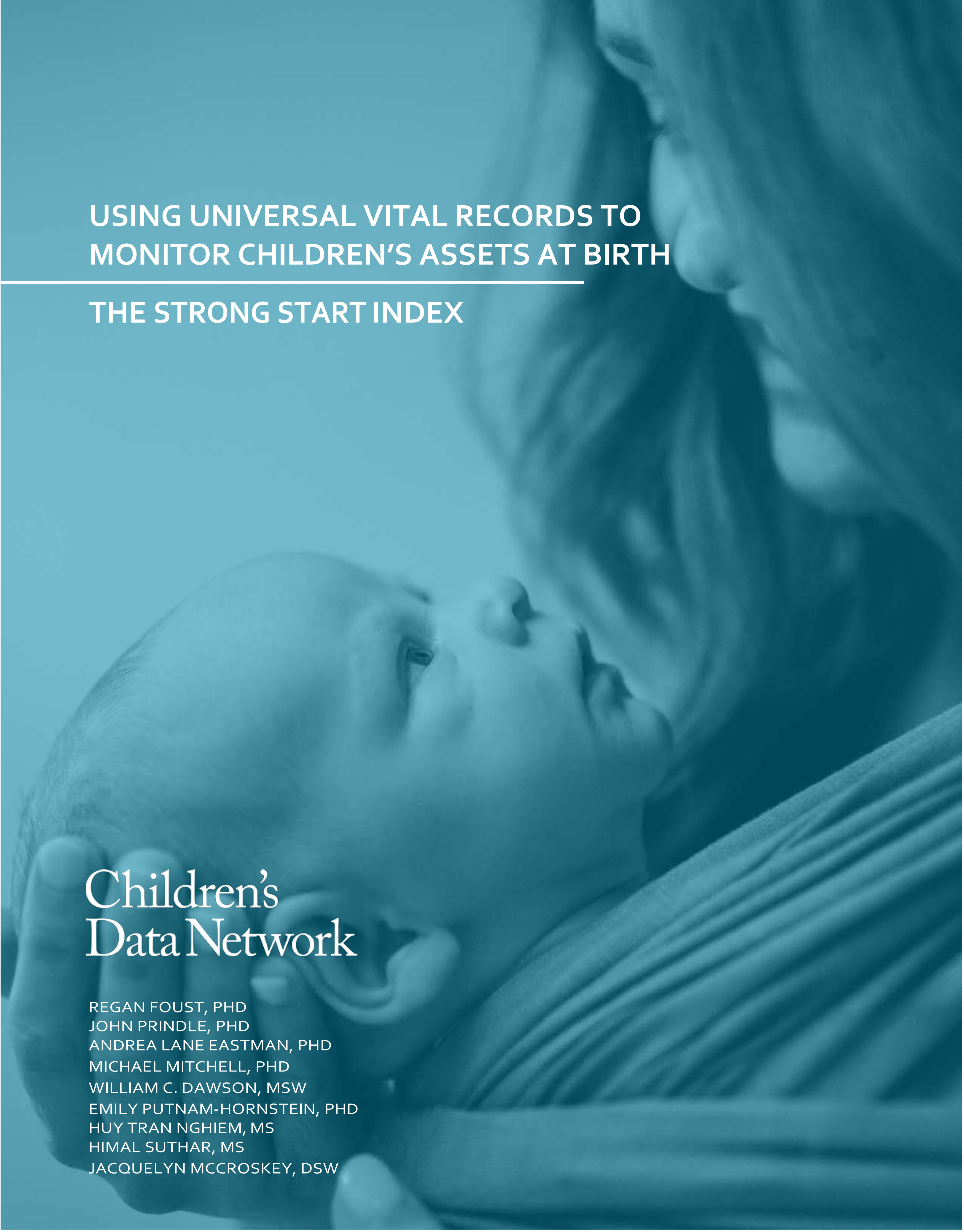

USING UNIVERSAL VITAL RECORDS TO MONITOR CHILDREN'S ASSETS AT BIRTH

THE STRONG START INDEX

Children's Data Network

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ACKNOWLEDGEMENTS

This project was supported through grants from the Heising-Simons Foundation and the First 5 Center for Children's Policy. We wish to acknowledge our collaborating colleagues at the Children's Data Network, Andy Krackov at Hillcrest Advisory, First 5 Association of California, First 5 County Commissions, California Child Welfare Indicators Project, and our state and county data partners. Additionally, none of this work would be possible without our core infrastructure supporters: the Heising-Simons Foundation, First 5 LA, and the Conrad N. Hilton Foundation. Their steadfast partnership, keen insights, and ongoing commitment to the children and families of California are critical to the development and continued iteration of the Strong Start Index and to all of our work at the Children's Data Network.

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EXECUTIVE SUMMARY

Ideally, every child would be healthy, growing, and thriving in a strong family and supported by a safe and nurturing community. The reality is, however, that the human, social, and material assets present at birth vary widely across California's nearly 500,000 infants born each year. And this variation is not inconsequential. A large and growing body of literature affirms the importance of early childhood experiences in influencing adolescent and adult behavior. The human, social, and material assets present at birth lay the foundation for the emergence of protective factors during childhood that we know are tied to good outcomes and resilience throughout the life course.[1]

Information universally registered at birth can be used to document assets available to each California newborn. Specifically, information regarding infant health and circumstances surrounding the birth (e.g., birthweight, presence of birth abnormalities), family socioeconomic status (e.g., ability to afford and access health care), maternal health behaviors and access to services (e.g., timing of initiation of prenatal care), and the age, education, and nativity of both parents (if paternity is established) all provide insight into the conditions into which individual children are born. Of course, assets and conditions at birth are not destiny. But thoughtful supports and services may be required to ensure that children with fewer assets find themselves on equal footing with their peers in California. Monitoring the distribution of assets among newborns in different communities can help ensure our investments are intentional and equitable.

