Analysis Plan for Cost-Benefit Analysis

National Evaluation of the 2nd Generation of Health Profession Opportunity Grants (HPOG 2.0)

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Analysis Plan for Cost-Benefit Analysis

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Overview

This document presents an analysis plan for the Cost-Benefit Analysis (CBA) to be conducted as part of the National Evaluation of the Second Generation of Health Profession Opportunity Grants (HPOG 2.0) Program. The National Evaluation includes 27 nontribal grantees funded in 2015.

This document provides a guide for implementing the CBA design. The CBA will:

- Estimate the costs of providing the local HPOG 2.0 programs; and
- Compare these costs with gains in employment and earnings measured in the National Evaluation’s Impact Evaluation.

Findings from the CBA—how the social costs (mostly program spending) compare with the social benefits (mostly earnings gains)—will be important to understanding the value of programs such as HPOG. Even if a program shows positive earnings impacts, those impacts may not outweigh the costs of the program. Knowing whether HPOG 2.0 benefits outweigh costs will help policymakers assess whether to encourage continuation of the federal HPOG Program or, potentially, replication of similar programs as part of national policy.

Research Questions

The CBA for HPOG 2.0 seeks to answer the following question:

- “Do the benefits resulting from HPOG 2.0 programs exceed their costs?”

Purpose

This document will serve as a plan for the CBA of the programs administered by the 27 nontribal HPOG 2.0 grantees. This plan provides additional analytic details on how the CBA team will implement the CBA design reported in the Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019).

Highlights

The overall approach of the CBA is to measure the costs of education and training and associated services and then compare these with estimates of the benefits of HPOG 2.0.

This document briefly summarizes the overview, data sources, and methods for cost and benefit calculation originally shared in the Design Plan. Building on that, this Analysis Plan then gives additional details of the analyses that will be carried out. It also provides more detail on:

- Methods for calculating the cost (price) of education and training received by treatment and control group members;
- Approaches for addressing limitations of the Participant Follow-up Surveys in the calculations of costs;
- Methods for projecting future earnings and for calculating confidence intervals and associated sensitivity analyses;
• Assumptions on discount rates for calculating net present value;
• Summary of sensitivity analyses the CBA will conduct;
• Specific subgroup analyses the CBA will include; and
• Timing and outline of reporting of final results.

Methods
The CBA will be conducted in four steps:

(1) Measure and monetize HPOG 2.0 program costs.
(2) Measure and monetize HPOG 2.0 benefits (including projection of lifetime earnings).
(3) Calculate the net present value of HPOG 2.0 programs.
(4) Conduct sensitivity analyses to learn whether findings change when alternative assumptions are applied.

Glossary
• Career pathways: a framework for occupational training that combines education, training, and support services that align with the skill demands of local economies and help individuals to enter or advance within a specific occupation or occupational cluster
• HPOG Program: the national Health Profession Opportunity Grants initiative, including all grantees and their local programs
• HPOG grantee: the entity receiving the HPOG grant and responsible for funding and overseeing one or more local programs
• Local HPOG program: a unique set of services, training courses, and personnel; a single grantee may fund one or more programs
• HPOG program participants: enrollees in education and training programs and related services supported by HPOG grants
• Study participants: eligible HPOG program applicants who agree to become part of the evaluation and are randomly assigned to the treatment or control group in the Impact Evaluation
• Outcomes: end goals for HPOG participants, including employment and earnings in general and in healthcare specifically
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Executive Summary

The Health Profession Opportunity Grants (HPOG) Program awards grants to organizations that provide education and training to Temporary Assistance for Needy Families (TANF) recipients and other low-income individuals for healthcare occupations that pay well and are expected to either experience labor shortages or be in high demand. In 2010, the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services awarded the first round of five-year HPOG grants (HPOG 1.0). Building on the first round of HPOG awards, in 2015 ACF awarded a second round of five-year grants (HPOG 2.0) to 32 grantees, 27 nontribal and 5 tribal. ACF’s Office of Planning, Research, and Evaluation (OPRE) is using a multipronged research and evaluation strategy to assess the success of HPOG 2.0. The cost-benefit analysis (CBA) is part of the National Evaluation of the nontribal grantees.

