

Cost Benefit Analysis of First 5 Kern-Funded Programs



Publication Notes

This report is reviewed by nice experts of the Kern County Children and Families Commission and approved through public hearings on June 6, 2018, the same date is used as the publication date for this report dissemination.

Acknowledgments

Many colleagues have contributed to the completion of this cost-benefit analysis (CBA) project. Mr. Roland Maier, *Executive Director of First 5 Kern*, met with the CBA research team to clarify expectations for this project and supported the presentation of an early version of the report at the 2018 Hawaii International Conference on Education. Ms. Theresa Ortiz, *Chief Evaluation/Program Officer*, exported trend data and made herself available for discussing the accuracy of the data throughout the process. Ms. Charlene McNama, *Administrative Finance Specialist*, prepared fiscal data for 2010-2017 across 39 programs, and worked with the team to facilitate interpretation of the effect size for fund leveraging across different focus areas. Ms. Kathy Ives, *Chief Finance Officer*, co-presented a revised version of the report at the 2018 annual meeting of the American Society for Public Administration. Ms. Christine Lollar, *Communications/Media Specialist*, created the cover page and assisted with the brochure design. Roland Maier, Kathy Ives, Ana Lester, Christine Lollar, and Theresa Ortiz proofread the final report and offered constructive feedback. Further, the tracking of fiscal and service data was built on collaborative efforts of program officers and the Institutional Review Board of California State University, Bakersfield to ensure compliance with federal, state, and local laws and regulations. The CBA team also benefited from the guidance of the Technical Advisory Committee under the Commission's leadership.

While these colleagues' assistance has been indispensable, we are solely responsible for this report and welcome any comments and suggestions.

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Executive Summary

This cost-benefit analysis (CBA) project, upon approval of the Kern County Children and Families Commission (First 5 Kern) in 2016, was conducted during 2016-2018 to examine the impact of Proposition 10 funding on Kern County children, families, and the overall community in Fiscal Years 2010-2017. Using the Process-Person-Context-Time (PPCT) paradigm (Bronfenbrenner, 2005a; 2005b) as the overarching theoretical framework, this CBA project consisted of two phases. Phase I included a trend study to examine the benefit-cost ratios (BCRs) across 39 programs that received continuous funding from First 5 Kern since 2010. Phase II provided a value-added assessment of the program performance between the last (2010-2015) and current (2015-2017) funding cycles that goes beyond First 5 Kern's annual state report as stipulated by Proposition 10. In combination, this CBA project addressed the following five questions:

1. How many programs have reached a status to pay for themselves with First 5 Kern funding?
2. What is the contribution of First 5 Kern, through partnership building, in improving the programs' financial conditions?
3. What programs would have been otherwise unavailable without First 5 Kern funding?
4. What programs became more sustainable, due to First 5 Kern's support for external fund leveraging, between the adjacent funding cycles?
5. What is the long-term return of First 5 Kern-funded programs and services?

The first three questions were addressed in Phase I of this study to configure both *point* and *interval* estimates of BCRs *with* and *without* external fund leveraging. The intervention variable at the commission level describes First 5 Kern's support for partnership building,

including securing the Institutional Review Board (IRB) protection from California State University, Bakersfield and pursuing additional external funding across three focus areas of *Child Health, Family Functioning, and Child Development*. The later fits the fourth focus area of *Service Integration* in First 5 Kern's strategic plan.

In Phase II of this study, a value-added approach was taken to address Question 4 through the aggregation of the CBA findings between the last and current funding cycles. To conform to professional practices, a modal discount rate of 3.5% was adopted from the Washington State Institute for Public Policy (2017) to adjust the *BCRs* and the *effect sizes of fund leveraging* in 2018 dollars. Due to limited data tracking within the past seven years, the long-term return of First 5 Kern funding (Question 5) was investigated through an extensive review of CBA literature on well-documented programs to support the benefit transfer to similar programs funded by First 5 Kern.

A summary of the CBA findings is provided below (see details in the Results section):

1. With the program funding exclusively from Proposition 10, approximately 75% of First 5 Kern-funded programs have consistently demonstrated *BCRs* larger than 1 during 2010-2017, an indication of program sustainability in future funding cycles. (Answer to Question 1)
2. Under the leadership of First 5 Kern, service providers raised a total of \$23,374,630 in the seven-year period across *Child Health, Family Functioning, and Child Development*. This is consistent with the original intent of Proposition 10 to use the seed money to raise external funds to fill service gaps. (Answer to Question 2)
3. Leveraged funds lifted the low boundary of the 95% Confidence Interval (CI) from a value less than 1 to a value larger than 1 in the configuration of *BCRs* for six programs

(i.e., CHI, 2-1-1, BCRC, KRVFRC, MFRC, and R2S). The low CI boundary remains below 1 for four other programs (i.e., CMIP, NFPP, DDCCC, and SSCDC). According to the probabilistic inference, these programs would have been otherwise unavailable without First 5 Kern funding. (Answer to Question 3)

4. Based on the value-added assessment, 17 programs increased their BCRs *without leveraged funds* and 19 programs raised their BCRs *with leveraged funds* to become more sustainable between the last and current funding cycles. (Answer to Question 4)
5. The configuration of the long-term impact of First 5 Kern programs reconfirmed a benefit-cost ratio (BCR) of at least 2, comparable to the results of similar programs. (Answer to Question 5).

In summary, this CBA, based on the PPCT theoretical framework, demonstrated that First 5 Kern-funded programs have generated benefits that doubled the value of state investments during the last and current funding cycles. While the decline of Proposition 10 revenue inevitably impacts leveraged funds through partnership building, this CBA project indicated an overall increase of the BCR value from 1.5 to at least 2.0 through external fund leveraging. These positive findings demonstrate the importance of strengthening local service support for children ages 0 to 5 and call for concerted efforts to improve and expand local capacity building in preparation for the next funding cycle. This report concluded with program rankings and presented three scenarios for the Commission to consider in its future decision making. Technical details of data cleaning, statistical analysis, and program information are summarized in the Appendix of this report to support result verification.

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Introduction

In November 1998, California voters passed Proposition 10, the California Children and Families Act, which levied a 50-cent tax on each pack of cigarettes and other tobacco products to finance service programs for children ages prenatal to five years of age. A First 5 Commission was created in each county to support local services in *Child Health, Family Functioning, Child Development, and Systems of Care*. Eighty percent of the tobacco tax revenue is allocated to 58 counties of California based on annual birth rates. Also, Proposition 10 stipulates that county commissions “use Outcome-Based Accountability [a.k.a., Results-Based Accountability] to determine future expenditures” (p. 4). Over time, cost-benefit analysis (CBA) has been identified as a fundamental component of the Results-Based Accountability model (Byrnes, 2014), and new CBA methods have been developed to support an unprecedented movement toward “standardization” of CBA for early childhood interventions (Karoly, 2012, p. 27).

Across the nation, CBA has been adopted for decades to examine early care and learning (ECL) programs and services. In addition to California, ECL programs and services are funded in other states, such as Vermont, to support children ages 0 to 5, and a CBA project was conducted to examine the returns of the state investment in Vermont (Diaz, 2017). Research has also been conducted on ECL programs and services in other countries, such as Canada, France, Sweden, and the United Kingdom, which has demonstrated the benefits of these services outweigh the costs (Cleveland & Krashinsky, 2003; Hansen, Joshi, & Dex, 2010; Lawson, 2009). As advocated by James Heckman (2017), Nobel Prize laureate, there are more benefits from early support programs than interventions in later years (see Figure 1), which is particularly true for disadvantaged children because ability “gaps between the advantaged and

disadvantaged open up early in the lives of children” (Heckman, 2017, p. 50). Heckman (2011) further pointed out, “[w]e can invest early to close disparities and prevent achievement gaps, or we can pay to remediate disparities when they are harder and more expensive to close. Either way we are going to pay” (p. 6).

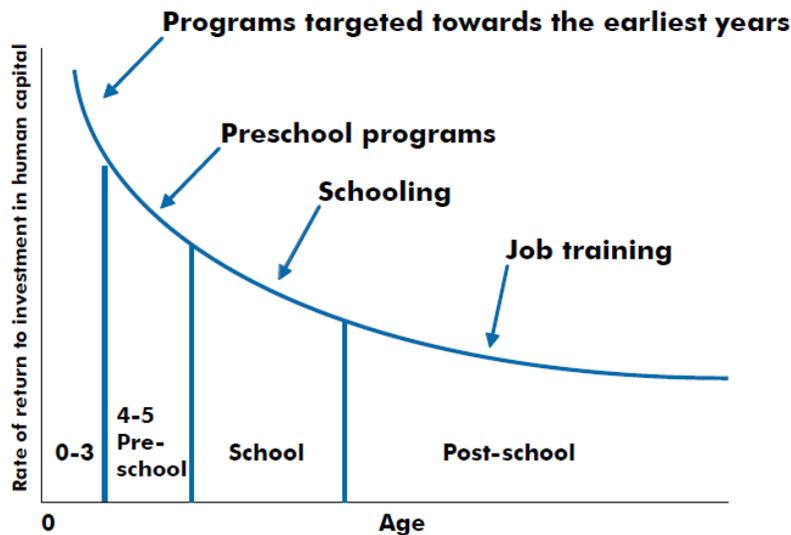


Figure 1. Returns to a Unit Dollar Invested in Human Capital

To enhance early childhood support, the Kern County Children and Families Commission (First 5 Kern) was created to administer Proposition 10 funding for programs and services in *Child Health, Family Functioning, Child Development, and Systems of Care*. There are very few private and community foundations in Kern County to sponsor ECL programs and services, and First 5 Kern fills this void by providing an equal opportunity of ECL to young children, regardless of their parents’ abilities or family resources. Since its inception, First 5 Kern has allocated more than \$180 million to support child development programs in local communities (Wang, 2018), and the investment “in early childhood development reduces the need for costly remedial education and other social programs, yielding long-term savings for Kern County” (First 5 Kern, 2017, p. 1).

To examine the impact of Proposition 10 funding on Kern County children, families,

and the overall community, First 5 Kern has commissioned several CBA projects, including two with the Corporation for Standards and Outcomes (CS&O) in 2007 and 2009, respectively. This CBA project, contracted with Drs. Wang and Sun in 2016, was built on the existing needs and consisted of two phases. Phase I included a trend study to examine the benefit-cost ratios (BCRs) across 39 programs that received continuous funding from First 5 Kern since 2010. Phase II provided a value-added assessment of the programs between the last (2010-2015) and current (2015-2017) funding cycles. In combination, the scope of this investigation extends beyond First 5 Kern’s annual state report as stipulated by Proposition 10.

CBA “seeks to help in deciding whether a program is of value to the stakeholder” (Karoly et al., 2001, p. 2). This CBA investigation intends to inform three major groups of stakeholders: (1) practitioners in service delivery, (2) scholars interested in CBA research, and (3) policymakers and the general public who care about the wellbeing of the young children in Kern County. To meet the needs of different stakeholders and align with the Results-Based Accountability model of Proposition 10, this CBA project has taken a comprehensive approach quantifying the benefits and costs of First 5 Kern’s programs and services. The rest of the report consists of the following sections: Theoretical Framework, Research Questions, Literature Review, Methodology, Results, Conclusion, and Recommendations. Technical details of data cleaning, statistical analysis, and program information are included in the Appendix.

Theoretical Framework

While quality programs are critical for supporting all children, researchers reported that “the costs and benefits of interventions vary across groups, locations, and times” (Olson & Bogard, 2014, p. 5), and the variations need to be examined under a solid theoretical framework

(Fleer, Anning, & Cullen, 2004). *Process-Person-Context-Time* (PPCT), a comprehensive model developed by Bronfenbrenner (2005a; 2005b), has been employed to examine program-specific benefits and compare CBA findings across different settings (see Dove, 2013). This CBA project is built on the PPCT model, and details of the four components (Process, Person, Context, and Time) are provided in the following paragraphs.

Programs funded by First 5 Kern involve substantially different service **processes** than those of programs documented in the recent literature. In particular, no local program in Kern County has adopted the intervention similar to the Perry Preschool Project that visited parents once a week for an hour and a half across a two-year period. First 5 Kern-funded programs are also different from the Abecedarian program that provided child care 8-10 hours a day for 50 weeks, starting from infancy and continuing for five years. And, unlike the Chicago Child Parent (CCP) program studied by Heckman and his colleagues (see Peters, 2016), Proposition 10 funding does not cover children beyond five years of age. Instead of incorporating strict interventions from the above-mentioned programs (see Farran & Lipsey, 2015), First 5 Kern-funded programs are built on the capacity of local service providers, and the **processes** vary across programs in *Child Health*, *Family Functioning*, and *Child Development*. Therefore, separate trends need to be configured in the CBA across different focus areas in Kern County.

The **person** component of the PPCT paradigm is another unique characteristic that needs to be considered in funding early childhood education. Different from the urban population in Chicago addressed in the CCP program (Heckman, 2010), the majority of Kern County population live in rural areas. With a large percentage of children being of Hispanic descent, bilingual services are essential in supporting child health and development in hard-to-reach communities across Kern County. Proposition 10 did not designate additional funding

for traditionally underserved areas, and the extra costs of program delivery must be absorbed by First 5 Kern to ensure and sustain program access. As a result, findings of this CBA project may deviate from those of comparable studies of other locations (e.g., Diaz, 2017; Heckman, 2017).