The Strong Start Index uses data that already exist for children and families to summarize, in a standardized way, the conditions into which children are born. It features 12 variables that fall into four domains. A birth asset score is calculated by simply counting the number of assets present (0–12).

TABLE 1. CALIFORNIA STRONG START INDEX INDICATORS

FAMILY

- Two legal parents
- Born to two nonteen parents
- Born to two parents with at least a high school degree

HEALTH

- Healthy birthweight (greater than 2,500 grams)
- Absence of congenital anomalies, abnormalities, or complications at birth
- Absence of transmissible (mother-to-child) infections

SERVICE

- Access to and receipt of timely prenatal care
- Receipt of nutritional services (WIC) if eligible
- Hospital with higher than the state's average of births with timely prenatal care

FINANCIAL

- Ability to afford and access health care
- Born to at least one parent with a college degree
- Born to two parents with employment history

These asset indicators are universally measured at birth with strong validity and set the stage for the emergence of protective factors and healthy development throughout the life course. A review of the literature and external validity checks confirm that the Strong Start Index adds unique insight into the conditions into which children are born in California and its scores are related to at least two important indicators of child health and well-being (i.e., child protection involvement and death).

The Strong Start Index allows us to characterize the number of assets children have at birth, including how California communities vary in the distribution of children at different asset levels.

Specifically, the Strong Start Index:

- Facilitates the identification of communities in which children have fewer assets at birth and where additional services and supports may be important to promote equity; and
- Characterizes how asset levels of children in different communities have changed over time, highlighting where disparities persist.

The Strong Start Index has the potential to:

- Act as a standardized and cost-effective anchor for community needs assessments;
- Guide a more strategic stewardship of public dollars, with increased accountability; and
- Promote the adoption of a common language across communities, commissions, and other stakeholder groups for conceptualizing and discussing early childhood investments.

Please visit **www.strongstartindex.org** to explore the data and learn more about how communities are using the index to facilitate equitable investment.

INTRODUCTION

Research has consistently demonstrated the developmental significance of the first 5 years of life.[2–5] The conditions and context in which children find themselves during this period—and the nature of family disadvantage or assets that may be present—have lifelong consequences.[6–8] Increased awareness and attention to the importance of investments during early childhood have been accompanied by a growth in policies and programs focused on this period, with many aimed at buffering socioeconomic disparities early in life.[9] Very little population-based information exists, however, to characterize the conditions (e.g., levels of disadvantage versus assets) into which children are born. Common geographic indicators of poverty, crime, and health are often adult focused and may be imperfect proxies for local opportunities or adversities faced by young children.[10–12] Meanwhile, birth- and child-focused geographic indicators (e.g., rates of teen births, infant birthweight) tend to measure a singular dimension of a child's context.[13–15] The absence of a holistic, early childhood-focused measure that captures variations in the circumstances of children limits our ability to make strategic investments in services and programs across communities. This, in turn, affects the speed at which we can expect to make progress on childhood equity goals and reduce disparities in outcomes.[16,17]

In the United States, federal law requires the collection and publication of information concerning births in all states. The National Center for Health Statistics at the Centers for Disease Control and Prevention coordinates the assembly of data on all children born in the United States, publishing natality trends and other reports on the characteristics of births across states and making record-level data available for public health surveillance and research purposes.[13,18,19] In the current paper, we detail our development of a population-based birth index for California, a strengths-based approach to operationalizing assets present when children are born using universally available vital birth record data. Specifically, we: (a) outline the construction of this new public health index using birth records; (b) provide an external validation of this birth index relative to other geographic measures of community conditions; and (c) document the relationship between individual children's asset scores on the index and incidence rates for two other childhood measures (i.e., maltreatment and death).

MATERIAL AND METHODS

DATA SOURCE

Vital records reflecting all births registered in California for calendar years 2016 (*N* = 485,572), 2017 (*N* = 464,354), 2018 (*N* = 452,830), 2019 (*N* = 444,822), and 2020 (*N* = 418,956) were obtained from the Center for Health Statistics and Informatics in the California Department of Public Health. All research activities were approved by both state and university human subjects review boards and adhered to strict requirements for data security to ensure the confidentiality of individuals. In California, vital statistics data are prepared pursuant to Health and Safety Code Section 102230. The Vital Statistics Advisory Committee is responsible for reviewing the findings of California's Committee for the Protection of Human Subjects to make recommendations to the state registrar regarding all requests for data from the confidential portion of the birth record.[20]

INDICATORS

We defined 12 indicators based on theoretical considerations, our review of the literature, and distributional examinations of available fields in the vital birth records related to the child, mother, and father or second parent per Assembly Bill 1951 (2014). We constructed each individual indicator from one or more underlying data fields in the birth record. Some fields contribute to more than one indicator (e.g., parent levels of education), and some indicators are conditioned on the presence of underlying information for two parents (e.g., born to two nonteen parents). We adopted a simple 0–1 scoring for the absence or presence of each indicator, with the indicator framed to reflect the positive condition (i.e., presence of the asset). In Appendix A, we detail empirical literature related to fields recorded in vital birth records and chosen for their relationship to subsequent child outcomes.