Findings from the CBA are important to understanding the value of programs such as HPOG. Even if a program shows positive earnings impacts, those impacts may not outweigh the cost of the program. Knowing whether HPOG 2.0 benefits outweigh costs will help policymakers assess whether to encourage continuation of HPOG or, potentially, replication of similar programs as part of national policy. Building on the Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019), this Analysis Plan provides a detailed description of the analyses and final assumptions for implementing the CBA.

Overview of CBA

The purpose of the CBA is to answer the question: “Do the benefits resulting from HPOG 2.0 programs exceed their costs?” The CBA will address this question in three steps:

1. Estimate the net cost of HPOG 2.0 per individual randomized to treatment, using new data collection and existing data sources.
2. Build on the HPOG 2.0 Impact Evaluation’s estimation of earnings impacts to estimate the benefits per individual randomized.
3. Compare benefits (impacts) and costs (inputs)—from a variety of perspectives and with a range of sensitivity analyses—to estimate net benefit per individual randomized.

If the benefits of the Program outweigh the costs, the net benefit of HPOG 2.0 is positive.

Cost-benefit analysis requires all costs and benefits to be identified and monetized. Most costs of HPOG 2.0 are expected to arise from the more extensive education, training, and support services anticipated for program participants than for their control group counterparts. The CBA team will estimate the differential costs—treatment versus control—of education and training and support services that treatment and control group members receive.

The main benefit from HPOG 2.0 is expected to be the increased earnings of treatment group members relative to control group members. The CBA will use estimates of the impact of HPOG 2.0 on earnings from the HPOG 2.0 Impact Evaluation. The study will also assess costs induced by impacts on receipt of employer-provided health insurance, public benefit receipt, and taxes.

The study will present findings from multiple perspectives: participants (treatment group members), government (taxpayers), and society (the combination of the two). The different perspectives reflect who receives the benefit or who incurs the cost. For example, if training is
publicly funded, the cost of training is a cost to the government, but not to the participant. The participant perspective would not include this cost in a cost-benefit calculation, but the government perspective would. The societal perspective considers whether the benefits to society outweigh the costs to society. It combines all measured social benefits and all measured social costs regardless of the party experiencing the benefit or incurring the cost.

**Measuring Costs and Benefits**

In general, the CBA will estimate a given cost component as the *quantity* of that type of service multiplied by an estimate of its *price* (i.e., cost of service per unit). The estimates of prices will come from a combination of grantee reports (from the Program Cost Survey), published estimates, and publicly available data.

Most HPOG 2.0 costs will likely be incurred in the first few years after enrollment. Given available data, the CBA will include costs through 36 months after random assignment. This should include almost all costs associated with the local HPOG 2.0 programs.

To measure the benefit of additional earnings for participants, the CBA team will use earnings impact estimates from the Impact Evaluation’s longer-term results. It will measure those impacts approximately 66 months (22 quarters) after randomization. In addition, to capture the hypothesized lifetime earnings impacts, the CBA will project the path of earnings impacts into the future over the projected working lives (assumed to be until age 65) of the treatment group. These projections will be for 30 years or more, given HPOG 2.0 treatment group members’ average age of 32 at baseline.

Because benefits and costs materialize in different years and because any given dollar amount is worth less further in the future, the CBA will calculate the *net present value* (NPV) of cost-benefit by subtracting the present value of all costs from the present value of all benefits.