Context is the third component of PPCT that emphasizes the need for local support systems in early child development. Kern County is located in the southern part of the California Central Valley, and spreads across a land area as large as the state of New Jersey. The median income of local families was 32% less than the corresponding state index over the past eight years (Wang, 2018), and Kern County's poverty rate for children under five years of age was far above the rate at the state and national levels (National Center for Children in Poverty, 2014). Meanwhile, child population in Kern County is predicted to increase from a little over 250,000 in 2015 to 278,144 by 2020 (Kern County Network for Children, 2016). In contrast, "birth rates have been declining [in California] nearly every year for the last 20 years" (Governor's Budget Office, 2016, p. 139). This context demands First 5 Kern to expand quality services across local communities.

In addition to the *process*, *person*, and *context* components of PPCT, **timing** plays a critical role in the design of this CBA project. The Patient Protection and Affordable Care Act (PPACA) was enacted in 2010 that expanded health insurance coverage for low-income families. The passage of PPACA coincided with California's Kindergarten Readiness Act of 2010 which revised the cutoff date from December 2 to September 1 for kindergarten entry (California Department of Education, 2016). Also, Proposition 56 was passed by California voters in November 2016 increasing state tobacco tax from \$.87 to \$2.87. As a result, Proposition 10 funding is projected to decrease by 17% in FY 2017-18 from the previous year

(First 5 Association of California, 2017). With these substantial changes, the **time** has elapsed requiring First 5 Kern to conduct a new CBA to assist in decision making and priority setting for the next funding cycle. As the Early Childhood Council of Kern (2014) acknowledged, “this is a critical time, with increasing academic mandates and decreasing funding” (p. iii).

Based on the PPCT framework, this CBA project intends to examine the benefits of early childhood services offered by First 5 Kern and promote program sustainability through partnership building within the local community. Kern County’s economy heavily relies on agriculture and petroleum extraction. In particular, Paramount Farming Company is the world's largest grower of almonds and pistachios, and the County produces 145 million barrels of oil accounting for 71% of California’s oil production and 10% of the total United States oil production (Kern Economic Development Foundation, 2014). Programs and services provided by First 5 Kern directly affect the wellbeing of children ages 0 to 5, their families, and the local community. Fund leveraging for Proposition 10-funded programs can be strengthened based on the Commission’s connections with the local community.

In summary, this CBA project is designed to track the benefits and costs of First 5 Kern-funded programs and services during the past and current funding cycles. Findings from the CBA are particularly important for First 5 Kern against the backdrop of newly-enacted policies, declining Proposition 10 funding, and increasing demand for ECL programs in Kern County. Built on the PPCT theoretical framework, research questions are presented below to address the broad interest of key stakeholders.

Research Questions

First 5 Kern works in partnership with its service providers in communities throughout Kern County and has positively affected the lives of thousands of children and their families

(First 5 Kern, 2017, p. 2). This study of the impact of Proposition 10 funding, based on the strategic partnership building under the Commission’s leadership, fits Da’ar and Diaz’s (2011) three-tier classification for assessing the return of investment (ROI) in health, education and social services (Figure 2). While *direct cost* is covered by Proposition 10 funding, *indirect cost* is related to additional support from other sources, and *opportunity cost* can be addressed by examining the benefits that are otherwise unavailable without First 5 Kern-funded programs and services.

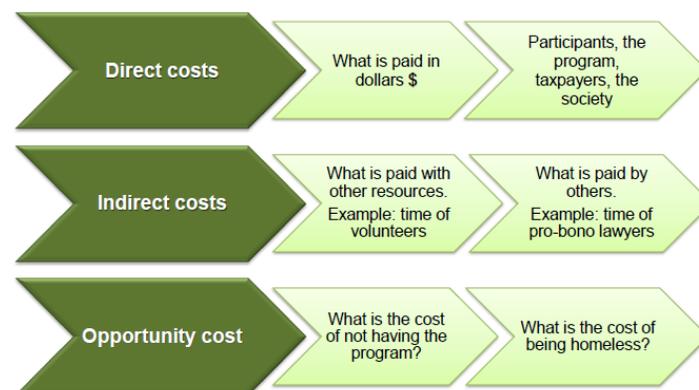


Figure 2. Classification of the cost coverage for assessing ROI

Accordingly, this CBA project addresses the following five research questions:

1. How many programs have reached a status to pay for themselves with First 5 Kern funding?
2. What is the contribution of First 5 Kern, through partnership building, in improving the programs’ financial conditions?
3. What programs would have been otherwise unavailable without First 5 Kern funding?
4. What programs became more sustainable, due to First 5 Kern’s support for external fund leveraging, between the adjacent funding cycles?
5. What is the long-term return of First 5 Kern-funded programs and services?

Questions 1 and 5 target *direct cost* to examine program benefits for participants and taxpayers,

while Questions 2 and 4 focus on *indirect cost* to illustrate First 5 Kern’s support for partnership building across programs. Question 3 is related to *opportunity cost* to demonstrate the consequences of not providing immunization and other critical programs by First 5 Kern within the communities.

These questions are important to various stakeholders of early childhood support. For policymakers, a key CBA question is program sustainability, i.e., “what is the chance that the program will at least break even by generating one dollar of benefits for each dollar of cost?” (Washington State Institute for Public Policy, 2017, p. 7). Research literature indicates a benefit-cost ratio (BCR) of 1 is “the point at which the investment pays for itself” (Heckman, Grunewald, & Reynolds, 2006, p. 13). Hence, Question 1 examines if First 5 Kern-funded programs can break even and sustain themselves based on the analysis of costs and benefits for each program over a seven-year period. Trend data are employed to construct a 95% confidence interval (CI) of BCR that reflects result variations in the **process** component of the PPCT model across 39 programs.

As required by Proposition 10, all programs funded by First 5 Kern serve children ages 0 to 5, and the CBA configuration is inseparable from the **person** component of the PPCT model. To ensure full compliance with federal, state, and local laws, rules, and regulations, First 5 Kern has established a protocol with the Institutional Review Board (IRB) of California State University, Bakersfield (CSUB) as documented in quarterly reports of *consent form administration, confidentiality training, and site inspection*. The IRB partnership extends to \$3 million in coverage to protect First 5 Kern against potential lawsuits. The fee for regular IRB review was waived by CSUB, which approximates \$100,000 per-year savings (at a review rate

of \$2,200 per program in California¹). Also, First 5 Kern encourages its service providers to seek at least two external funding opportunities every year. Based on First 5 Kern’s support for service protection and fund leveraging, Question 2, through this trend investigation, addresses the Commission’s contribution in improving the programs’ financial conditions.

Further, “social programs often exist because there is no ‘market’ or profit-making motivation to provide many social services” (Shank & Rosenbaum, 2003, p. 5). Proposition 10 funding provides essential programs, such as immunization services, that would have been otherwise unavailable in remote communities. Question 3 focuses on identification of these essential programs that are unable to make their ends meet without Proposition 10 funding.

Since “local conditions vary in the United States, the results of benefit-cost analyses will, too” (Olson & Bogard, 2014, p. 13). This CBA project provides a value-added assessment of First 5 Kern-funded programs between the last and current funding cycles, and Question 4 addresses the improvement of program sustainability in the **context** component of the PPCT paradigm.

While the first four questions track the benefits of First 5 Kern-funded programs on an annual basis, Question 5 examines the long-term return of these programs. According to Heckman (2017), “[e]xisting research on the effectiveness of early childhood programs largely focuses on short-term academic gains when it is long-term benefits that provide a more relevant measure of value” (p. 1). Since the data used for this CBA are limited in seven years (a little over one-third of First 5 Kern’s history), external CBA results are reviewed to configure the long-term return of First 5 Kern-funded programs (Question 5).

In summary, this CBA project intends to reveal whether a service provider has reached a

¹ <https://www.som.uci.edu/research/research-support-services/index-08-07-2015.asp>

status to pay for itself (Question 1), and add new evidence for the Commission to justify three core components of Results-Based Accountability:

1. The funding of programs with *BCRs less than 1* indicates the *extent* that First 5 Kern plays an *irreplaceable* role in filling service gaps in early childhood interventions (Question 3);
2. The support for programs to become more sustainable between the last and current funding cycles illustrates *how well* the Commission performed in local capacity building (Question 4); and
3. Answers to Questions 2 and 5 further demonstrate whether local children, their families, and service providers are *better off* due to First 5 Kern's support.

Literature Review

Supply and demand have been advocated as the most fundamental concepts of economics for CBA (Hayes, 2018). Information gathered for CBA of ECL programs “shall include, but need not be limited to, data on supply, demand, cost and market rates for each category of child care in the county” (Early Childhood Council of Kern, 2014, p. 1). From the supply side, good child care tends to be more expensive than poor child care, and the mechanism of market competition cannot weed out poor-quality programs. From the demand side, parents vary in their abilities to raise children, and low-quality care can be attractive to many parents who do not have the resources to purchase quality care. Therefore, to “argue that child care markets work perfectly and that no government intervention is required, one must assume that there is no public interest in the raising of children” (Cleveland & Krashinsky, 1998, p. 9). According to the Heckman (2017) model, society cannot just rely on the market to provide quality ECL programs and services. Public investment is crucial, and there is a strong

public interest in improving quality child care that cannot be accomplished through free market competition, particularly for children in the first five years that account for 90% of the brain development.

This section provides a review of the literature on CBA of ECL programs and services. To ensure that “the results of benefit cost analyses need to compare apples to apples, not apples to oranges” (Olson & Bogard, 2014, p. 12), the following section summarizes the findings of (1) three model programs (i.e., Abecedarian Program, CCP program, and Perry Preschool Project); (2) Vermont ECL programs; (3) comparative studies of ECL programs; and (4) prior CBA reports commissioned by First 5 Kern.

The three model programs deserved special attention because of their configuration of the long-term benefits that cannot be replicated by the short-term trend examination in this study. Vermont ECL programs were recently evaluated by Diaz (2017), which, similar to Proposition 10-funded programs, support young children ages 0 to 5, regardless of their socioeconomic status. A comparative study (Cleveland & Krashinsky, 1998), which coincided with the time of Proposition 10 passage, focused on programs that demonstrated a close match with First 5 Kern-funded programs on the PPCT paradigm. Previous CBA projects commissioned by First 5 Kern did not consider the PPCT model, and are reviewed in reference to the unique characteristics of Proposition 10-funded programs in Kern County.

CBA Findings from Three Model Programs

To date, Abecedarian Program, CCP program, and Perry Preschool Project (PPP) are three prominent programs that have been studied extensively by the research community (see Galinsky, 2006; Isaacs, 2008; Pace, 2015; & Schaeffer, 2008). These programs have been able to track data over an extensive period of time, while “large-scale programs ... generally have

failed to track their costs and to invest in studies that quantify their benefits, particularly in the years after children leave the programs” (Center on the Developing Child at Harvard University, 2007, p. 19). Major features of Abecedarian Program, CCP, and PPP, as well as their cost information and BCR values, are summarized in Table 1.

Table 1: Primary Features of Abecedarian Program, Chicago CCP, and Perry Preschool Project

Features	Abecedarian Program	Chicago CCP	Perry Preschool
Years	1972-1985	1983-1989	1962-1967
Age Delimit	0-5 plus three years of home learning visits	3-8, or Preschool-Grade 3	3-4
Operating Hours	8-10 hours on weekdays year round	3-hour pre-K on weekdays plus K-3 schooling	2.5 hour on weekdays 1.5 hour/week visit
Random Sample	57 children in treatment 54 children in control	989 children in treatment 550 children in control	58 children in treatment 65 children in control
Demo-Graphics	98% African American 53% female	94% African American 49% female	All African Americans 41.2% female
Teacher-Child Ratio	1:3 for infants/toddlers 1:6 for preschoolers	1:8.5 for pre-K, 1:12.5 for Kindergarten	1:5 to 1:6.25
Follow-up	Ages 8, 12, 15, 21	Annually through grade 7 Plus ages 15, 17-18, 24-26	Ages 15, 19, 27, 40
Cost	\$83,500 per child ¹	\$9,700 per child ²	\$20,900 per child ³
BCR	2.5 ²	6.9 ³	6.6-12.2 ¹

Notes: ¹ - Heckman et al. (2010); Burr & Grunewald (2006). ² - Barnett & Masse (2007); ³ - Temple & Reynolds (2007).

According to Barnett (1985), “Three domains of generalizability are important: the program [P], the population [P], and the context [C]” (p. 340). For trend data analysis, time [T] is another dimension that should be considered in triangulating CBA findings from other projects. As shown in Table 1, these three programs started in the early 1960s, 1970s, and

1980s, respectively, and information from different periods of time provides an opportunity to assess the long-term impact of ECL programs.

Based on the PPCT paradigm, service **processes** differ across the three model programs in their early childhood support arrangements, as reflected by teacher-child ratios, operating hours, fund allocations, and follow-up settings (see Table 1). Variations are also shown in demographic compositions, age delimitations, and sample sizes on the **person** dimension, despite the fact that the vast majority of the population (94% or more children) across these three model programs are African American. Regarding the **context** differences, these programs were “operated in inner-city Chicago (CCP), a mid-sized city near Ann Arbor, Michigan (Perry), and a small city outside of Durham, North Carolina (Abecedarian)” (Pace, 2015, p. 3). The **timing** component of the PPCT model is another factor because “[t]he 1960s study (HighScope Perry) is capable of the longest follow-up period, through age 40, whereas the others reach into adulthood, with the last follow-ups to date coming at ages 21 or 26” (Pace, 2015, p. 3). The comparison of the three programs in Table 1 ends with BCRs ranging from 2.5 to 12.2.

More importantly, these programs have some experimental characteristics that cannot be replicated in local settings. For example, Perry Preschool offered weekly seminars with visiting experts for the entire preschool staff, which never occurred in any of the First 5 Kern-funded programs from the **process** perspective. On the **person** dimension, the vast majority of the population (94% or more children) across these programs are African American, but African-American children only account for 1.5% of the child population in Kern County. Also, Proposition 10 provides ECL services to all children, not just the underserved ones in the local **context**. Further, Proposition 10 funding has been declining over **time**, reaching a level of

approximate \$370 per child across the state in FY 2016-2017 (Wang, 2018). The funding for these model programs is much higher, as shown in Table 1.