GEOCODING

We used maternal residential addresses documented in the birth record to assign each birth to a set of geospatial coordinates. Geocoded records were then aggregated by census tract as our proxy for neighborhoods.[21,22] California has 8,057 census tracts with an average population of 4,624 each.[23] We identified the residential location of more than 98% of births in the 2016 files and more than 99% of residential locations in 2017–2020. Approximately 5,000 records contained missing addresses in 2016, about 3,000 were missing in 2017, and about 1,000 were missing in 2018, 2019, and 2020. We excluded those records from our analysis. After birth records were geocoded, we overlaid shape boundaries of other geographic regions using GIS mapping technology shapefiles. Geographies included counties and legislative districts (both state senate and assembly). We also created subcounty regions for Los Angeles (LA) County based on its eight service planning areas, five supervisorial districts, and Best Start Communities[24,25] (see Appendices B–E).

ETHICAL PROCEDURES

We relied on the California Health and Human Services Agency's data deidentification guidelines to ensure we had aggregated information to prevent risk of exposure of personal characteristics.[26] In accordance with these guidelines, we masked census tracts and all other geographies with fewer than 11 births. Masking resulted in the suppression of about 241 tracts per year (i.e., 225 in 2016, 226 in 2017, 250 in 2018, 237 in 2019, and 266 in 2020) and one county (i.e., Alpine County) for all years. All other tracts, counties, legislative districts, and subcounty regions in LA County met the criteria of 11 or more births during the cohort year. As an additional confirmation that scores were sufficiently aggregated to prevent the identification of individuals, we examined the margin of error for each tract relative to the average score. The margin of error serves as a confidence interval for each tract, identifying the expected range of scores. Given that the distribution of scores is not presented for all tracts, the margin of error provides an indication of variability within tracts, not specifically how many births deviate from the average. Using this approach, we verified that we could not identify individual birth index scores after applying statistical masking.

RESULTS

DESCRIPTIVE STATISTICS

ASSETS

In Table 1, we present the number and percentage of births featuring each asset in California's 2016–2020 birth cohorts. For example, in 2020, the presence of assets ranged from a low of 42.9% of children born to at least one parent with a college degree to a high of 99.8% for absence of transmissible (mother-to-child) infections. In Table 2, we document the cumulative number and percentage of births at different asset levels. Statewide, 2020 data indicate that 5.9% (*n* = 12,919) of children had five or fewer assets. Meanwhile, 11.7% (*n* = 48,854) of children in the birth cohort were recorded as having all 12 assets present.

Table 1. Registered births in California: Count and percentage of newborns with specific assets present by year (2016–2020)

	2016		2017		2018		2019		2020	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%
All births	485,572		464,354		452,830		444,822		418,956	
Two legal parents established at birth	454,268	93.6%	434,777	93.6%	424,013	93.6%	417,369	93.8%	392,520	93.7%
Born to two nonteen parents	435,172	89.6%	418,026	90.0%	409,098	90.3%	403,609	90.7%	380,481	90.8%
Born to two parents with at least a high school degree	338,087	69.6%	328,754	70.8%	323,763	71.5%	319,556	71.8%	302,021	72.1%
Healthy birthweight (greater than 2,500 g)	452,438	93.2%	432,549	93.2%	421,342	93.0%	413,324	92.9%	390,023	93.1%
Absence of anomalies, abnormalities, or complications at birth	306,351	63.1%	283,063	61.0%	271,017	59.8%	255,406	57.4%	233,631	55.8%
Absence of transmissible (mother-to-child) infections	484,422	99.8%	463,092	99.7%	451,620	99.7%	443,415	99.7%	417,661	99.7%
Access to and receipt of timely prenatal care	400,129	82.4%	385,580	83.0%	378,712	83.6%	381,861	85.8%	360,713	86.1%
Receipt of nutritional services (WIC) if eligible	435,205	89.6%	411,268	88.6%	398,488	88.0%	385,835	86.7%	357,074	85.2%
Born in hospital with above average rates of timely prenatal care	296,341	61.0%	291,294	62.7%	282,399	62.4%	273,554	61.5%	267,719	63.9%
Ability to afford and access health care	353,764	72.9%	337,683	72.7%	330,808	73.1%	325,351	73.1%	305,317	72.9%
Born to at least one parent with a college	208,240	42.9%	204,050	43.9%	202,896	44.8%	202,286	45.5%	191,123	45.6%
Born to two parents with employment history	335,679	69.1%	326,147	70.2%	324,763	71.7%	268,638	60.4%	244,552	58.4%

Notes: Data for employment is significantly different in 2019/20 from previous years due to missing work date values. Please use caution when comparing data across years.

Table 2. Registered births in California in 2016: Count, percentage, and cumulative percentage of newborns by total number of assets by year (2016–2020)

