities that manifest in these different subpopulations.

While there are reasons for optimism, caution should be exercised when projecting the net impact of home visiting programs on health disparities. Program effects tend to be heterogeneous and small in aggregate.<sup>3,4</sup> Additionally, most programs employ a targeted prevention approach whereby services are directed toward a small segment of the population. For instance, the FFHV program typically enrolls less than 1000 families with newborns per year, representing less than 2% of births statewide.<sup>20</sup> Moving the needle on population-level health disparities may require achieving larger effect sizes, reaching more families, or both.

Efforts to promote maternal and child health equity in Wisconsin may be advanced by expanding the FFHV program statewide. At the same time, there is a need to understand which strategies are most effective for specific populations, an approach known as precision home visiting.<sup>21</sup> One way to increase precision is by investing in innovative models that engage underserved populations. For instance, the Milwaukee Health Department

supports the Direct Assistance for Dads Project, which serves expecting fathers and men with children up to age 3. Another example is the Family Spirit model, which provides culturally aligned education and services to tribal communities<sup>22</sup> and has been piloted in Wisconsin by the Ho-Chunk Nation Department of Health.

Greater precision also may be achieved by combining targeted interventions with more universal strategies, as recommended by the World Health Organization's Commission on Social Determinants of Health.<sup>23</sup> Exemplifying progress on this front in Wisconsin, Racine and Walworth counties recently adopted the Hello Baby program, a postpartum nurse home visiting initiative. Once fully implemented, this program will offer services countywide to all families with a newborn. Although Hello Baby is offered to families across the socioeconomic spectrum, the level of support they receive varies based on their assessed need. This prevention strategy, known as targeted universalism, balances equality of access with equity of resource allocation. By increasing access to home visiting and allocating resources proportionate to the needs of different families and communities, Hello Baby is well aligned with national health equity goals articulated in the Healthy People 2030 framework.<sup>24</sup>

### CONCLUSIONS

Since 2011, Wisconsin has used federal Maternal, Infant, and Early Childhood Home Visiting dollars to develop and sustain a robust network of evidence-based home visiting programs. Our findings suggest that the Family Foundations Home Visiting program is successfully reaching priority populations and communities at risk of poor maternal and child health outcomes. More fully realizing the program's potential to promote health equity at scale may require additional investments to extend services to unserved and underserved populations and communities.

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### REFERENCES

1. Jackie Walorski Maternal and Child Home Visiting Reauthorization Act of 2022, H.R. 8876, 117th Cong. (2021-2022). Accessed June 25, 2024. <https://www.congress.gov/bills/117/congress-house-bill/8876>
2. Congressional Research Service. In focus: Maternal, Infant, and Early Childhood Home Visiting Program. Updated August 29, 2023. Accessed June 25, 2024. <https://crsreports.congress.gov/product/pdf/IF/IF10595>
3. Filene JH, Kaminski JW, Valle LA, Cachat P. Components associated with home visiting program outcomes: a meta-analysis. *Pediatrics*. 2013;132(suppl 2):S100-S109. doi:10.1542/peds.2013-1021H
4. Sweet MA, Appelbaum MI. Is home visiting an effective strategy? a meta-analytic

review of home visiting programs for families with young children. *Child Dev.* 2004;75(5):1435-1456. doi:10.1111/j.1467-8624.2004.00750.x

5. The Maternal, Infant, and Early Childhood Home Visiting Program. Health Resources and Services Administration, Maternal and Child Health Bureau. June 2024. Accessed June 25, 2024. <https://mchb.hrsa.gov/sites/default/files/mchb/about-us/program-brief.pdf>

6. Braveman P, Gottlieb L. The social determinants of health: it's time to consider the causes of the causes. *Public Health Rep.* 2014;129(suppl 2):19-31. doi:10.1177/003335491412915206

7. Mitchell A, Heisler, EJ. Bipartisan Budget Act of 2018 (P.L. 115-123): CHIP, public health, home visiting, and Medicaid provisions in Division E. Congressional Research Service. Report R45136. March 20, 2018. Accessed June 25, 2024. <https://sgp.fas.org/crs/misc/R45136.pdf>

8. Wisconsin Maternal, Infant, and Early Childhood Home Visiting: statewide needs assessment update. Wisconsin Department of Children and Families. 2020. Accessed June 25, 2024. <https://dcf.wisconsin.gov/files/cwportal/prevention/wi-update-narrative.pdf>