In summary, there are differences among state-sponsored ECL programs, such as those from Proposition 10 that do not just support children with low socioeconomic status. Hence, caution should be exercised when generalizing CBA findings from these model programs to local settings. Ignoring these differences could lead to misestimation of the benefits of ECL programs. To ensure an apple-to-apple comparison, we further examine additional issues with Vermont early learning programs in the following section.

Results of Vermont Early Learning Programs

The State of Vermont sponsored a project to examine the economic return from investing public funds in ECL programs for children ages 0 to 5 (Diaz, 2017). Despite the fact that Vermont is much smaller than California, both states were rated similarly across the nation for having the lowest infant mortality rates². Kern County is the third largest county in California by land area, and the scope of service delivery is comparable between First 5 Kern and the State of Vermont.

According to Diaz (2017), the benefits associated with publicly-funded ECL programs in Vermont include:

1. Savings for Vermont's government in its K-12 public education system through reduced special education costs and reduced grade retention
2. Savings for Vermont's justice system
3. Additional tax revenues
4. Reduced future healthcare costs paid by the government

² <https://moneyish.com/ish/these-are-the-best-and-worst-states-to-have-a-baby/>

5. Benefits to participating children, including additional net lifetime earnings and reduced future health care costs
6. Benefits to other members of society via reduced cost to victims of crime and reduced health care costs accrued by other private payers (p. 5)

Diaz's CBA of the Vermont programs (2017) found that society "would receive \$3.08 for every additional dollar invested by Vermont's government in the expansion of ECL programs" (p. 2). This result was much lower than an earlier report of 6.30 BCR from the Abecedarian program under a well-controlled experimental setting (Harrington, 2016). The Washington State Institute for Public Policy (WSIPP) (2004) concurred that "prevention and intervention programs developed in carefully controlled settings often fail to achieve the same results in the 'real world'" (p. 2).

On the surface, the smaller BCR value (i.e., BCR = 3.08) from Vermont seemed to align with Heckman's research that concluded a higher BCR value (i.e., BCR = 6.30) for programs serving at-risk populations. Nonetheless, Diaz (2017) cited that a "recent report from The Heckman Group shows returns of \$13 per invested dollar in birth to 5 programs such as the Abecedarian program" (p. 19), which was inaccurate. A link in the report (Diaz, 2017) led to the original writing of the Heckman Group (see Garcia, Heckman, Leaf, & Prados, 2016) that showed a 13% per year return on investment, instead of "returns of \$13 per invested dollar" (see Harrington, 2016). Due to the technical oversight, it is likely that Diaz's report has inadvertently inflated the BCR values.

In addition to the misinterpretation in Diaz's report, First 5 California (2018) used the past literature to make a similar claim regarding the statewide return of Proposition 10 funding, i.e., "California's investment in high-quality early learning and care can reap dividends – up to

a 13-to-1 return on investment” (p. 5). Harrington (2016) recollected, “Camille Maben, executive director of First 5 California, said research by Heckman and others helps her organization to educate policymakers about the benefits of high-quality early childhood education programs” (p. 2).

In summary, Diaz’s (2017) study reconfirmed fewer benefits from ECL programs that served the general population than their counterparts for at-risk population. Similar to this CBA study of First 5 Kern-funded programs, the Vermont project relied on short-term population estimates from the Public Use Microdata Sample in the 2011–2013 American Community Survey (Diaz, 2017, p. 6), and thus, literature support was needed for the configuration of the long-term value of ECL programs. However, technical issues surfaced in Diaz’s (2017) literature citation. Further comparison of the CBA findings is presented in the next section.

Comparative CBA Studies of Early Childhood Support Programs

The literature for meta-analysis of ECL programs often included high profile projects like Abecedarian Program, Chicago CCP, and Perry Preschool Project (see Table 1) for at-risk populations. As a result, it is suspected that the BCR values “scored high among intervention program types” (Burr & Grunewald, 2006, p. 31). For example, a meta-analysis of 53 early childhood education programs found a BCR of 2.36 (Aos, Lieb, Mayfield, Miller, & Pennucci, 2004). The BCR values for First 5 Kern-funded programs could be smaller since they do not serve exclusively at-risk populations.

In 1998 when Proposition 10 was passed, a comparative study was released by Child Care Advocacy Association of Canada (CCAAC) to support system building across ECL programs and improve “universally accessible, comprehensive, high quality, publicly-funded

and accountable services” (Cleveland & Krashinsky, 1998, p. 3). The universal service access did not delimit the service coverage within the at-risk populations, similar to Proposition 10-funded programs in Kern County.

This comparative study is rigorous in that it was “able to control for a wide range of possibly confounding factors” in different contexts (Cleveland & Krashinsky, 1998, p. 6), including ECL projects from the United States. It is also objective as the “CCAAC initiated this study with no guarantees about its outcome” (Cleveland & Krashinsky, 1998, p. 4). The comparative study concluded that “for every dollar spent on such a program [in early childhood support], approximately two dollars worth of benefits are generated for children and their parents” (Cleveland & Krashinsky, 1998, p. 5). This finding is endorsed by 16 international experts across economics, education, social planning, family networking, policy analysis, and other fields of study.

In summary, it is well-known that BCRs “are highest when interventions are conducted with at-risk children” (Burr & Grunewald, 2006, p. 6). Therefore, caution should be exercised when transferring CBA findings from programs that serve at-risk children (see programs in Table 1) to programs that do not exclude certain populations (such as First 5 Kern-funded programs). Further, BCRs could be higher for programs in those well-controlled experimental settings (e.g., Aos et al., 2004). Even with the advocacy of randomized trials for the purpose of result generalization (e.g., Garcia et al., 2016), CBA should be tailored to the unique circumstances of ECL programs (i.e., according to the PPCT paradigm). The next section covers a review of past CBA reports of First 5 Kern-funded programs.

Past CBA Reports for First 5 Kern

To quantify the benefits of Proposition 10 funding for Kern County children, families,

and the overall community, First 5 Kern sponsored two CBA projects with CS&O. CS&O's first report (2008) included three components: (1) an analysis of the economic impact of First 5 Kern for FY 2006-2007, (2) an examination of the impact of Proposition 10 on decreasing cigarette consumption in Kern County, and (3) a CBA of Nurse Family Partnership Program (NFPP), dental programs, and health insurance programs in Kern County (CS&O, 2008). The project did not specify the total number of programs under the investigation (CS&O, 2008, p. 2).

While CS&O's final report relied on a review of the literature, the findings may not necessarily apply to Kern County, per the PPCT model. For example, the analysis of the impact of Proposition 10 on cigarette consumption was built on the economic model of Hu, Bai, Keeler, Barnett, and Sung (1994, p. 31), whose study was based on the funding **process** of Proposition 99 with three-year data from **participants** age 15 or older, rather than children ages 0 to 5. When California voters passed Proposition 99 in 1988, a 25-cent-per-pack tax was added to tobacco products. In contrast, Proposition 10 levied a 50-cent-per-pack tax for early childhood support, which made the **context** substantially different from Proposition 99. Further, the **timing** could be an issue with the short period of CS&O inquiry (2008) because “[b]enefits of early childhood programs accrue over the long term; several benefits do not appear until 15 to 20 years later” (Burr & Grunewald, 2006, p. iv).

To overcome some of the limitations in the CS&O study (2008), the second round of CBA reports (CS&O, 2010a-d) covered five programs in *Child Health*: (1) the Healthy Kids of Kern County (HKKC) Health Net Program within the Children's Health Initiative (CHI), (2) Oral Health Programs (Little Smiles and West Kern Dental), (3) San Joaquin Hospital Children's Immunization Program (CMIP), (4) NFPP, and (5) the Medically Vulnerable Infant

Program (MVIP).

Both HKKC and Little Smiles are no longer funded by First 5 Kern, so from the **process** perspective of the PPCT model, CBA results from discontinued programs are not relevant to future funding configurations at First 5 Kern. On the **person** dimension, Little Smiles served 414 children and West Kern Dental served 2,280 children during the first two quarters of FY 2009-2010 (CS&O, 2010b, p. 3). CS&O (2010b) admitted that “Little Smiles will be the only program that is able to be analyzed in this manner [i.e., tracking restorative and preventative services] given that financial breakdown by type of service was able to be tabulated” (p. 6). The exclusion of West Kern Dental from service tracking inadvertently missed the majority of the dental support funded by First 5 Kern. CS&O (2010c) further acknowledged that of “the seventeen vaccination [types] provided by San Joaquin Immunization, clear literature support was able to be gathered on five of the immunization types” (p. 5). Thus, 12 out of 17 (or over 70% of) the vaccine options were not identified within the literature to describe the **context** of immunization services. The incomplete context coverage was also illustrated in CBA for NFPP – Although “NFPP does have a prenatal component” (CS&O, 2010d, p. 5), CS&O (2010d) admitted that “our study did not consider the benefit of immunization and prenatal care” (p. 5). Finally, an examination of the **timing** indicated the need for updating program features in this study. The program that formerly coordinated CHI announced:

Since 2004, the once, Children’s Health Initiative has succeeded in providing health insurance to 1,400 children through the Healthy Kids Program. Since the changes the Affordable Care Act has brought forth, our community outreach efforts has expanded to all community members and has resulted in an enrollment of many families into programs such as Medi-Cal or an affordable health insurance plan through Covered

California.³

In summary, a review of the past CBA projects revealed limitations across the PPCT paradigm, particularly for the configuration of program benefits “without data on clients” (CS&O, 2010a, p. 7). Although CS&O (2008) planned to complete a CBA “of one or more programs each year” (p. 2), its contract was terminated in the last funding cycle, and no other CBA projects were launched to cover additional programs. This CBA project, approved by First 5 Kern in June 2016, includes both qualitative literature review and quantitative data analysis to address the five questions enumerated early in the *Research Questions* section. Details of the research methodology are explained in the next section.

Methodology

This CBA project used the trend data annually collected by First 5 Kern during 2010-2017 on the Total Funded Amount (TFA), Expected Service Count (ESC), and Completed Service Count (CSC) for each program. As the baseline cost and benefit measures, indicators of *program funding* and *service count* are aligned with the Commission’s drive for capacity building according to the *Guidelines for Implementing the California Children and Families Act* (First 5 California, 2010). Built on the tracking of Actual Program Cost (APC), the BCR is derived as

$$BCR = \frac{TFA}{ESC} \times CSC \div APC \quad (1)$$

Based on the BCR calculation, programs that have reached a status to pay for themselves can be identified by BCR=1 (Question 1). Programs that are financially sound are represented by BCR>1, and programs that would have dissolved without First 5 Kern funding are indicated by BCR<1.

³ <http://www.coveredkerncounty.org/about/>

Under the Commission’s leadership, additional benefits are generated from First 5 Kern’s support for external partnership building (EPB), such as leveraged funds and IRB savings for service providers. These benefits are incorporated in this CBA project, since “[i]gnoring these benefits means underestimating a program’s benefit-cost ratio or its potential net savings to government, particularly over the short term” (Byrnes, 2014, p. 5). As a result, an Adjusted BCR (BCR_{adj}) is computed as:

$$BCR_{adj} = \left[\frac{TPF}{ESC} \times CSC + EPB \right] \div APC \quad (2)$$

which includes EPB for First 5 Kern’s contribution (Question 2).

The effect size of the net benefit is measured by the amount of leveraged funds across First 5 Kern-funded programs. Researchers cautioned that the “net benefit of one program may be somewhat higher than that for another, but the uncertainty ranges may overlap so much that the advantage cannot be asserted with high confidence” (Károly et al., 2001, p. 4). Thus, CIs are constructed to identify programs with *BCR or BCR_{adj} less than 1* for issues of service sustainability in Kern County (Question 3).

In accordance with Proposition 10, First 5 Kern supports children ages 0 to 5 and their families. Each year, newborns enter the service group, and former five-year-olds exceed the age limit. Due to local population growth, the incoming population is larger than the exiting population, causing more than 40% population refreshment each year. Therefore, traditional distribution-specific approaches, such as the Monte Carlo method, cannot be employed to track CIs between adjacent years (Adèr, Mellenbergh, & Hand, 2008). This CBA project adopts bootstrapping as a resampling technique to maintain the distribution-independent features of the statistical computing. Trend data from 2010-2017 are employed to construct the 95% CIs for *BCR or BCR_{adj}* across 39 programs.

To compare CBA findings between the last and current funding cycles, a discount mechanism is introduced to support the result aggregation in 2018 dollars. Based on an extensive review of the current literature, this CBA project adopts the modal discount rate of 3.5% (i.e., Dis=0.035) from the WSIPP study (2017). The WSIPP was created in 1983 to improve evidence-based decision-making by the Washington state legislature and other policymakers,⁴ and has become the leading example of CBA “to summarize the extant evidence on a variety of programs in the hope that their syntheses will be used in decisions about funding (or defunding) programs” (Bogard, Karoly, & Brooks-Gunn, 2015, p. 1). Past reviewers of the WSIPP (2017) approach included scholars from Duke University, RAND Corporation, the University of Chicago, University of California-Berkeley, and University of Wisconsin-Madison (WSIPP, 2017, p. 9-10). The credibility of the WSIPP approach has been established through peer-reviewed journal publications (Drake, 2012; Drake, Aos, & Miller, 2009; Lee, Drake, Pennucci, Bjornstad, & Edovald, 2012) and 26 state implementations (as part of the Pew-MacArthur Results First Initiative⁵).