	2016			2017			2018			2019			2020		
	N	%	cum %	*N*	%	cum %	*N*	%	cum %	*N*	%	cum %	*N*	%	cum %
All births	485,572			464,354			452,830			444,822			418,956		
1 asset	137	0.0%	0.0%	144	0.0%	0.0%	156	0.0%	0.0%	140	0.0%	0.0%	189	0.0%	0.0%
2 assets	852	0.2%	0.2%	884	0.2%	0.2%	931	0.2%	0.2%	1,025	0.2%	0.3%	1,096	0.3%	0.3%
3 assets	3,262	0.7%	0.9%	3,119	0.7%	0.9%	3,271	0.7%	1.0%	3,114	0.7%	1.0%	3,250	0.8%	1.1%
4 assets	7,848	1.6%	2.5%	7,376	1.6%	2.5%	7,282	1.6%	2.6%	7,207	1.6%	2.6%	7,296	1.7%	2.8%
5 assets	14,104	2.9%	5.4%	13,195	2.8%	5.3%	12,665	2.8%	5.4%	13,428	3.0%	5.6%	12,919	3.1%	5.9%
6 assets	23,642	4.9%	10.3%	22,399	4.8%	10.1%	21,218	4.7%	10.1%	23,165	5.2%	10.8%	22,514	5.4%	11.3%
7 assets	41,244	8.5%	18.8%	38,572	8.3%	18.5%	37,357	8.2%	18.3%	40,516	9.1%	19.9%	38,835	9.3%	20.6%
8 assets	65,539	13.5%	32.3%	61,265	13.2%	31.6%	60,030	13.3%	31.6%	62,949	14.2%	34.1%	58,373	13.9%	34.5%
9 assets	82,919	17.1%	49.3%	79,004	17.0%	48.7%	74,270	16.4%	48.0%	72,380	16.3%	50.3%	66,541	15.9%	50.4%
10 assets	86,019	17.7%	67.0%	82,945	17.9%	66.5%	79,504	17.6%	65.5%	77,907	17.5%	67.9%	72,081	17.2%	67.6%
11 assets	94,848	19.5%	86.6%	90,879	19.6%	86.1%	91,629	20.2%	85.8%	89,867	20.2%	88.1%	87,008	20.8%	88.3%
12 assets	65,158	13.4%	100.0%	64,572	13.9%	100.0%	64,517	14.2%	100.0%	53,124	11.9%	100.0%	48,854	11.7%	100.0%

Notes: Data for employment is significantly different in 2019/20 from previous years due to missing work date values. Please use caution when comparing data across years.

LEVEL DISTRIBUTION

In Table 3, we present statewide birth index scores distributed into three levels: Level 1 (8 or fewer assets), Level 2 (9 or 10 assets), and Level 3 (11 or 12 assets). Statewide, newborns in California were born with an average of 9.2 of the 12 index indicators, and about one third of all births fell into each of the three levels.

Table 3. Birth assets by level by year

	Level 1 (8 or fewer assets)		Level 2 (9 or 10 assets)		Level 3 (11 or 12 assets)	
	N	%	*N*	%	*N*	%
All births	742,508	32.8%	773,570	34.1%	750,456	33.1%
2016	156,628	32.3%	168,938	34.8%	160,006	33.0%
2017	146,954	31.6%	161,949	34.9%	155,451	33.5%
2018	142,910	31.6%	153,774	34.0%	156,146	34.5%
2019	151,544	34.1%	150,287	33.8%	142,991	32.1%
2020	144,472	34.5%	138,622	33.1%	135,862	32.4%

Notes: Data for employment is significantly different in 2019/20 from previous years due to missing work date values. Please use caution when comparing data across years.

RACE AND ETHNICITY

In Tables 4a and b, we examine birth index scores stratified by maternal race and ethnicity. Stark differences emerged in the racial and ethnic distributions of Level 1 (babies with 8 or fewer assets) and Level 3 (babies with 11 or 12 assets). Specifically, babies born to Asian and Pacific Islander or White mothers were overrepresented among Level 3, whereas babies born to Black or African American mothers, Latina mothers, or mothers of another race or ethnicity were underrepresented relative to their proportion of the population.

Asian and Pacific Islander mothers had the highest average number of assets present in 2020 (*M* = 10.3), whereas infants born to Black or African American mothers or mothers of another race or ethnicity had the lowest average birth index scores (*M* = 8.2 and 7.9, respectively). Children born to White mothers had a mean asset score of 9.9; children of Latina mothers had an average of 8.6 assets. In addition, babies born to Asian and Pacific Islander or White mothers were more likely to have 11 or 12 assets than the average baby born in California that year, whereas babies born to Black or African American mothers, Latina mothers, or mothers of another race or ethnicity were more likely to have 8 or fewer assets. Additional stratifications are available in Appendix F.

Table 4a. Racial and ethnic distribution of birth asset levels (2020)

	Total		Level 1 (8 or fewer assets)		Level 2 (9 or 10 assets)		Level 3 (11 or 12 assets)	
	N	(col) %	*N*	(col) %	*N*	(col) %	*N*	(col) %
All births	418,956		144,472		138,622		135,862	
Asian/Pacific Islander	61,327	14.6%	7,750	5.4%	19,108	13.8%	34,469	25.4%
Black or African American	23,468	5.6%	11,793	8.2%	6,966	5.0%	4,709	3.5%
Latina	193,582	46.2%	87,419	60.5%	69,137	49.9%	37,026	27.3%
White	119,454	28.5%	23,702	16.4%	37,752	27.2%	58,000	42.7%
Other	21,125	5.0%	13,808	9.6%	5,659	4.1%	1,658	1.2%

Table 4b. Birth asset level distribution by maternal race and ethnicity (2020)

		Level 1 (8 or fewer assets)		Level 2 (9 or 10 assets)		Level 3 (11 or 12 assets)	
	Mean Number of Assets	*N*	(row) %	*N*	(row) %	*N*	(row) %
All births	9.2	144,472	34.5%	138,622	33.1%	135,862	32.4%
Asian/Pacific Islander	10.3	7,750	12.6%	19,108	31.2%	34,469	56.2%
Black or African American	8.2	11,793	50.3%	6,966	29.7%	4,709	20.1%
Latina	8.6	87,419	45.2%	69,137	35.7%	37,026	19.1%
White	9.9	23,702	19.8%	37,752	31.6%	58,000	48.6%
Other	7.9	13,808	65.4%	5,659	26.8%	1,658	7.8%

BIRTH INDEX VALIDATION

To confirm that the index adds unique insight regarding children born in California and yet is related to other outcomes as expected, we produced two external validations. For the first validation, we examined the correlation between aggregated birth index scores and other published community indexes. Second, we linked an earlier birth cohort (2007) to child protection and death records from California. We then calculated child-specific index scores and looked at the association between a child's score and risk of maltreatment and mortality during the first 5 years of life.