**Subgroup and Sensitivity Analyses**

The CBA study will calculate separate cost-benefit estimates for subgroups of HPOG participants for whom the HPOG 2.0 Impact Evaluation generates separate impact estimates, as described in Klerman, Judkins, and Locke (2019). The Impact Evaluation plans to calculate estimates for subgroups (as measured at baseline) that consider demographics (gender, age, and race), the presence of dependent children, education level attained and current enrollment in schooling, employment, numeracy and literacy skill level, presence of complex life conditions that can be barriers to training and employment, English proficiency, and receipt of public assistance.

The CBA will also include several analyses to explore the sensitivity of the final NPV estimates to study assumptions. Sensitivity analyses will include:

- **Sensitivity to alternative assumptions on education and training costs.** Alternative cost estimates for education and training will be calculated using reported cost estimates for healthcare program training from community colleges as compared to the base case which uses average costs across all community college trainings available in public data sources.

- **Sensitivity to alternative assumptions for earnings projections.** The CBA will estimate three different scenarios for projecting future earnings: (i) assuming last measured impacts
continue over participants’ lifetimes; (ii) assuming no impacts past 10 years post-randomization; and (iii) the mid-point of the previous two scenarios. We consider this third scenario the “base case” for earnings projections and the other two sensitivity estimates around this base.

- **Sensitivity to earnings estimates based on confidence intervals.** Estimates will be calculated for the base case earnings projections using an upper and lower value of the 95 percent confidence interval on projected lifetime earnings impacts.

- **Sensitivity to discount rates.** In addition to a base case discount rate, the CBA will calculate estimates using a higher and lower discount rate assumption for calculating the present value of benefits.
1. Introduction

The Health Profession Opportunity Grants (HPOG) Program awards grants to organizations that provide education and training to Temporary Assistance for Needy Families (TANF) recipients and other low-income individuals for healthcare occupations that pay well and are expected to either experience labor shortages or be in high demand. In 2010, the Administration for Children and Families (ACF) within the U.S. Department of Health and Human Services awarded the first round of five-year HPOG grants (HPOG 1.0). Building on the first round of HPOG awards, in 2015 ACF awarded a second round of five-year grants (HPOG 2.0) to 32 grantees, 27 nontribal and 5 tribal.

ACF’s Office of Planning, Research, and Evaluation (OPRE) is using a multipronged research and evaluation strategy to assess the success of HPOG 2.0. The cost-benefit analysis (CBA) is part of the National Evaluation of the nontribal grantees. Building on the Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019), this document provides a detailed description of the analyses and final assumptions for implementing the CBA.

1.1 The HPOG 2.0 Program

ACF’s Funding Opportunity Announcement for HPOG 2.0 stated that programs should provide healthcare training within a career pathways model—a framework for occupational training that combines education, training, and support services that align with the skill demands of local economies and help individuals enter or advance within a specific occupation or occupational cluster. This includes training that results in employer- or industry-recognized credentials for in-demand skills and occupations in healthcare. Further, HPOG 2.0 grantees combine supportive services with education and training as necessary to improve outcomes.

Within these requirements, HPOG 2.0 grantees have flexibility to design programs to meet the needs of their target populations, local employers, and local labor market. Thus, each program has its own structure. Despite these differences in design, all programs have similar objectives: to help participants enroll in and complete healthcare training, earn necessary licenses and certifications, and find healthcare employment. As part of its career pathways approach, HPOG 2.0 seeks to move participants forward in careers in healthcare to improve their economic opportunities and meet employer needs.

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1 HPOG was authorized by the Affordable Care Act (ACA), Public Law 111-148, 124 Stat. 119, March 23, 2010, sect. 5507(a), “Demonstration Projects to Provide Low-Income Individuals with Opportunities for Education, Training, and Career Advancement to Address Health Professions Workforce Needs,” adding sect. 2008(a) to the Social Security Act, 42 USC. 1397g(a) and extended by the Bipartisan Budget Act of 2018, Pub. L. 115-123, through fiscal year 2019.
1.2 HPOG Evaluation

Launched in 2015, the HPOG 2.0 National Evaluation is part of a robust research and evaluation portfolio ACF supports to assess the effect of career pathways programs on low-income participants’ educational attainment, employment, and earnings.\(^2\)

The 27 nontribal grantees are participating in the HPOG 2.0 National Evaluation, and the 5 tribal grantees are participating in the HPOG 2.0 Tribal Evaluation. The 27 grantees in the National Evaluation are implementing 38 separate local HPOG programs (see Box 1). The HPOG 2.0 National Evaluation includes three major components: the Descriptive Evaluation, the Impact Evaluation, and the CBA.