In this CBA project, the BCR for value-added assessment (BCR_{va}) is adapted below from the notations of WSIPP (2017):

$$BCR_{va} = \sum_{i=1}^N \frac{P_i \times Q_i}{(1+Dis)^i} / \sum_{i=1}^N \frac{C_i}{(1+Dis)^i} \quad (3)$$

where $P_i = (TFA_i)/(ECS_i)$, $Q_i = CSC_i$, and $C_i = APC_i$ for year i , and N represents the number of years involved in the CBA computing in each funding cycle.

The Adjusted BCR for value-added assessment (BCR_{va_adj}) is configured as:

$$BCR_{va_adj} = \sum_{i=1}^N \frac{P_i \times Q_i + EPB_i}{(1+Dis)^i} / \sum_{i=1}^N \frac{C_i}{(1+Dis)^i} \quad (4)$$

⁴ <https://medium.com/data-labs/washington-state-institute-for-public-policy-wsipp-c91d7e40b8fd>

⁵ <http://www.pewstates.org/projects/pew-macarthur-results-first-initiative-328069>

where EPB_i is the EPB value introduced in Formulas 1 and 2 for year i .

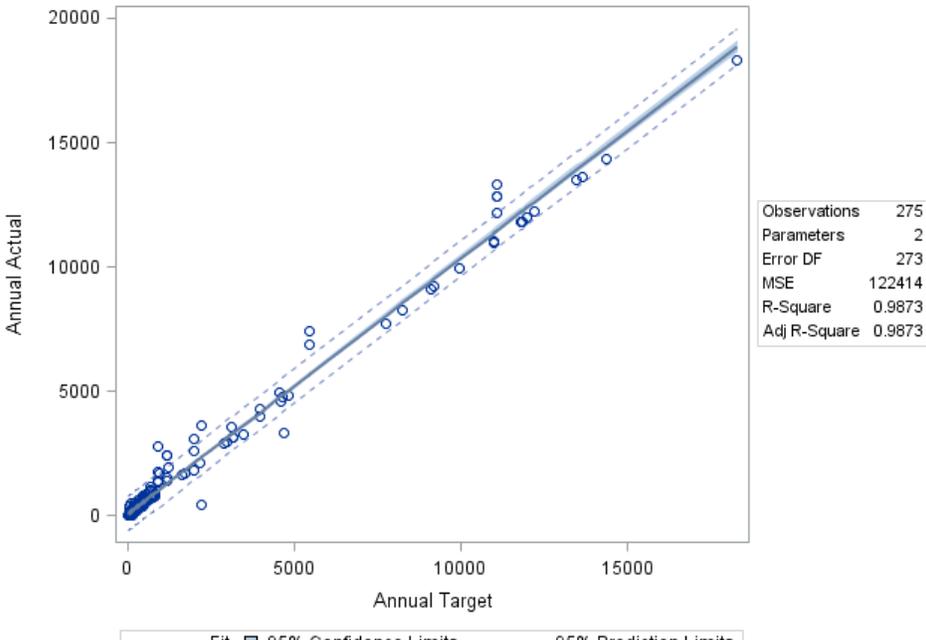
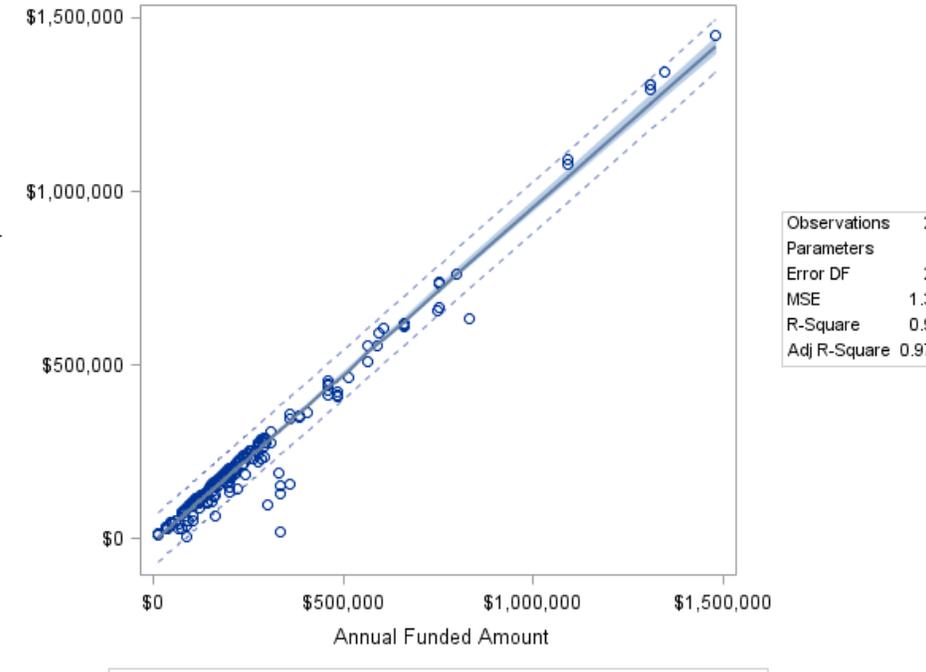
As suggested by WSIPP (2017), the incorporation of the discount factor in Formulas 3 and 4 ensures a fair, apples-to-apples comparison of CBA findings through value-added assessment between funding cycles to highlight programs that become more sustainable due to First 5 Kern's support for external fund leveraging (Question 4).

Altogether Formulas 1-4 are rooted in a meta-analysis of the CBA literature by WSIPP (2017). To facilitate the setting of P_i , Q_i , and C_i values in each funding cycle, First 5 Kern organizes a Program Review Committee to determine program support according to comparable services in the local market. The internal consistency of program support is confirmed by the fact that there has been no dispute on the funding decisions in the last and current funding cycles across 39 service providers.

The feasibility of the method is also verified by researchers in the past in that one "approach for valuing the benefits of social programs is to base the benefits on prices people are actually paying for comparable goods in the competitive marketplace" (Shank & Rosenbaum, 2003, p. 4). More importantly, trend data from 2010-2017 reflected adequate alignment from both service (i.e., actual count vs. target count) and funding (i.e., program spending vs. program funding) perspectives with a coefficient of determination above 97% across 39 programs (see $R^2 > .97$ in Table 2).

In summary, Questions 1-4 are addressed using trend data collected by First 5 Kern, and Question 5 is answered through a thorough review of the literature, similar to the approach adopted by the Vermont study (Diaz, 2017). Results of these CBA approaches are summarized in the next section.

Table 2: Plots of *Actual and Target Values* on Program Funding and Service Counts

Comparison	Plots of Actual Service and Spending against Target Settings
<p>Fit of Actual Service Count with Annual Target Setting</p>	<p style="text-align: center;">Fit Plot for Actual</p>  <p style="text-align: center;"> — Fit 95% Confidence Limits - - - 95% Prediction Limits </p>
<p>Fit of Actual Spending with Annual Funded Amount</p>	<p style="text-align: center;">Fit Plot for AmountSpent</p>  <p style="text-align: center;"> — Fit 95% Confidence Limits - - - 95% Prediction Limits </p>

Results

Despite minor differences in First 5 Kern's strategic plan between the last and current funding cycles, *Integration of Services* has been one of the focus areas to support local service system building. The trend data collection includes annual tracking of *Result Indicators* (RI) from the strategic plan to support the aggregation of CBA findings between adjacent funding cycles. Following the Result-Based Accountability model required by Proposition 10, APC has been systematically gathered, and benefits are configured to determine whether a program has (1) made APC less than the TFA to reduce program spending, (2) increased the CSC above the ESC to expand the service delivery, and (3) followed the Commission's leadership on EPB to strengthen program sustainability (see Formulas 1-4). Results of this CBA project are presented below.

Benefits from External Fund Leveraging

Proposition 10-funded programs are built on existing early childhood services to fill program gaps across communities (Bodenhorn & Kelch, 2001). In service capacity building, "The Proposition 10 Commission can be a lead partner to fund, leverage other funding and resources, and help develop a network of neighborhood family support hubs throughout the County" (Coachman-Moore, Trevino, & Wright, 2002, p. 19). The funds leveraged from other partners represent effect sizes of additional benefits through EPB (O'Sullivan et al., 2002).

In Formula 1, EPB is excluded to examine the baseline trend on whether programs have reached a status to pay for themselves (Question 1). Under the leadership of First 5 Kern, effects of service integration are assessed through the inclusion of the EPB factor in Formula 2 for improvement of the programs' financial conditions (Question 2). A comparison of the findings from Formulas 1 and 2 can help identify programs that would have been otherwise

unsustainable without First 5 Kern funding (Question 3). On the whole, Questions 1-3 are designed to examine the benefits from external fund leveraging because additional support would not have occurred without the seed money of program funding from First 5 Kern. Total leveraged funds from 2010-2017 are depicted in Figure 3 to aggregate external support in each focus area. Figure 3 shows that total leveraged funds in *Child Health* fall below those in *Family Functioning* and above those in *Child Development*, which is parallel to the total program counts in each focus area (see Appendix).

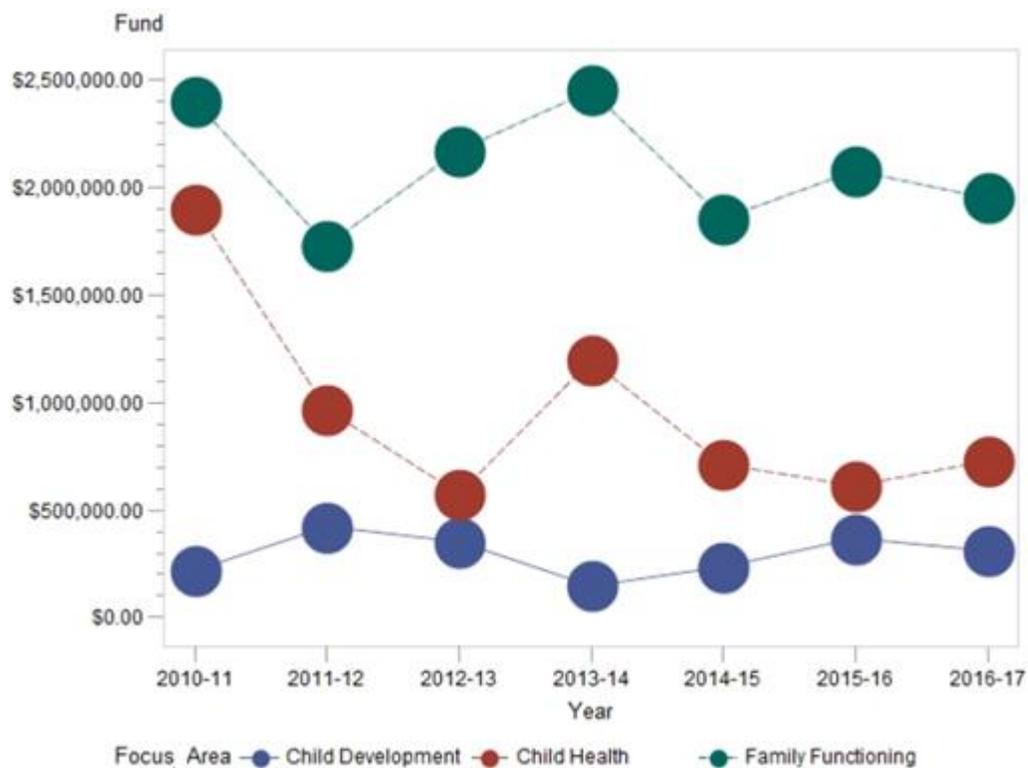


Figure 3. Trend of the leveraged funds across focus areas

Over time, per-child investment from Proposition 10 has been decreasing since 2000 (Figure 4). As First 5 Fresno (2013) speculated, the decline in Proposition 10 funding could have “resulted in organization becoming more insular thus decreasing their collaboration with other organizations” (p. 102) and reducing the capacity for fund leveraging. The persistent support of First 5 Kern for partnership building, however, seems to have counterbalanced the

impact of Proposition 10 funding decline. As a result, there is no obvious fluctuation of leveraged funds between the current funding cycle (i.e., FYs 2015-2017) and the last year of the past funding cycle (i.e., FY 2014-2015) (see Figure 3).

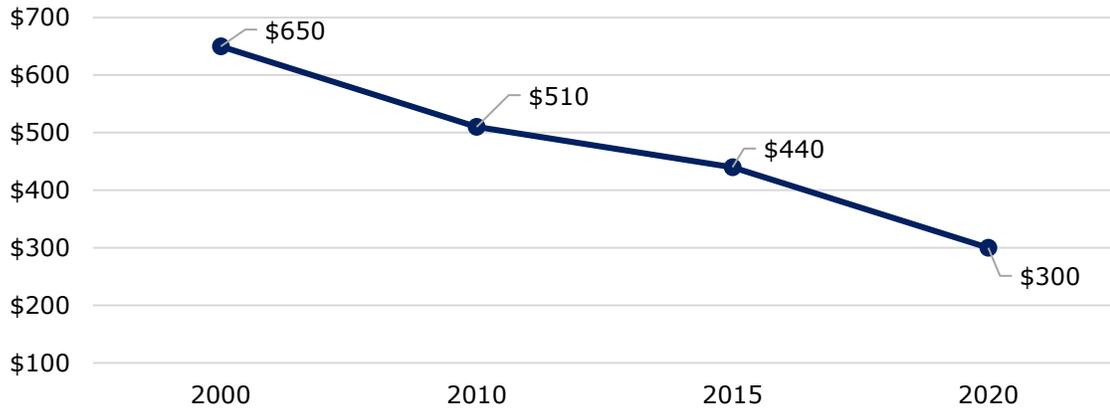


Figure 4. Decline of Proposition 10 Per-Child Investments in California

Across the past seven years, 37 (out of 39) First 5-funded programs jointly raised approximately \$23,374,630 through service deliveries in *Child Health*, *Family Functioning*, and *Child Development* (Table 3), despite the lack of leveraged funds in the other 2 programs. Further, a program’s leveraged funds may vary over time. For instance, the Differential Response (DR) program raised \$560,000 in some years and no funds in others (Table 3). Since fund leveraging depends on partnership building that cannot be unilaterally controlled by service providers, construction of CIs is included in this CBA report to account for result fluctuations. While the majority of service providers strengthen their program capacity through partnership building, Table 3 also reveals the inclusion of \$0 in the 95% CI estimation for 6 out of 39 programs, which suggests that there is a 95% likelihood that these six programs generate no significant net gain from fund leveraging at $\alpha=.05$.