COMMUNITY-LEVEL VALIDATION

First, we explored the correlation between birth index scores aggregated to the census tract level and three community-level indices. Our goal with this validation was to confirm that the birth index we developed was neither exceedingly divergent from nor duplicative of other published measures. We used the Healthy Places Index (HPI), Child Opportunity Index (COI), and Human Development Index (HDI) as benchmarks for external validation.[27–29] Consistent with the Strong Start Index, the HPI, COI, and HDI are asset based, associated with health and well-being outcomes, and available for California. Unlike the Strong Start Index, which is constructed solely from individual-level information available from universally collected birth records, the HPI, COI, and HDI are based on survey- and administrative-based community-level information.

For comparative purposes, we obtained census tract-level HPI 3.0 scores (2015–2019)[30] and plotted them against 2020 Strong Start Index scores. The correlation coefficient (R^2) was .81, indicating strong alignment between our measure of assets at birth and the HPI's measure of broader community conditions.

We used the same approach with 2015 COI 2.0 scores (the most recent year of data available).[31] We calculated the correlation between both overall and domain-specific COI scores and Strong Start Index scores. Robust alignment emerged between Strong Start Index scores and overall COI scores (R^2 = .82), education domain scores (R^2 = .77), and socioeconomic domain scores (R^2 = .77). The correlation between Strong Start Index and health and environment domain scores, however, was significantly weaker (R^2 = .48).

We also obtained county-level scores from the HDI and plotted them against tract-level birth index scores (HDI scores are not available by census tract). The R^2 between these two indices was .25, indicating a relatively weak alignment. When we increased the level of aggregation, however, and plotted our birth index county scores against the HDI, the R^2 jumped to .78. The difference in R^2 values between the census tract-level versus county-level correlation analysis suggests that within-county variability is substantial and aggregation at the county-level masks that variability.

Findings validate the expected relationship between the Strong Start Index and the HPI, COI, and HDI; confirm that our birth index is neither exceedingly divergent from nor duplicative of these measures; and reinforce the value of generating community scores at granular levels.

CHILD-LEVEL VALIDATION

In addition to community-level validation, we also sought to validate the birth index at the birth or child level using two outcomes: child maltreatment and mortality during the first 5 years of life. These child-level outcomes were chosen because both are objectively poor outcomes that we would hope to prevent and that we expect would be inversely related to asset scores at birth based on the literature documented in Appendix A. We examined the correspondence between a child's scored asset level (0–12) and the absence of an allegation of abuse or neglect before age 5. Similarly, we examined the relationship between a child's scored asset level and postneonatal survival rates through age 5.

Three logistic regression models were fit to measure the predicted probability of a maltreatment allegation as a function of a child's birth index score. For the cohort used, 74,811 children born in 2014 (14.9% of the full birth cohort) experienced a report of alleged maltreatment between birth and age 5 (2019). The quality of model fit for these three models was assessed via pseudo-R^2 and area under the receiver operating characteristic curve (AUC). Model 1 included the 12 index indicators, with each indicator dichotomously coded (pseudo-R^2 = .132; AUC = .757). Model 2 modeled the count of total asset indicators present, with each count coded as a dichotomous variable (pseudo-R^2 = .102; AUC = .726). Model 3 examined the relationship between a child's birth index score and the likelihood of a maltreatment allegation if the score count was coded as a continuous variable (pseudo-R^2 = .099; AUC = .726). Although Models 2 and 3 fit somewhat poorer than Model 1, overall, the index exhibited a graded relationship with the predicted probability of child protection involvement before age 5. Specifically, according to Model 2, 53.0% of children with 3 assets were reported for alleged maltreatment, compared with 32.8% of children with 6 assets and 3.3% of children with 12 assets. Model 3, which uses the Strong Start Index total score as a continuous variable, yielded very similar predicted rates of maltreatment: 60.9% with 3 assets, 33.0% with 6 assets, and 4.7% with 12 assets. In other words, the more assets at birth, the less likely children were to become involved with the child protection system during early childhood.

Similarly, three logistic regression models were fit using child death before age 5 as the outcome. Death was restricted to postneonatal deaths (from 1 month after birth until December 31, 2019; n = 890, 0.18%). The same three models described for a maltreatment allegation were examined. Once again, Model 1 produced the best fit (pseudo-R^2 = .053; AUC = .727), relative to Model 2 (pseudo-R^2 = .025; AUC = .664) and Model 3 (pseudo-R^2 = .024; AUC = .664). Again, our birth index demonstrated a graded relationship with risk of postneonatal death. For example, according to Model 2, the death rate of children with 3 assets present at birth was 6.4 per 1,000, compared with a death rate of 3.5 per 1,000 among children with 6 assets and 0.6 per 1,000 among children with 12 assets. Using Model 3, the predicted death rate was 7.5 per 1,000 for those with 3 assets, 3.5 per 1,000 for those with 6 assets, and 0.7 per 1,000 for those with 12 assets. The results show the more assets at birth, the more likely children were to survive through age 5.