9. American Community Survey: ACS 5-year estimates detailed tables. Table B05010: ratio of income to poverty level in the past 12 months by nativity of children under 18 years in families and subfamilies by living arrangements and nativity of parents. United States Census Bureau. 2021. Accessed June 25, 2024. <https://data.census.gov/table/ACSST5Y2021.B05010?q=B05010&y=2021>

10. CDC WONDER: natality information. Centers for Disease Control and Prevention. Updated September 18, 2024. Accessed December 18, 2024. <https://wonder.cdc.gov/natality.html>

11. Wisconsin Interactive Statistics on Health (WISH) query system: birth counts module. Wisconsin Department of Health Services. Updated May 10, 2023. Accessed June 25, 2024. <https://www.dhs.wisconsin.gov/wish/birth/index.htm>

12. Lipari RN, Van Horn SL. Children living with parents who have a substance use disorder. In: *The CBHSQ Report*. Substance Abuse and Mental Health Services Administration (US); August 24, 2017:1-7. Accessed June 25, 2024. <https://www.ncbi.nlm.nih.gov/books/NBK464590/>

13. Noelke C, McArdle N, Baek M, et al. *Child Opportunity Index 2.0 Technical Documentation*. diversitydatakids.org; January 15, 2020. Accessed June 25, 2024. [https://www.diversitydatakids.org/sites/default/files/2020-02/ddk\\_coi2.0\\_technical\\_documentation\\_20200212.pdf](https://www.diversitydatakids.org/sites/default/files/2020-02/ddk_coi2.0_technical_documentation_20200212.pdf)

14. Mersky JP, Jeffers NK, Lee CP, Schlafer RJ, Jackson DB, Gómez A. Linking adverse experiences to pregnancy and birth outcomes: a life course analysis of racial and ethnic disparities among low-income women. *J Racial Ethn Health Disparities.* 2024;11(3):1741-1753. doi:10.1007/s40615-023-01647-w

15. Mersky JP, Janczewski CE. Racial and ethnic differences in the prevalence of adverse childhood experiences: findings from a low-income sample of U.S. women. *Child Abuse Negl.* 2018;76:480-487. doi:10.1016/j.chiabu.2017.12.012

16. Parker MA, Weinberger AH, Eggers EM, Parker ES, Villanti AC. Trends in rural and urban cigarette smoking quit ratios in the US from 2010 to 2020. *JAMA Netw Open.* 2022;5(8):e2225326. doi:10.1001/jamanetworkopen.2022.25326

17. Probst JC, Zahnd WE, Hung P, Eberth JM, Crouch EL, Merrell MA. Rural-urban mortality disparities: variations across causes of death and race/ethnicity, 2013-2017. *Am J Public Health.* 2020;110(9):1325-1327. doi:10.2105/AJPH.2020.305703

18. Zeng D, You W, Mills B, Alwang J, Royster M, Anson-Dwamena R. A closer look at the rural-urban health disparities: insights from four major diseases in the Commonwealth of Virginia. *Soc Sci Med.* 2015;140:62-68. doi:10.1016/j.socscimed.2015.07.011

19. Grubestic TH. Zip codes and spatial analysis: problems and prospects. *Socioecon Plan Sci.* 2008;42(2):129-149. doi:10.1016/j.seps.2006.09.001

20. Wisconsin Interactive Statistics on Health (WISH) query system: annual number of Wisconsin births, 1990-2022. Wisconsin Department of Health Services. Updated February 15, 2024. Accessed August 26, 2024. <https://www.dhs.wisconsin.gov/wish/birth/data.htm>

21. Supplee LH, Duggan A. Innovative research methods to advance precision in home visiting for more efficient and effective programs. *Child Dev Perspect.* 2019;13(3):173-179. doi:10.1111/cdep.12334

22. Haroz EE, Ingalls A, Kee C, et al. Informing precision home visiting: identifying meaningful subgroups of families who benefit most from family spirit. *Prev Sci.* 2019;20(8):1244-1254. doi:10.1007/s11121-019-01039-9

23. World Health Organization. Closing the gap in a generation: health equity through action on the social determinants of health – final report of the Commission on Social Determinants of Health. August 27, 2008. Accessed August 26, 2024. <https://www.who.int/publications/i/item/WHO-IER-CSDH-08.1>

24. US Department of Health and Human Services. Healthy People 2030 framework. Accessed August 26, 2024. <https://health.gov/healthypeople/about/healthy-people-2030-framework>

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