Table 3: Trend of Leveraged Funds across Programs (in \$1,000)

Program*	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Annual Mean	95% C.I.
BIH	0.00	0.00	0.00	2.37	2.60	0.00	239.52	34.93	0.00-119.76
CHI	58.50	23.61	85.18	613.99	82.08	110.59	201.28	167.89	55.79-362.02
CMIP	1294.01	220.94	20.00	0.00	7.50	15.00	0.00	222.49	5.00-652.00
HLP	2.50	2.50	2.50	18.33	4.70	45.00	0.00	10.79	1.53-23.76
KCCDHN	5.88	51.75	16.13	19.64	97.81	73.59	15.67	40.07	13.99-65.75
MAS	2.74	10.71	0.00	40.00	38.71	38.80	29.40	22.91	8.55-37.14
MVCCP	30.00	30.00	50.00	37.00	15.00	10.00	11.50	26.21	15.38-38.00
MVIP	227.96	354.41	197.08	191.38	201.03	119.00	115.58	200.92	143.89-265.64
NFPP	88.47	41.48	135.71	182.44	115.95	38.08	113.52	102.24	64.82-141.00
RSNC	20.17	1.94	2.00	21.90	18.10	0.32	0.00	9.20	1.07-17.63
SAS	164.58	229.31	65.50	67.16	127.77	161.91	1.45	116.81	60.64-175.21
SSEC	6.10	0.00	0.60	0.00	0.00	0.00	0.00	0.96	0.00-3.05
2-1-1	257.43	194.18	269.67	314.14	401.34	556.98	546.85	362.94	225.25-474.09
AFRC	95.75	3.58	2.34	1.26	5.02	0.00	4.10	16.01	1.52-48.78
BCRC	23.74	27.02	12.51	3.63	2.81	23.76	16.08	15.65	7.51-22.97
DR	0.00	0.00	271.81	560.00	560.00	560.00	504.00	350.83	137.95-550.67
DVRP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00-0.00
EKFRC	160.89	54.72	35.30	6.50	1.50	35.00	31.21	46.45	16.36-96.05
GSR	16.96	36.14	6.96	10.58	3.83	78.10	12.53	23.59	7.99-48.22
GCP	34.22	24.61	25.44	40.65	33.33	40.86	37.18	33.76	28.58-38.88
IWVFC	99.82	60.84	51.81	64.99	53.90	58.25	52.91	63.2	53.95-78.36
KRVFC	777.99	579.67	415.57	263.67	196.74	218.90	152.09	372.09	207.85-562.38
LVSFP	424.99	240.71	355.45	342.92	0.00	3.00	7.50	196.37	61.49-341.07
MCFC	39.21	109.28	44.11	80.81	41.64	25.73	51.56	56.05	37.49-80.43
MFRC	104.73	45.16	31.35	149.86	135.53	129.11	28.76	89.21	48.35-131.08
SHS	4.75	8.61	2.38	2.98	1.00	3.39	18.51	5.95	2.38-10.99
SENP	121.90	140.10	152.74	133.61	155.48	121.93	129.44	136.46	125.81-146.94
WSCRC	34.35	140.89	61.38	46.90	60.00	54.49	60.91	65.56	47.18-94.26
WSN	204.04	65.72	432.36	426.26	202.97	166.71	294.84	256.13	157.22-375.31
BCDC	29.95	0.00	0.00	0.40	0.00	46.90	165.23	34.64	0.08-90.20
DSR	0.02	2.50	0.00	0.20	0.00	3.52	0.00	0.89	0.00-2.19
DDCCC	0.00	177.58	0.70	0.57	7.66	62.05	0.79	35.62	0.57-90.85
LHFRC	3.35	1.96	44.81	3.10	1.00	3.07	14.50	10.26	2.10-24.75
NPCLC	18.36	26.58	25.24	30.16	52.42	49.01	19.71	31.64	22.13-42.16
R2S	65.00	155.90	225.00	47.50	91.67	137.50	22.50	106.44	52.09-165.11
SSCDC	42.80	6.00	10.25	23.76	36.00	19.85	35.57	24.89	13.61-35.56
SFP	13.18	9.47	9.90	7.49	14.33	17.55	22.98	13.56	9.99-18.19
SPCSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00-0.00
WWP	46.16	42.38	36.84	33.61	32.84	28.46	29.16	35.64	31.02-40.72

* Program acronyms are defined in the Appendix.

BCR Indicators on Program Sustainability

Leveraged funds represents a measure of effect sizes based on partnership building and is aligned with *Service Integration*, the fourth focus area of First 5 Kern’s (2017) strategic plan.

The use of effect sizes alone, however, could cause problems as described below:

Unfortunately, effect sizes can provide incomplete and at times, misleading guidance to policymakers. It is important to recognize that sometimes small effects may translate into meaningful differences in children’s lives. In addition, it is possible that small effects across a range of domains taken together may also lead to important improvements. A cost-benefit approach may be more useful because it quantifies the value of a program’s effects relative to the costs incurred in achieving them. (Center on the Developing Child at Harvard University, 2007, p. 11)

BCRs from Formula (1) indicate whether the benefits of ECL programs outweigh the costs. Figure 5 shows the aggregated average BCRs for First 5 Kern-funded programs across *Child Health, Family Functioning, and Child Development*, all of which are larger than 1.

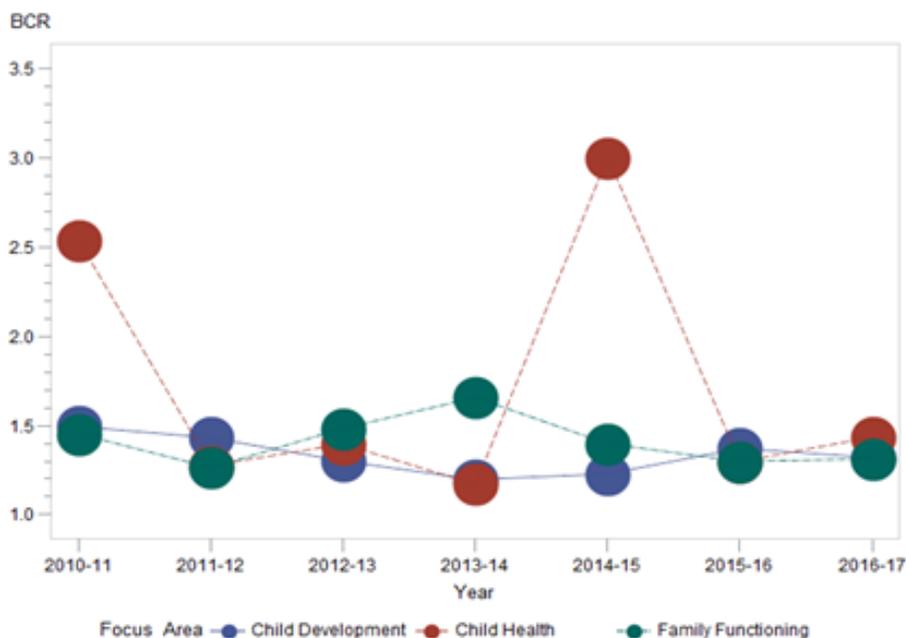


Figure 5. Trend of the BCRs across focus areas without the fund leveraging impact

It should be noted that *Community Health Initiative of Kern County (CHI)* and *Successful Application Stipend (SAS)* were considerably impacted by the enactment of major healthcare policies, such as the PPACA. In FY 2010-2011, CHI was expected to provide medical homes for 100 children and assist health insurance applications for 120 children. The

program leveraged \$58,502 in that year, more than doubling the leveraged funds in FY 2011-2012. As a result, CHI provided medical homes for 779 children and assisted health insurance applications for 2,122 children, resulting in an increase of the BCR value to 13.62 in FY 2010-2011. Similarly, SAS was funded for \$335,150 in FY 2014-2015, but it only spent \$18,858, generating a BCR value larger than 23.94. These abnormally high BCRs contributed to the fluctuations of BCRs in *Child Health* (see Figure 5).

At the program level, Formula (1) was used to compute 273 BCR indices from 2010-2017 (Table 4). Programs with sustainability concerns are identified by a *less-than-1* BCR value and/or low boundary of the CI for BCR. Table 4 shows 36 BCRs less than 1, consisting of 13.19% of all BCRs. More specifically, three programs in *Child Health* (CHI, CMIP, NFPP), four programs in *Family Functioning* (2-1-1, BCRC, KRVFRC, MFRC), and three programs in *Child Development* (DDCCC, R2S, SSCDC) would have been unsustainable. The remaining **29 programs have reached a status to pay for themselves**, as indicated by BCR larger than 1 in Table 4, with the designated funds from Proposition 10.

In view of fund leveraging effects in Formula (2), the contribution of First 5 Kern is indicated by improvement of program financial conditions through *service integration*. Similar to results in Figure 5, the impact from CHI and SAS caused result fluctuations in *Child Health* during FY 2010-2011 and FY 2014-2015 (see Figure 6). Excluding the outliers, Figure 6 shows that BCRs converge 2.0 across *Child Health*, *Family Functioning*, and *Child Development*. In contrast, if programs operated on their own without fund leveraging, the corresponding BCRs converged around 1.5 (see Figure 5).

Table 4: Benefit-Cost Ratios without Considering Fund Leveraging across Programs

Program*	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Mean	95% C.I. ²
BIH	1.49	1.24	1.86	1.29	0.93	2.43	1.25	1.50	1.15-1.91
CHI	13.62	0.33	0.92	0.53	0.39	1.88	0.47	2.59	0.45-7.05
CMIP	1.95	1.21	1.27	1.08	1.10	0.86	0.73	1.17	0.90-1.29
HLP	1.74	1.40	1.59	1.33	1.08	1.09	1.14	1.34	1.15-1.54
KCCDHN	1.23	1.10	1.01	1.16	1.16	1.36	1.28	1.19	1.10-1.28
MAS	1.25	1.33	1.21	1.38	1.14	1.11	1.07	1.21	1.13-1.30
MVCCP	1.60	2.28	2.54	1.84	1.24	1.24	1.30	1.72	1.33-2.19
MVIP	1.13	1.02	1.01	1.07	1.26	1.40	1.35	1.18	1.06-1.30
NFPP	1.03	0.78	1.08	0.87	0.95	0.89	1.08	0.95	0.87-1.04
RSNC	0.96	1.50	1.31	1.22	1.22	1.46	1.12	1.26	1.11-1.40
SAS	3.40	2.10	1.85	1.05	23.94	0.55	5.27	5.45	1.48-13.06
SSEC	1.00	1.02	1.09	1.22	1.61	1.30	1.15	1.20	1.06-1.38
2-1-1	1.08	1.05	1.12	1.03	1.02	0.42	0.73	0.92	0.68-1.07
AFRC	1.40	1.23	1.37	1.18	1.40	1.43	1.28	1.33	1.25-1.40
BCRC	1.51	1.23	1.10	0.83	1.04	1.01	1.18	1.13	0.97-1.29
DR	1.14	0.98	1.65	1.39	1.08	1.06	1.17	1.21	1.06-1.41
DVRP	1.97	1.39	1.09	1.04	1.12	1.05	1.13	1.26	1.07-1.53
EKFCRC	1.93	1.47	1.97	1.97	1.23	1.59	1.80	1.71	1.48-1.93
GSR	1.30	1.61	1.94	1.34	1.43	1.30	1.21	1.45	1.28-1.66
GCP	1.42	1.33	1.39	1.35	1.59	1.20	1.20	1.35	1.25-1.46
IWVFRC	2.04	1.97	1.62	1.59	1.28	1.82	1.78	1.73	1.52-1.91
KRVFRC	0.82	0.88	1.32	1.11	0.89	1.10	1.21	1.05	0.90-1.21
LVSFP	2.69	1.09	1.20	1.06	1.10	2.00	1.56	1.53	1.10-2.09
MCFRC	0.91	1.27	1.67	7.28	3.82	1.31	1.06	2.47	1.12-4.48
MFRC	1.09	1.04	1.05	0.91	1.01	1.58	1.18	1.12	0.99-1.31
SHS	1.35	1.16	1.15	1.02	1.01	1.19	1.21	1.16	1.08-1.24
SENP	1.73	1.30	2.31	2.19	1.50	1.34	1.65	1.72	1.43-2.03
WSCRC	1.52	1.46	1.39	1.40	1.56	1.66	1.56	1.51	1.43-1.58
WSN	0.79	1.01	1.89	1.46	1.67	1.02	1.41	1.32	1.04-1.61
BCDC	1.97	1.67	1.53	1.21	1.31	1.76	1.32	1.54	1.34-1.76
DSR	1.72	1.65	1.45	1.37	1.56	1.08	1.16	1.43	1.23-1.60
DDCCC	1.02	1.08	0.63	1.13	1.12	1.53	1.17	1.10	0.90-1.30
LHFRC	1.61	1.15	1.40	1.32	1.08	1.09	1.13	1.25	1.12-1.42
NPCLC	0.86	1.47	1.32	1.23	1.30	1.97	1.88	1.43	1.13-1.72
R2S	0.94	0.94	0.95	0.85	0.67	0.72	0.76	0.83	0.74-0.92
SSCDC	0.61	0.52	1.11	0.90	1.03	1.52	1.57	1.04	0.75-1.34
SFP	2.91	1.51	1.27	1.43	1.43	1.42	1.31	1.61	1.35-2.12
SPCSR	2.00	3.07	2.18	1.52	1.67	1.44	1.81	1.96	1.58-2.39
WWP	1.29	1.25	1.16	1.01	1.12	1.18	1.09	1.16	1.08-1.23

* Program acronyms are defined in the Appendix.