DISCUSSION

With the development of this birth index, California can now present a more holistic characterization of children, document the number of assets present at birth, and detail how California communities vary in the distribution of children at different asset levels. Specifically, this index facilitates the identification of communities in which children have fewer assets at birth and where investments in enhanced services and supports may be particularly impactful to promote developmental equity and reduce disparities in childhood outcomes. This index can also be used to characterize how asset levels of children in different communities have changed over time, highlighting where gaps persist, including by race and ethnicity. Organizing vital records using these methods has the potential to: (a) act as a standardized and cost-effective anchor for community needs assessments; (b) guide a more strategic stewardship of public dollars, with increased accountability; and (c) promote the adoption of a common language across communities, commissions, and other stakeholder groups for conceptualizing and discussing early childhood investments.

The strengths and limitations of this index should be considered when reviewing the data and exploring potential applications. First, we opted to use a single, universal source of existing data to construct the index (i.e., vital birth records). The strength of this approach cannot be understated. Beyond the cost-effectiveness of using existing records, population-based data tend to allow reporting at a more granular level and as such, provide more opportunities for local translation and impact. This approach also avoids many of the pitfalls of survey methods (e.g., cost and questionable generalizability). That said, our reliance on a single source of existing administrative data means that in many cases, we constructed indicators that were crude proxies for the domain in which we were ultimately interested (e.g., birth payment method as a measure of the ability to afford and access health care). We look forward to using integrated administrative data to improve the precision of the index in future iterations.

Second, we chose to implement a simple scoring system to assign a standard (0–1) weight to each indicator. There are many more methodologically rigorous ways we could have built models to weight the contribution of each indicator to a child's overall score. We avoided more sophisticated methodologies to ensure that individual indicators were intuitive, their weighting easy to understand, and their relationship to children's outcomes clear. We also chose to create a static snapshot of assets based on what we knew of the child at a moment in time (i.e., birth). A focus on assets observable at birth felt strategic given the goal was to develop an index that could guide the outlay of investments in home visiting and other early childhood programs that typically begin during the first year of life. This approach has proven helpful in documenting racial and ethnic disparities in assets recorded at birth at the state and local level, benchmarking in the context of workforce assessments, budgeting for universal and targeted home visiting initiatives, informing community needs assessments and organizational strategic plans, augmenting and validating existing indices, and identifying “resilient” communities (i.e., communities faring better on subsequent developmental or academic assessments than what would be expected using the Strong Start Index).

Third, there are always questions about the reliability and consistency of data fields in administrative records; vital birth data are no exception. We identified very low rates of missingness (< 1%) for most core variables (e.g., parental age), but slightly higher rates of missingness (2%–6%) for others (e.g., parental education, birthweight). The distribution of missingness is likely not random, because some hospitals may be more diligent about entering birth registration data than others. The aggregation of data geographically may amplify the bias introduced by missing or errantly entered information. The nature of our coding decisions means some geographies may have underreported asset levels. Finally, the data for this birth index were limited to children born in California and presented according to maternal residential address at birth. As such, this index is best applied for the allocation of resources delivered around birth and during early childhood; these data may be less applicable as children age.

Constructing a birth index provides a simple, standardized, strengths-based measure for documenting assets at birth for entire cohorts of children. Rather than presenting geographic differences in discrete risk factors, the index we describe in this paper presents a more holistic picture of children’s circumstances at birth. External validations confirmed that this index generates community insights that complement those of other, survey-based, indexes, and initial analyses suggested that index scores are inversely related to at least two critical outcomes for children, maltreatment and death. A final differentiating factor is that this birth index leverages existing administrative data, making it a cost-effective, valid, and valuable tool for those working with and on behalf of children and families. Although we present findings for children born in California, information from vital records could be similarly applied to generate a birth index in other states.

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APPENDICES

APPENDIX A. EVIDENCEFORINCLUSIONINTHECALIFORNIASTRONGSTART INDEX, BYINDICATOR

		Lower incidence of child maltreatment or child protection system involvement	Lower risk of infant mortality or stillbirth	Lower risk of early childhood mortality	Lower risk of mortality	Lower risk of preterm birth or low birth weight	Reduced prevalence of STDs	Lower risk of adverse educational outcomes
FAMILY								
	Legal parentage established at birth	32–45	46–48	49,50		51	52	53
	Born to nonteen parents	32–41,44,45,54–56	46–48	49,50		51,57		53
	Born to parents with at least a high school degree	32–36,39–42,44,45,54–56	46,47	49,50		51,57		53
HEALTH								
	Healthy birth weight	34,36–40,42,44,45,54,55	47,48				52	53
	Absence of congenital anomalies, abnormalities, or complications at birth	38–41			47,49,58	57,59		53
	Absence of transmissible (mother-to-child) infections	52	59			57,59		
SERVICE								
	Access to and receipt of timely prenatal care	34–36,38–41,44,45,54	46	50		51,57	52	53
	Receipt of nutritional services (WIC) if eligible	33,42,44,54,56				60		
	Hospital with high percentage of births with timely prenatal care	34,38–41,44,45,54,56	46	50		51,57	52	53
FINANCIAL								
	Ability to afford and access health care	34,38–40,42,44,45,54,56	46,48	49,50		51,60		
	Born to a parent with a college degree	39–41	47	49				
	Born to parents with employment history	37,42,54,55						

APPENDIX B. ASSET DISTRIBUTION BY COUNTY (2016–2020)