The Impact Evaluation uses an experimental design to estimate the effectiveness of HPOG 2.0. Eligible applicants at each local program (“study participants”) are assigned at random either to a treatment group offered access to an HPOG 2.0 program or to a control group not offered access; either group can use other similar services available in the community.

As described in Klerman, Judkins, and Locke (2019), the HPOG 2.0 Impact Evaluation is comparing the treatment and control groups’ education and training attainment, employment, earnings, and other outcomes at approximately 15 and 36 months after random assignment using

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Box 1. Important Terms for This Report

- **Career pathways**: a framework for occupational training that combines education, training, and support services that align with the skill demands of local economies and help individuals to enter or advance within a specific occupation or occupational cluster
- **HPOG Program**: the national Health Profession Opportunity Grants initiative, including all grantees and their local programs
- **HPOG grantee**: the entity receiving the HPOG grant and responsible for funding and overseeing one or more local programs
- **Local HPOG program**: a unique set of services, training courses, and personnel; a single grantee may fund one or more programs
- **HPOG program participants**: enrollees in education and training programs and related services supported by HPOG grants
- **Study participants**: eligible HPOG program applicants who agree to become part of the evaluation and are randomly assigned to the treatment or control group in the Impact Evaluation
- **Outcomes**: end goals for HPOG participants, including employment and earnings in general and in healthcare specifically

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\(^2\) OPRE’s portfolio is designed to assess the success of both the first and the second rounds of HPOG awards. In addition to the HPOG 2.0 National Evaluation and HPOG 2.0 Tribal Evaluation, it includes evaluation studies of longer-term outcomes for HPOG 1.0 participants (36 and 72 months after enrollment), as well as separate evaluations of nine career pathways programs, including three HPOG 1.0 grantees, under the Pathways for Advancing Careers and Education (PACE) evaluation. The portfolio also includes University Partnership studies for HPOG 1.0 and 2.0. For additional information about this work, visit the OPRE website “Health Profession Opportunity Grants (HPOG) Evaluation Portfolio: Project Overview,” [https://www.acf.hhs.gov/opre/research/project/evaluation-portfolio-for-the-health-profession-opportunity-grants-hpog](https://www.acf.hhs.gov/opre/research/project/evaluation-portfolio-for-the-health-profession-opportunity-grants-hpog); and the Abt Associates website “Health Profession Opportunity Grants (HPOG),” [http://www.career-pathways.org/acf-sponsored-studies/hpog/](http://www.career-pathways.org/acf-sponsored-studies/hpog/).
survey and administrative data, and at 66 months (22 quarters) using administrative data only. The resulting longer-term 66-month impact estimates will be the basis for the benefit estimates in the CBA.

Among the characteristics that make this evaluation distinctive is that the HPOG 2.0 Impact Evaluation considers the collective of the diverse local HPOG 2.0 programs. Pooling across all 38 of them, the Impact Evaluation will estimate an average impact of HPOG 2.0. (The HPOG 1.0 Impact Study also used this approach; see Peck et al. 2018.) A benefit of this evaluation approach is that it assesses whether the general model—across its many implementations—is effective in achieving its goals. In a similar way, the CBA will combine costs across all local HPOG 2.0 programs to achieve an average cost to compare with that average benefit impact.

### 1.3 Cost-Benefit Analysis Purpose

The purpose of the CBA is to estimate the cost of providing HPOG 2.0 and then compare that with participants’ gains in employment and earnings measured by the Impact Evaluation. The CBA seeks to answer the question: “Do the benefits resulting from HPOG 2.0 programs exceed their costs?”