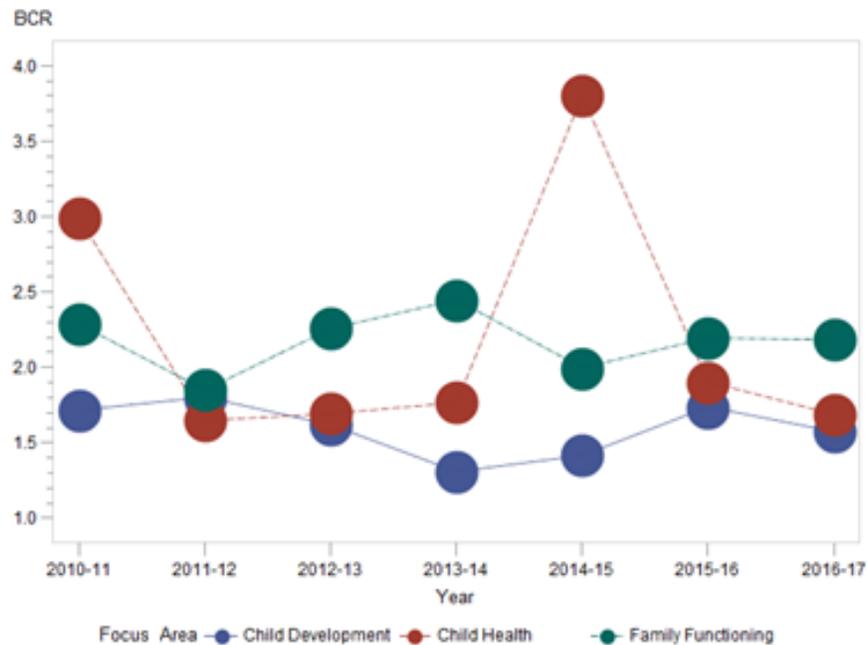


Figure 6. Trend of the BCRs across focus areas with the fund leveraging impact

It should be noted that programs may show BCRs less than 1, even after incorporating fund leveraging, because “some prevention and early intervention programs fail to generate more benefits than costs” (WSIPP, 2014, p. 1). For example, Table 5 shows BCRs less than 1 in FY 2015-2017 for CMIP, an immunization program funded by First 5 Kern that offers free vaccination services to the communities. The benefits of CMIP cannot be simplistically quantified by a single dollar amount across different vaccines.

In summary, **due to First 5 Kern’s support for fund leveraging, BCR values increased from 1.5 to 2.0** in three focus areas of direct services across 39 programs funded by First 5 Kern during 2010-2017 (Figures 5 & 6). In addition, a comparison of the results in Tables 4 and 5 demonstrated that First 5 Kern’s support for partnership building contributed significantly to improving program financial conditions. While over 13% of the BCRs in Table 4 were below 1 without considering the EPB, mean BCRs in Table 5 were all above 1 through the incorporation of fund leveraging in 2010-2017.

Table 5: BCRs with Fund Leveraging Impact across Programs

Program*	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	Mean	95% C.I.
BIH	1.49	1.24	1.86	1.29	0.93	2.43	1.25	1.50	1.23-2.81
CHI	14.01	0.48	1.45	4.33	0.90	2.47	1.47	3.59	1.11-7.73
CMIP	3.65	1.71	1.32	1.08	1.12	0.91	0.73	1.50	0.95-2.37
HLP	1.75	1.41	1.61	1.48	1.12	1.52	1.14	1.43	1.23-1.62
KCCDHN	1.23	1.14	1.03	1.17	1.24	1.43	1.29	1.22	1.12-1.31
MAS	1.31	1.58	1.21	2.32	1.94	2.25	1.92	1.79	1.45-2.12
MVCCP	2.73	3.26	4.16	2.56	1.53	1.46	1.55	2.46	1.73-3.27
MVIP	1.96	2.29	1.69	1.76	2.11	2.05	1.84	1.96	1.80-2.12
NFPP	1.17	0.84	1.29	1.12	1.10	0.95	1.26	1.10	0.97-1.21
RSNC	1.04	1.51	1.32	1.31	1.29	1.46	1.12	1.29	1.16-1.42
SAS	4.46	3.30	2.28	1.56	30.72	4.63	5.54	7.50	2.78-17.57
SSEC	1.05	1.02	1.10	1.22	1.61	1.30	1.15	1.21	1.07-1.38
2-1-1	3.72	2.93	3.83	3.94	4.70	7.28	6.87	4.75	3.60-6.22
AFRC	1.77	1.25	1.38	1.18	1.42	1.43	1.30	1.39	1.26-1.56
BCRC	1.66	1.40	1.18	0.85	1.06	1.19	1.31	1.24	1.05-1.42
DR	1.15	0.98	2.09	2.30	2.00	2.16	2.07	1.82	1.42-2.17
DVRP	1.97	1.39	1.09	1.04	1.12	1.05	1.13	1.26	1.07-1.55
EKFRFC	3.04	1.78	2.16	2.02	1.24	1.89	2.07	2.03	1.64-2.46
GSR	1.38	1.78	1.97	1.39	1.45	1.76	1.28	1.57	1.38-1.78
GCP	1.54	1.43	1.48	1.50	1.71	1.38	1.36	1.49	1.41-1.58
IWVFRFC	2.78	2.35	1.92	1.95	1.58	2.23	2.14	2.14	1.89-2.45
KRVFRFC	4.65	3.85	3.42	2.44	1.89	2.45	2.13	2.98	2.26-3.94
LVSFRP	4.36	2.12	2.71	2.49	1.10	2.02	1.60	2.34	1.62-3.23
MCFRC	1.09	1.81	1.89	7.69	4.03	1.47	1.37	2.76	1.42-4.54
MFRC	1.62	1.28	1.22	1.71	1.74	2.40	1.36	1.62	1.34-1.97
SHS	1.38	1.21	1.16	1.03	1.02	1.21	1.34	1.19	1.09-1.30
SENP	2.34	2.01	3.10	2.85	2.35	2.17	2.50	2.47	2.21-2.77
WSCRC	1.70	2.20	1.71	1.65	1.90	1.98	1.92	1.87	1.71-2.02
WSN	2.70	1.68	6.07	5.58	3.65	3.25	5.38	4.04	2.71-5.31
BCDC	2.44	1.67	1.53	1.22	1.31	2.14	2.65	1.85	1.41-2.28
DSR	1.72	1.66	1.45	1.37	1.56	1.10	1.16	1.43	1.25-1.61
DDCCC	1.02	2.53	0.64	1.14	1.18	2.20	1.17	1.41	0.95-1.95
LHFRFC	1.63	1.16	1.64	1.33	1.09	1.11	1.22	1.31	1.14-1.49
NPCLC	0.94	1.58	1.42	1.35	1.51	2.22	1.98	1.57	1.25-1.91
R2S	1.59	2.55	3.27	1.34	1.66	2.44	1.04	1.98	1.42-2.63
SSCDC	1.05	0.54	1.15	0.99	1.15	1.61	1.72	1.17	0.88-1.46
SFP	3.04	1.63	1.39	1.52	1.61	1.66	1.62	1.78	1.50-2.32
SPCSR	2.00	3.07	2.18	1.52	1.67	1.44	1.81	1.96	1.59-2.46
WWP	1.73	1.64	1.52	1.31	1.42	1.46	1.38	1.49	1.39-1.61

* Program acronyms are defined in an Appendix.

Table 6 includes indicators and answers to Questions 1-3 from the trend data analysis.

To expand the impact of this CBA project, reports of these findings were presented at two peer-reviewed professional conferences in 2018:

Sun, J., Wang, J., & Ives, K. (2018, March). *A cost-benefit analysis of early childhood education programs through Proposition 10 funding in California*. Paper presented at the 2018 annual meeting of the American Society for Public Administration (ASPA), Denver, Colorado.

Wang, J., Sun, J., & Maier, R. (2018, January). *A cost-benefit analysis of Proposition 10 funding in early childhood development*. Paper presented at the 2018 Hawaii International Conference on Education, Honolulu, Hawaii.

Table 6: Indicators and Answers to Questions 1-3

Research Questions	Indicators	Answers
1. How many programs have reached a status to pay for themselves?	Baseline BCR values larger than 1 without fund leveraging	9 programs in <i>Child Health</i> , 13 programs in <i>Family Functioning</i> , and 7 programs in <i>Child Development</i> .
2. What is the contribution of First 5 Kern in improving the programs' financial conditions?	Effect sizes of partnership building as represented by the leveraged funds	\$23,374,630 leveraged funds in 7 years to increase the <i>ratio of net benefit over program cost</i>
3. What programs could have been otherwise unavailable without First 5 Kern funding?	Low boundary of the 95% CI for BCR values less than 1	NFPP & CMIP in <i>Child Health</i> ; DDCCC & SSCDC in <i>Child Development</i>

Value-Added Assessments between Funding Cycles

As explained in the *Methodology* section, when the actual program cost is fully covered by First 5 Kern funding, the BCR value from Formula 1 equals 1 if the target service count is met by local programs each year. In this context, the impact of fund leveraging is considered in Formula 2 to assess additional benefits from First 5 Kern's support for EPB. Formulas 3 and 4 were developed for value-added assessment to compute the aggregated BCR_{va} and BCR_{va_adj} between the last and current funding cycles.

Table 7 lists the CBA findings between the last and current funding cycles across 39 programs based on the discount rate of 3.5% (WSIPP, 2017). Leveraged funds are included in Table 7 to compute the effect size for the impact of partnership building in both funding

cycles. Because fund leveraging will continue in FY2017-2020, results from FY 2015-2017 are proportionally increased by a factor of 2.5 to project the total leveraged funds for the current five-year funding cycle (i.e., $2 \times 2.5 = 5$).

Table 7: Comparison of the Discounted BCR Findings between Funding Cycles

Program	BCR _{va}		BCR _{va_adj}		Leveraged Funds*	
	Last Cycle	This Cycle	Last Cycle	This Cycle	Last Cycle	This Cycle
BIH	1.36	1.68	1.36	3.37	\$5,833.93	\$257,209.59
CHI	3.22	1.15	4.28	1.96	\$1,041,937.95	\$339,210.24
CMIP	1.43	0.80	2.09	0.82	\$2,037,680.86	\$16,692.04
HLP	1.48	1.12	1.51	1.33	\$36,951.19	\$50,076.11
KCCDHN	1.13	1.32	1.16	1.36	\$230,465.80	\$98,720.18
MAS	1.26	1.09	1.65	2.08	\$109,812.57	\$74,749.16
MVCCP	1.84	1.27	2.71	1.51	\$201,819.29	\$23,477.35
MVIP	1.09	1.37	1.96	1.94	\$1,462,503.51	\$256,537.08
NFPP	0.94	0.98	1.10	1.11	\$690,648.97	\$164,280.24
RSNC	1.23	1.29	1.29	1.30	\$78,829.71	\$356.10
SAS	2.75	1.10	3.75	4.74	\$821,820.43	\$181,723.41
SSEC	1.18	1.22	1.19	1.22	\$8,849.37	\$0.00
2-1-1	1.06	0.58	3.82	7.07	\$1,763,646.35	\$1,207,047.39
AFRC	1.32	1.36	1.41	1.37	\$142,113.20	\$4,402.80
BCRC	1.15	1.09	1.24	1.25	\$89,309.18	\$43,707.69
DR	1.26	1.11	1.75	2.11	\$1,651,555.96	\$1,164,391.94
DVRP	1.34	1.09	1.34	1.09	\$0.00	\$0.00
EKFRC	1.71	1.69	2.04	1.97	\$337,374.69	\$72,464.04
GSR	1.53	1.25	1.60	1.52	\$94,601.27	\$100,357.51
GCP	1.41	1.20	1.53	1.37	\$195,596.23	\$85,400.54
IWVFC	1.69	1.80	2.09	2.18	\$414,783.77	\$121,637.55
KRVFC	1.00	1.15	3.30	2.29	\$2,834,985.41	\$406,915.32
LVSFP	1.48	1.77	2.65	1.80	\$1,723,989.90	\$11,392.31
MCFRC	2.86	1.18	3.17	1.42	\$391,586.55	\$84,001.45
MFRC	1.02	1.38	1.51	1.88	\$571,406.38	\$174,556.27
SHS	1.15	1.20	1.17	1.27	\$25,023.48	\$23,647.81
SENP	2.34	1.50	2.53	2.34	\$869,986.49	\$274,688.10
WSCRC	1.46	1.61	1.83	1.95	\$427,716.58	\$126,047.07
WSN	1.35	1.21	3.91	4.29	\$1,634,480.13	\$502,131.65
BCDC	1.48	1.54	1.53	2.39	\$40,305.06	\$229,625.53
DSR	1.55	1.12	1.56	1.13	\$3,474.90	\$3,914.43
DDCCC	1.01	1.35	1.31	1.70	\$238,255.33	\$69,897.73
LHFRC	1.32	1.11	1.37	1.17	\$67,311.17	\$18,977.33
NPCLC	1.23	1.93	1.36	2.10	\$186,258.10	\$75,701.42
R2S	0.88	0.74	2.09	1.75	\$727,586.13	\$177,172.05
SSCDC	0.86	1.55	0.96	1.67	\$147,205.05	\$60,283.18
SFP	1.81	1.37	1.93	1.64	\$67,410.19	\$44,203.10
SPCSR	2.11	1.62	2.11	1.62	\$0.00	\$0.00
WWP	1.17	1.13	1.53	1.42	\$239,425.21	\$502,131.65

* The leveraged funds from 2015-2017 are proportionally adjusted to represent the estimated leveraged funds for the current funding cycle.