	Births	Average Strong Start Score	Babies with 8 or Fewer Assets		Babies with 9 or 10 Assets		Babies with 11 or 12 Assets	
			n	%	n	%	n	%
California	2,266,534	9.3	742,508	33%	773,570	34%	750,456	33%
Alameda	91,794	9.9	20,562	22.4%	28,137	30.7%	43,095	46.9%
Alpine	31	7.8	20	64.5%	LNE		LNE	
Amador	1,482	9.1	530	35.8%	555	37.4%	397	26.8%
Butte	11,360	8.2	5,490	48.3%	4,987	43.9%	883	7.8%
Calaveras	1,907	8.6	852	44.7%	694	36.4%	361	18.9%
Colusa	1,413	7.9	853	60.4%	455	32.2%	105	7.4%
Contra Costa	59,939	9.9	12,383	20.7%	19,448	32.4%	28,108	46.9%
Del Norte	1,234	7.8	750	60.8%	405	32.8%	79	6.4%
El Dorado	7,743	9.4	2,321	30.0%	2,744	35.4%	2,678	34.6%
Fresno	71,648	8.8	29,191	40.7%	25,721	35.9%	16,736	23.4%
Glenn	1,850	7.9	1,116	60.3%	646	34.9%	88	4.8%
Humboldt	6,797	7.9	3,875	57.0%	2,313	34.0%	609	9.0%
Imperial	13,440	7.4	9,103	67.7%	3,490	26.0%	847	6.3%
Inyo	879	8.3	422	48.0%	360	41.0%	97	11.0%
Kern	64,658	8.3	32,847	50.8%	23,240	35.9%	8,571	13.3%
Kings	11,067	8.9	3,990	36.1%	4,818	43.5%	2,259	20.4%
Lake	3,612	8.1	2,029	56.2%	1,195	33.1%	388	10.7%
Lassen	1,206	8.0	663	55.0%	436	36.2%	107	8.9%
Los Angeles	551,422	9.3	175,902	31.9%	193,718	35.1%	181,802	33.0%
Madera	10,647	8.2	5,818	54.6%	3,184	29.9%	1,645	15.5%
Marin	10,752	9.8	2,786	25.9%	3,077	28.6%	4,889	45.5%
Mariposa	684	8.4	321	46.9%	235	34.4%	128	18.7%
Mendocino	4,668	8.0	2,728	58.4%	1,445	31.0%	495	10.6%
Merced	19,706	8.4	9,827	49.9%	7,450	37.8%	2,429	12.3%
Modoc	171	7.6	109	63.7%	44	25.7%	18	10.5%
Mono	574	9.0	191	33.3%	284	49.5%	99	17.2%
Monterey	29,349	8.5	15,654	53.3%	8,138	27.7%	5,557	18.9%
Napa	6,352	9.8	1,344	21.2%	2,470	38.9%	2,538	40.0%
Nevada	3,784	8.6	1,644	43.4%	1,518	40.1%	622	16.4%
Orange	175,538	10.0	32,471	18.5%	58,085	33.1%	84,982	48.4%
Placer	18,100	9.7	3,773	20.8%	7,116	39.3%	7,211	39.8%
Plumas	716	8.2	353	49.3%	285	39.8%	78	10.9%
Riverside	143,662	9.2	47,610	33.1%	54,509	37.9%	41,543	28.9%
Sacramento	94,360	9.3	29,157	30.9%	34,965	37.1%	30,238	32.0%
San Benito	3,801	9.5	948	24.9%	1,601	42.1%	1,252	32.9%
San Bernardino	144,146	8.9	55,537	38.5%	51,644	35.8%	36,965	25.6%
San Diego	198,876	9.3	61,870	31.1%	67,092	33.7%	69,914	35.2%
San Francisco	42,869	10.2	7,734	18.0%	10,138	23.6%	24,997	58.3%
San Joaquin	49,504	8.8	19,930	40.3%	18,232	36.8%	11,342	22.9%
San Luis Obispo	12,277	8.8	4,698	38.3%	5,137	41.8%	2,442	19.9%
San Mateo	41,712	10.4	5,985	14.3%	10,029	24.0%	25,698	61.6%
Santa Barbara	26,952	8.7	12,436	46.1%	8,597	31.9%	5,919	22.0%
Santa Clara	106,594	9.9	25,205	23.6%	28,904	27.1%	52,485	49.2%
Santa Cruz	12,275	9.4	3,855	31.4%	3,938	32.1%	4,482	36.5%
Shasta	9,522	8.3	4,685	49.2%	3,623	38.0%	1,214	12.7%
Sierra	97	8.5	47	48.5%	35	36.1%	15	15.5%
Siskiyou	1,667	8.2	871	52.2%	601	36.1%	195	11.7%
Solano	25,343	9.0	9,498	37.5%	9,765	38.5%	6,080	24.0%
Sonoma	22,694	9.4	6,870	30.3%	8,291	36.5%	7,533	33.2%
Stanislaus	36,705	8.8	14,638	39.9%	13,310	36.3%	8,757	23.9%
Sutter	6,390	8.0	3,595	56.3%	2,202	34.5%	593	9.3%
Tehama	3,891	8.1	2,162	55.6%	1,457	37.4%	272	7.0%
Trinity	534	7.9	315	59.0%	178	33.3%	41	7.7%
Tulare	34,501	7.7	22,522	65.3%	10,818	31.4%	1,161	3.4%
Tuolumne	2,231	8.6	949	42.5%	931	41.7%	351	15.7%
Ventura	44,859	9.3	14,452	32.2%	14,869	33.1%	15,538	34.6%
Yolo	10,769	9.0	3,836	35.6%	4,027	37.4%	2,906	27.0%
Yuba	5,780	8.0	3,185	55.1%	1,977	34.2%	618	10.7%

APPENDIX C. ASSET DISTRIBUTION IN LOS ANGELES COUNTY BY SERVICE PLANNING AREA (SPA; 2016–2020)