Table 7 shows value-added trend improvement *in 17 programs* in terms of BCR_{va} values and *in 19 programs* in terms of BCR_{va_adj} values between adjacent funding cycles. The average BCR_{va} value across all 39 programs in Table 7 is 1.47 in the last funding cycle and 1.28 in the current funding cycle. The *larger-than-1* BCR values indicate that the overall benefits of the programs in *Child Health, Family Functioning, and Child Development* have outweighed the costs of state investments in First 5 Kern-funded programs. Accompanied with less state revenue from Proposition 10, Table 7 also shows that 33 out of 39 programs in the current funding cycle receive less leveraged funds than the last funding cycle.

At the program level, 34 programs had BCR_{va} and BCR_{va_adj} values larger than 1 in both funding cycles, demonstrating consistent service sustainability (Table 7). The following discussions pertain to the other five programs that have BCR_{va} or BCR_{va_adj} values less than 1:

1. Because of fund leveraging, Ready to Start (R2S) and NFPP attained BCR_{va_adj} values larger than 1 in this funding cycle. Hence, as long as First 5 Kern funds R2S and NFPP as one of the partners, these programs can sustain their services through EPB.
2. Children Mobile Immunization Program (CMIP) and 2-1-1 Kern County (2-1-1) only showed *less-than-1* BCR_{va} values in the current funding cycle. Due to adequate fund leveraging, 2-1-1 ended up with $BCR_{va_adj} > 1$. In contrast, the amount of leveraged funds by CMIP varied substantially in the last funding cycle, ranging from \$1,294,010 in FY 2010-2011 to \$0 in FY 2013-2014. In the first two years of the current funding cycle, CMIP raised \$15,000 external funding in FY 2015-2016 and \$0 in FY 2016-2017 (see Table 3), which led to the estimated leveraged funds below 1% of the corresponding amount from the last funding cycle. Therefore, CMIP needs to leverage

stable funding, like R2S, NFPP, and 2-1-1 programs during the first two years of the current funding cycle.

3. Small Steps Child Development Center (SSCDC) receives First 5 Kern funding to support children whose mothers were victims of domestic violence. Its BCR_{va} and BCR_{va_adj} values were *less than 1* in the last funding cycle, and *larger than 1* in the current funding cycle, indicating an improvement of sustainability from the trend data analysis.

Based on the findings in Table 7, all 39 programs, including CMIP, NFPP, R2S, SSCDC, and 2-1-1, have strong potential to maintain their service delivery with partnership support in the future. It should be noted that fund leveraging did not always influence the status of a few specialized, small programs. For example, a small amount of external funding, such as \$5,834 for Black Infant Health (BIH) (see Table 7), only improved its BCRs from $BCR_{va} = 1.35616$ to $BCR_{va_adj} = 1.36339$ in the last funding cycle. The minor difference indicated little impact of minor fund leveraging on program sustainability. In contrast, Domestic Violence Reduction Project (DVRP) and Supporting Parents and Children for School Readiness (SPCSR) were able to maintain their BCRs above 1, despite the lack of success in fund leveraging. Special Start for Exceptional Children (SSEC) also kept its BCRs above 1 without the support from leveraged funds in this funding cycle. Hence, the demand for fund leveraging could be program specific, depending on the nature of service deliveries in the local settings.

Long-Term Return of First 5 Kern Programs

“Many of the studies that include a benefit-cost analysis do not find substantial benefits for society until later in participants’ lives, such as decreased use of the criminal justice system for program participants,” according to Burr and Grunewald (2006, p. 33). Unfortunately,

“Long-term evidence on their [ECL programs’] effectiveness is surprisingly limited. ... Yet it is the long-term returns that are relevant for policy analysis” (Garcia, Heckman, Leaf, & Prados, 2016, p. ii). The model programs listed in Table 1 did address the long-term program impact. An evaluation of the Perry Preschool Project showed the benefits of early childhood support programs in terms of lower crime rates, less retention and special education use in school, and increased lifetime earnings (Belfield, Nores, Barnett, & Schweinhart, 2006). The study of the Chicago CCP also revealed increased earning and tax revenues, reduced costs associated with crime, and reduced need for special education services as the program value for the society (Reynolds et al., 2011). The Abecedarian Program further demonstrated increased lifetime earnings for participants, increased maternal earnings, decreased school costs, and decreased smoking-related costs across different key stakeholders (Barnett & Masse, 2007).

Since Proposition 10 has not been in existence long enough to reach the period “later in participants’ lives,” a feasible way to address the long-term impact of First 5 Kern programs, as stated in Question 5, is to review the literature on the long-term impact of *comparable programs* supporting the transfer of long-term benefits to First 5 Kern-funded programs. This external research complements internal data tracking and supports **policymakers and administrators** to align local results with the well-established research literature in promoting ECL programs and services.

It was discussed in the *Literature Review* section that there were substantial differences between ECL programs for low-income children and Proposition 10-funded program for the general child population. Accordingly, this CBA project reviewed similar programs that serve the general child population to ensure a proper transfer of comparable results to First 5 Kern programs. The exploratory nature of literature-based inquiries is guided by the PPCT paradigm

to conform to the professional practice of CBA research across different settings.

As a result, the extensive investigation of the past CBA literature supported the transfer of value from the comparative study (Cleveland & Krashinsky, 1998) for a long-term return of approximate \$2.00. In other words, First 5 Kern-funded programs generated long-term benefits that approximately doubled the state investments in early childhood services (answer to Question 5).

Conclusion

Among the five key questions addressed in this CBA project, Questions 1-4 focused on a trend analysis of the benefits and costs of ECL programs funded by First 5 Kern. Question 5 was addressed through a review of the literature on the long-term impact of ECL programs, as illustrated by less special education spending, fewer grade repeats, decreasing behavioral problems, and higher graduation rate in high school, as well as less spending in the criminal justice system and higher tax contributions to the society (Cleveland & Krashinsky, 1998, 2003; Diaz, 2017; Heckman, 2017). The following section summarizes the answers to these questions:

1. With the program funding exclusively from Proposition 10, approximately 75% of the programs have consistently demonstrated BCRs larger than 1 during 2010-2017 (see BCR in Table 4), an indication of program sustainability in future funding cycles.
(Answer to Question 1)
2. Under the leadership of First 5 Kern, service providers leveraged a total of \$23,374,630 in the seven-year period across *Child Health, Family Functioning, and Child Development*, consistent with the original intent of Proposition 10 to use the seed money to raise external funds to fill service gaps. (Answer to Question 2)

3. Fund leveraging lifted the low boundary of the 95% CI from a value *less than 1* (see Table 4) to a value *larger than 1* (see Table 5) in the configurations of BCRs for six programs (i.e., CHI, 2-1-1, BCRC, KRVFRC, MFRC, R2S). The low CI boundary remains below 1 for four other programs (i.e., CMIP, NFPP, DDCCC, SSCDC in Tables 4 & 5). According to the probabilistic inference, these programs would have been otherwise unavailable without First 5 Kern funding. (Answer to Question 3)
4. Based on the value-added assessment (see Table 7), 17 programs⁶ increased their BCR_{va} values and 19 programs⁷ raised their BCR_{va_adj} values *without fund leveraging*. Nineteen programs raised their BCR_{va_adj} values *with fund leveraging* to become more sustainable between the last and current funding cycles. (Answer to Question 4)
5. The configuration of the long-term impact of First 5 Kern programs reconfirmed the BCR value of at least 2 during 2010-2017, compared to the results of similar programs. (Answer to Question 5)

In conclusion, this CBA, based on the PPCT theoretical framework, demonstrated that First 5 Kern-funded programs have generated benefits that doubled the value of state investments during the last and current funding cycles.

While the decline of Proposition 10 revenue inevitably impacts fund leveraging through partnership building, this CBA project revealed an overall increase of the BCR value from 1.5 to at least 2.0 through external fund leveraging. These positive findings demonstrate the importance of strengthening of local service support for children ages 0 to 5 and call for concerted efforts to improve and expand local capacity building in preparation for the next

⁶ These programs are AFRC, BCDC, BIH, DDCCC, IWVFRC, KCCDHN, KRVFRC, LVS RP, MFRC, MVIP, NFPP, NPCLC, RSNC, SHS, SSCDC, SSEC, WSCRC.

⁷ These programs are 2-1-1, BCDC, BCRC, BIH, DDCCC, DR, IWVFRC, KCCDHN, MAS, MFRC, NFPP, NPCLC, RSNC, SAS, SHS, SSCDC, SSEC, WSCRC, WSN.

funding cycle. Based on these findings, recommendations are made in the following section to support funding decisions of First 5 Kern in the future.

Recommendations

Abiding by the state statute, First 5 Kern will support programs in *Child Health, Family Functioning, and Child Development* in the funding cycle of 2020-2025. Table 8, built on Table 7, contains program rankings to illustrate their relative standing based on BCR_{va} , BCR_{va_adj} , and *the average of BCR_{va} and BCR_{va_adj}* values across 39 programs.

The ongoing reduction of tobacco consumption has made it impossible to accurately predict Proposition 10 funding during 2020-2025. Taking into account the dependency between external fund leveraging and program sustainability, this CBA project presents the following three scenarios for the Commission to consider in its future decision-making:

1. If Proposition 10 funding declines substantially to make local programs too small to leverage external funding, First 5 Kern may reference program rankings in the BCR_{va} column for fund allocation;
2. If the Commission projects that the current level of fund leveraging can be sustained in the next funding cycle, program rankings in the BCR_{va_adj} column might be relevant for future funding consideration;
3. With the uncertainty of future seed money from Proposition 10 and external funds through EPB, First 5 Kern could face a situation between scenarios (1) and (2). In that case, rankings in the “BCR Mean” column can be employed to ensure future program benefits outweigh the costs of state investments.

Table 8: Ranking on Discounted BCR Values in the Current Funding Cycle

Focus Area	Program Acronym*	BCR _{va}		BCR _{va_adj}		BCR Mean	
		Value	Rank	Value	Rank	Value	Rank
Child Health	BIH	1.68	1	3.37	2	2.53	2
	CHI	1.15	7	1.96	4	1.56	5
	CMIP	0.80	12	0.82	12	0.81	12
	HLP	1.12	8	1.33	8	1.23	9
	KCCDHN	1.32	3	1.36	7	1.34	7
	MAS	1.09	10	2.08	3	1.59	4
	MVCCP	1.27	5	1.51	6	1.39	6
	MVIP	1.37	2	1.94	5	1.66	3
	NFPP	0.98	11	1.11	11	1.05	11
	RSNC	1.29	4	1.30	9	1.30	8
	SAS	1.10	9	4.74	1	2.92	1
	SSEC	1.22	6	1.22	10	1.22	10
Family Functioning	2-1-1	0.58	17	7.07	1	3.83	1
	AFRC	1.36	7	1.37	14	1.37	12
	BCRC	1.09	16	1.25	16	1.17	16
	DR	1.11	14	2.11	6	1.61	10
	DVRP	1.09	15	1.09	17	1.09	17
	EKFRC	1.69	3	1.97	7	1.83	5
	GSR	1.25	8	1.52	11	1.39	11
	GCP	1.20	10	1.37	13	1.29	14
	IWVFRC	1.80	1	2.18	5	1.99	3
	KRVFRC	1.15	13	2.29	4	1.72	8
	LVS RP	1.77	2	1.80	10	1.79	6
	MCFRC	1.18	12	1.42	12	1.30	13
	MFRC	1.38	6	1.88	9	1.63	9
	SHS	1.20	11	1.27	15	1.24	15
	SENP	1.50	5	2.34	3	1.92	4
	WSCRC	1.61	4	1.95	8	1.78	7
	WSN	1.21	9	4.29	2	2.75	2
Child Development	BCDC	1.54	4	2.39	1	1.97	2
	DSR	1.12	8	1.13	10	1.13	10
	DDCCC	1.35	6	1.70	4	1.53	5
	LHFRC	1.11	9	1.17	9	1.14	9
	NPCLC	1.93	1	2.10	2	2.02	1
	R2S	0.74	10	1.75	3	1.25	8
	SSCDC	1.55	3	1.67	5	1.61	4
	SFP	1.37	5	1.64	6	1.51	6
	SPCSR	1.62	2	1.62	7	1.62	3
WWP	1.13	7	1.42	8	1.28	7	

* Program acronyms are defined in the Appendix.