	Births	Average Strong Start Score	Babies with 8 or Fewer Assets		Babies with 9 or 10 Assets		Babies with 11 or 12 Assets	
			n	%	n	%	n	%
LA County	551,422	9.3	175,902	31.9%	193,718	35.1%	181,802	33.0%
SPA 1	26,305	7.5	16,452	62.5%	7,797	29.6%	2,056	7.8%
SPA 2	111,494	9.7	27,093	24.3%	39,292	35.2%	45,109	40.5%
SPA 3	102,824	9.9	20,847	20.3%	36,511	35.5%	45,466	44.2%
SPA 4	53,539	9.2	19,276	36.0%	16,735	31.3%	17,528	32.7%
SPA 5	30,755	10.7	2,748	8.9%	7,468	24.3%	20,539	66.8%
SPA 6	70,849	8.0	39,772	56.1%	23,992	33.9%	7,085	10.0%
SPA 7	72,710	9.2	22,652	31.2%	31,896	43.9%	18,162	25.0%
SPA 8	82,927	9.2	27,057	32.6%	30,018	36.2%	25,852	31.2%

APPENDIX D. ASSET DISTRIBUTION IN LOS ANGELES COUNTY, BY SUPERVISORIAL DISTRICT (SD; 2016–2020)

	Births	Average Strong Start Score	Babies with 8 or Fewer Assets		Babies with 9 or 10 Assets		Babies with 11 or 12 Assets	
			n	%	n	%	n	%
LA County	551,422	9.3	175,902	31.9%	193,718	35.1%	181,802	33.0%
Supervisorial District 1	114,092	9.2	37,126	32.5%	45,880	40.2%	31,086	27.2%
Supervisorial District 2	124,017	8.6	57,072	46.0%	41,322	33.3%	25,623	20.7%
Supervisorial District 3	100,171	9.7	24,404	24.4%	32,796	32.7%	42,971	42.9%
Supervisorial District 4	110,053	9.6	28,322	25.7%	40,731	37.0%	41,000	37.3%
Supervisorial District 5	103,079	9.4	28,976	28.1%	32,985	32.0%	41,118	39.9%

APPENDIX E. ASSET DISTRIBUTION IN LOS ANGELES COUNTY BY BEST START COMMUNITY (BSC; 2016–2020)

	Births	Average Strong Start Score	Babies with 8 or Fewer Assets		Babies with 9 or 10 Assets		Babies with 11 or 12 Assets	
			n	%	n	%	n	%
LA County	551,422	9.3	175,902	31.9%	193,718	35.1%	181,802	33.0%
Broadway/Manchester	6,853	7.7	4,237	61.8%	2,166	31.6%	450	6.6%
Central Long Beach	5,691	8.1	3,159	55.5%	1,890	33.2%	642	11.3%
Compton	10,128	8.2	5,282	52.2%	3,889	38.4%	957	9.4%
East LA	8,351	8.8	3,111	37.3%	3,885	46.5%	1,355	16.2%
Lancaster	12,298	7.3	7,899	64.2%	3,652	29.7%	747	6.1%
Metro LA	4,410	8.1	2,575	58.4%	1,312	29.8%	523	11.9%
NE SFV	7,539	8.6	3,401	45.1%	2,840	37.7%	1,298	17.2%
Palmdale	11,946	7.5	7,839	65.6%	3,262	27.3%	845	7.1%
Panorama City	9,872	8.8	3,996	40.5%	4,047	41.0%	1,829	18.5%
SELA	9,913	8.6	4,263	43.0%	4,595	46.4%	1,055	10.6%
South El Monte/El Monte	5,738	8.9	2,116	36.9%	2,473	43.1%	1,149	20.0%
Watts/Willowbrook	6,681	7.8	4,021	60.2%	2,216	33.2%	444	6.6%
West Athens	3,140	7.9	1,854	59.0%	935	29.8%	351	11.2%
Wilmington	3,833	8.5	1,804	47.1%	1,444	37.7%	585	15.3%

APPENDIX F. BIRTH ASSET LEVEL DISTRIBUTION AMONG ASIAN AND PACIFIC ISLANDER CHILDREN (2016–2020)

	Mean Number of Assets	Level 1 (8 or fewer assets)		Level 2 (9 or 10 assets)		Level 3 (11 or 12 assets)	
		N	(row) %	*N*	(row) %	*N*	(row) %
All Asian / Pacific Islander Births	10.4	42,596	11.8%	110,151	30.5%	208,420	57.7%
Asian	10.4	3,359	12.3%	7,945	29.1%	15,997	58.6%
Cambodian	9.4	2,123	27.8%	3,098	40.5%	2,428	31.7%
Chinese	10.6	9,487	8.3%	30,970	27.1%	73,972	64.6%
Filipino	10.3	6,747	11.2%	19,767	32.8%	33,678	56.0%
Guamanian	9.2	335	31.7%	415	39.3%	306	29.0%
Hawaiian	9.1	537	34.9%	544	35.3%	459	29.8%
Hmong	9.4	3,233	28.6%	4,781	42.4%	3,274	29.0%
Indian	10.6	4,959	8.0%	18,495	29.9%	38,415	62.1%
Japanese	10.7	753	6.9%	2,961	27.2%	7,176	65.9%
Korean	10.6	1,519	8.0%	5,167	27.4%	12,190	64.6%
Laotian	9.2	997	32.9%	1,151	38.0%	880	29.1%
Pacific Islander	9.1	2,022	34.8%	2,217	38.2%	1,564	27.0%
Samoan	8.6	1,313	43.0%	1,175	38.5%	567	18.6%
Thai	10.2	466	14.0%	1,122	33.6%	1,748	52.4%
Vietnamese	10.1	4,746	15.4%	10,343	33.5%	15,766	51.1%