Following the wisdom of Albert Einstein that “Not everything that counts can be counted, and not everything that can be counted counts,”⁸ and “There can be types of outcomes

⁸ <https://www.teachers.ab.ca/Publications/The%20Learning%20Team/Volume%208/Number%203/Pages/Not%20everything%20that%20counts%20can%20be%20counted.aspx>

that are difficult to value in monetary terms that are routinely left out of traditional economic appraisals” (O’Shea et al., 2004, p. 11), it is important to note that the reference for funding decision is solely grounded in countable indicators tracked by First 5 Kern from 2010-2017 and quantifiable benefits measured in monetary terms. Karoly et al. (2001) concurred,

Benefits that cannot be expressed in dollar terms cannot be compared in this manner and are included only in associated qualitative discussion. ... cost-benefit analysis is subject to the greatest challenges in execution and interpretation. That is because benefits must be denominated in dollars, and that adds another source of uncertainty and potential disagreement over quantities. For some benefits, dollar conversions are not really feasible. Cost-benefit assessments can thus rarely be comprehensive. (p. 2)

In the same vein, this CBA project is not comprehensive, and results from this study only represent a conservative estimation of the benefits of First 5 Kern-funded programs. In addition, this CBA research focused on 39 programs that received Proposition 10 funding during 2010-2017. If program funding continues in Kern County, future research can be conducted to confirm the CBA findings in the next funding cycles. To facilitate result verification, technical details of data cleaning, statistical analysis, and program information are summarized in the Appendix of this report.

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Appendix: Supplementary Information of the CBA Project

This CBA project, upon approval of the Kern County Children and Families Commission in 2016, was conducted from 2016-2018 to examine the impact of Proposition 10 funding on Kern County children, families, and the overall community. This study focused on 39 programs that received Proposition 10 funding in the last and current funding cycles during 2010-2017. Program acronyms are presented in Table 9 to match their full names, and a brief description of each program is available at <https://www.first5kern.org/wp-content/uploads/2018/02/Funded-Programs-Guide-01-2018v2.pdf>.

For few programs, primarily the ones for referral services like 2-1-1 and MVCCP, actual service counts were considered at the program target level each year as service target counts cannot be determined by the program supply side. Similarly, Result Indicators are defined by First 5 Kern's Strategic Plan, and service contracts are set according to mutual agreements between the Commission and local programs. As a result, this CBA project excluded certain indicators (see Table 10) due to missing targets or actual service counts. Table 11 links programs to these indicators cited in Table 10.

Statistical analysis was conducted using SAS and SPSS. Besides general data access, the SPSS computing of 95% confidence intervals is grounded on 1,000 bootstrap samples. According to DiCiccio and Efron (1996) and Adèr, Mellenbergh, and Hand (2008), bootstrap is asymptotically more accurate than standard intervals obtained using sample variance and assumptions of normality. The interpretation of results pertaining to confidence interval reporting is straightforward (see Helwig, 2017), i.e., through repeated samples, 95 out of 100 confidence intervals would be expected to contain the true BCR value. For this project, special attention was given to situations in which the low boundary of the confidence interval was less

than 1, and thus, the true BCR=1 cannot be excluded from the parameter estimation. Syntax of statistical computing is provided in Table 12.

Table 9: A List of First 5 Kern-Funded Programs for this CBA Project

Acronym	Program Full Name
BIH	Black Infant Health
CHI	Community Health Initiative of Kern County/Children’s Health Initiative of Kern County
CMIP	Children’s Mobile Immunization Program
HLP	Bakersfield Adult School Health Literacy Program
KCCDHN	Kern County Children’s Dental Health Network
MAS	Make A Splash
MVCCP	Medically Vulnerable Care Coordination Project
MVIP	Medically Vulnerable Infant Program
NFPP	Nurse Family Partnership Program
RSNC	Richardson Special Needs Collaborative
SAS	Successful Application Stipend
SSEC	Special Start for Exceptional Children
2-1-1	2-1-1 Kern County
AFRC	Arvin Family Resource Center
BCRC	Buttonwillow Community Resource Center
DR	Differential Response
DVRP	Domestic Violence Reduction Project
EKFRC	East Kern Family Resource Center
GSR	Greenfield School Readiness Program
GCP	Guardianship Caregiver Project
IWVFCR	Indian Wells Valley Family Resource Center
KRVFCR	Kern River Valley Family Resource Center
LVSFRP	Lamont Vineland School Readiness Program
MCFCR	Mountain Communities Family Resource Center
MFCR	McFarland Family Resource Center
SHS	Shafter Healthy Start
SENP	Southeast Neighborhood Partnership Family Resource Center
WSCRC	West Side Community Resource Center
WSN	Women’s Shelter Network
BCDC	Blanton Child Development Center
DSR	Delano School Readiness
DDCCC	Discovery Depot Child Care Center
LHFRC	Lost Hills Family Resource Center
NPCLC	Neighborhood Place Community Learning Center
R2S	Ready to Start
SSCDC	Small Steps Child Development Center
SFP	South Fork Preschool and Day Care Center
SPCSR	Supporting Parents and Children for School Readiness
WWP	Wind in the Willows Preschool

Table 10: Indicators with Missing Targets or Actual Service Counts

Indicator	Fiscal Year	Description
1.1.2.2	2014-2015	Number and percentage of children who have health insurance that provides medical, dental, vision, and mental health services
1.1.3	2015-2017	Number of children who were successfully enrolled into a health insurance program and received well-child check-ups
1.1.4	2015-2016	Number of children successfully renewed into a health insurance program
1.1.5	2015-2017	Number of children with an established medical home
1.1.6.7	2013-2014	Number and percentage of children with diagnosed special needs receiving special needs' services
1.4.1	2016-2017	Number of identified special needs children who received developmental screenings
1.4.2	2015-2017	Number of identified special needs children who received special needs services
2.1.2.19	2010-2012 2013-2014	Number and percentage of parents engaged in parent education programs, demonstrating an increase in knowledge
2.1.3.24	2010-2011 2013-2014	Number and percentage of children entering kindergarten ready for school as determined by assessments completed by teachers and parents that indicate the child is ready in the areas of cognitive, social, emotional, language, approaches to learning, and health/physical development
2.1.4	2015-2016	Number of parents/guardians who received general case management services, including home visits
2.4.1	2015-2017	Number of parents/guardians who received social service referrals
4.1.1	2016-2017	Number of providers trained as certified application assisters
4.1.3.36	2011-2012	Number and percentage of funded programs that provide services in community-based locations (e.g. schools).

Table 11: Reasons of Result Indicator Exclusion from the CBA Reporting

Fiscal Year	Program Name	Indicator*	Reason
2016-2017	Arvin Family Resource Center	2.4.1	Target Count = 0
	Black Infant Health	2.4.1	
	Blanton Child Development Center	2.4.1	
	Buttonwillow Community Resource Center	2.4.1	
	Community Health Initiative of Kern	1.1.3	
		1.1.5	
	Delano School Readiness	2.4.1	
	Differential Response Services	2.4.1	
	Discovery Depot Child Care	1.4.1	
	Domestic Violence Reduction Project	2.4.1	
	East Kern Family Resource Center	2.4.1	
	Greenfield School Readiness	2.4.1	
	Guardianship Caregiver Project	2.4.1	
	Indian Wells Valley Family Resource Center	2.4.1	
	Kern River Valley Family Resource Center	2.4.1	
	Lamont/Vineland School Readiness Program	2.4.1	
	Lost Hills Family Resource Center	2.4.1	
	McFarland Family Resource Center	2.4.1	
	Medically Vulnerable Care Coordination	1.1.5	
		1.4.2	
	Medically Vulnerable Infant Program	2.4.1	
	Mountain Communities Family Resource Center	2.4.1	
	Nurse Family Partnership Program	2.4.1	
	Richardson Special Needs Collaborative	2.4.1	
	Shafter Healthy Start	2.4.1	
	Small Steps Child Development Center	1.4.1	
	Southeast Neighborhood Partnership Family Resource Center	2.4.1	
	Successful Application Stipend	1.1.3	
		1.1.5	
	Supporting Parents and Children for School Readiness	2.4.1	
	West Side Community Resource Center	2.4.1	
	Women's Shelter Network	2.4.1	
	Community Health Initiative of Kern	1.1.3	
	4.1.1		
Discovery Depot Child Care	1.4.1		
Small Steps Child Development Center	1.4.1		
2015-2016	Arvin Family Resource Center	2.4.1	Target Count = 0
	Black Infant Health	2.4.1	
	Blanton Child Development Center	2.4.1	
	Buttonwillow Community Resource Center	2.4.1	
	Community Health Initiative of Kern	1.1.3	
		1.1.5	
	Delano School Readiness	2.4.1	
	Differential Response Services	2.4.1	
	Domestic Violence Reduction Project	2.4.1	
	East Kern Family Resource Center	2.4.1	
	Greenfield School Readiness	2.4.1	
	Guardianship Caregiver Project	2.4.1	
	Indian Wells Valley Family Resource Center	2.4.1	
	Kern River Valley Family Resource Center	2.4.1	

	Lamont/Vineland School Readiness Program	2.4.1	Actual Count = 0	
	Lost Hills Family Resource Center	2.4.1		
	McFarland Family Resource Center	2.4.1		
	Medically Vulnerable Care Coordination	1.1.5		
		1.4.2		
	Medically Vulnerable Infant Program	2.4.1		
	Mountain Communities Family Resource Center	2.4.1		
	Nurse Family Partnership Program	1.1.3		
		2.4.1		
	Richardson Special Needs Collaborative	2.4.1		
	Shafter Healthy Start	2.4.1		
	Southeast Neighborhood Partnership Family Resource Center	2.4.1		
	Successful Application Stipend	1.1.3		
		1.1.5		
	Supporting Parents and Children for School Readiness	2.4.1		
	West Side Community Resource Center	2.4.1		
	Women's Shelter Network	2.4.1		
	Community Health Initiative of Kern	1.1.5		
	Discovery Depot Child Care	2.1.4		
	Successful Application Stipend	1.1.2		
		1.1.4		
	Supporting Parents and Children for School Readiness	1.1.4		
2014-2015	Successful Application Stipend	1.1.2.2		
2013-2014	Health Literacy Program	2.1.2.19		Target Count = 0
	Medically Vulnerable Care Coordination Project	1.1.6.7		
	Shafter Healthy Start	2.1.3.24		
2011-2012	Greenfield School Readiness	4.1.3.36		Actual Count = 0
	Shafter Healthy Start	2.1.2.19		
	Make a Splash	2.1.2.19		
2010-2011	Small Steps Child Development Center	2.1.3.24		
	Make a Splash	2.1.2.19		

Table 12: Syntax for Statistical Computing

Software	Syntax
SAS	<pre> *Core Components for Phase I of the Trend Data Analysis; Proc import datafile = "e:\Benefit_original.sav" out= work.B; proc means sum noprint; class programname; var AnnualActual AnnualTarget; output out=b1 sum (AnnualActual AnnualTarget)=Actual Target; data b2; set b1; if _TYPE_=0 then delete; proc sort; by programname; Proc import datafile = "e:\Cost_Original.sav" out= work.C; proc sort; by programname; data bc; merge b2 C; by programname; benefit1=(FundedAmount/Target)*Actual; benefit2=(FundedAmount/Target)*Actual+Sustainability; CBA1=((FundedAmount/Target)*Actual)/AmountSpent; CBA2=((FundedAmount/Target)*Actual+Sustainability)/AmountSpent; format benefit1: dollar13.2; format benefit2: dollar13.2; *Repeat the above codes for each fiscal year prior to data aggregation for plotting; symbol1 interpol=join value=dot height=3; proc gplot; plot CBA1*FiscalYear= programname / hminor=0; proc gplot; plot CBA2*FiscalYear= programname / hminor=0; proc print; id FiscalYear; var Sustainability CBA1 CBA2; by programname; run; </pre>
	<pre> *Core Components for Phase II of the Trend Data Analysis; Data Discount2010; Set bc; benefit10a=((FundedAmount/Target)*Actual+2200)/.965**8; benefit10b=((FundedAmount/Target)*Actual+2200+Sustainability)/.965**8; c10=AmountSpent/.965**8; Sus10=Sustainability/.965**8; format benefit10a: dollar13.2; </pre>

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format benefit10b: dollar13.2;
format c10: dollar13.2;
format Sus10: dollar13.2;
*Repeat the above codes for each fiscal year with the discount index reduced
yearly from 7 in 2011-2012 to 2 in 2016-2017;
data yr2010_15;
merge c10_11 c11_12 c12_13 c13_14 c14_15;
by programname;
BCR1=(benefit14a+benefit13a+benefit12a+benefit11a+benefit10a)/(c14+c13+c1
2+c11+c10);
BCR2=(benefit14b+benefit13b+benefit12b+benefit11b+benefit10b)/(c14+c13+c
12+c11+c10);
SUS=SUS10+SUS11+SUS12+SUS13+SUS14;
format SUS: dollar13.2;
proc print;
var programname BCR1 BCR2 SUS;
data yr2015_17;
merge c15_16 c16_17;
by programname;
BCR1=(benefit16a+benefit15a)/(c16+c15);
BCR2=(benefit16b+benefit15b)/(c16+c15);
SUS=(SUS15+SUS16)*5/2;
format SUS: dollar13.2;
proc print; var programname BCR1 BCR2 SUS;
run;

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SPSS

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*Core Components for Bootstrapping;
GET
  FILE='e:\yr2010_17a.sav'.
BOOTSTRAP
  /SAMPLING METHOD=SIMPLE
  /VARIABLES TARGET=CBA1 INPUT= ProgramName
  /CRITERIA CILEVEL=95 CITYPE=PERCENTILE NSAMPLES=1000
  /MISSING USERMISSING=EXCLUDE.
BOOTSTRAP
  /SAMPLING METHOD=SIMPLE
  /VARIABLES TARGET=CBA2 INPUT= ProgramName
  /CRITERIA CILEVEL=95 CITYPE=PERCENTILE NSAMPLES=1000
  /MISSING USERMISSING=EXCLUDE.
BOOTSTRAP
  /SAMPLING METHOD=SIMPLE
  /VARIABLES TARGET=Sustainability INPUT= ProgramName
  /CRITERIA CILEVEL=95 CITYPE=PERCENTILE NSAMPLES=1000
  /MISSING USERMISSING=EXCLUDE.

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