The CBA will address this question in three steps:

1. Estimate the net cost of HPOG 2.0 per individual randomized to treatment, using new data collection and existing data sources.
2. Build on the HPOG 2.0 Impact Evaluation’s estimation of earnings impacts to estimate the benefits per individual randomized.
3. Compare benefits (impacts) and costs (inputs)—from a variety of perspectives and with a range of sensitivity analyses—to estimate net benefit per individual randomized.

If the benefits of HPOG 2.0 outweigh its costs, the net benefit of HPOG 2.0 is positive.

Findings from the CBA are important to understanding the value of programs such as HPOG. Even if a program shows positive earnings impacts, those impacts may not outweigh the cost of the program. Knowing whether HPOG 2.0 benefits outweigh costs will help policymakers assess whether to encourage continuation of HPOG or, potentially, replication of similar programs as part of national policy.

### 1.4 Structure of the Document

This Analysis Plan proceeds as follows. Chapter 2 provides a brief overview of the CBA design, including the data sources we will use. Chapter 3 describes our analytic approach for measuring costs, and Chapter 4 describes our analytic approach for measuring benefits. Chapter 5 provides our analytic approach to the cost-benefit estimation. Chapter 6 gives information on the timeline for this work and reporting of results.
2. Overview of Cost-Benefit Analysis Plan for HPOG 2.0 Programs

This chapter provides a high-level summary of our approach to the CBA, summarizing information that was presented in more detail in the Design Plan for Cost-Benefit Analysis\(^3\) (Loprest, Lerman, and Klerman 2019). It includes a description of the specific costs and benefits the CBA will include and the perspectives the CBA team will consider, an overview of our measurement plan, and a brief summary of the data sources the CBA will use.

2.1 Costs and Benefits

“Do the benefits resulting from HPOG 2.0 programs exceed their costs?” We will address that central CBA question from multiple perspectives: participants (treatment group members), government (taxpayers), and society (the combination of the two). We do this because benefits to one party may be costs to another. Perspective reflects who receives the benefit or who incurs the cost. For example, if training is publicly funded, the cost of training is a cost to the government (taxpayers), but not to participants. The participant perspective would not include this as a cost, but the government perspective would. On the other hand, increased taxes resulting from higher earnings are a cost to participants, but a benefit to the government. The societal perspective considers whether the benefits to society outweigh the costs to society. The societal perspective is measured as the combination of the participant and government results. The Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019) provides a description of the expected costs and benefits of the different components considered by perspective.

Costs

Most costs to society from HPOG 2.0 are expected to arise from the more extensive education, training, and support services anticipated for program participants than for their control group counterparts. To not overestimate the net cost to society of HPOG 2.0, the CBA must take into account the costs that control group members incur for such assistance. For example, approximately 15 months after intake in HPOG 1.0, 60% of control group members had made educational progress (completed training or enrolled in training) (Peck et al 2018). To do this, the CBA will estimate the cost of treatment compared to control for multiple program components.

The cost components considered in the CBA will include most of the major parts of HPOG 2.0: occupational education and training courses; basic skills training courses; academic supports (including counseling and case management, mentoring, tutoring, boot camps, and other skills development and academic assistance); employment supports (assistance in finding and retaining jobs); transportation assistance; training-related materials (including school fees, supplies, uniforms, testing fees, equipment and tools); child care assistance; and administrative costs.

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Although many local HPOG programs offer other support services (such as emergency housing or food assistance), the CBA will not include them because they are often provided via referral, making costs difficult to collect. Excluding these other support service costs would tend to bias downward the estimated cost of HPOG 2.0, because treatment group members are more likely to receive them than control group members. However, because these supports are provided infrequently (Loprest and Sick 2019) the bias is likely small.

**Benefits**

The benefits the CBA mainly considers will be gains in earnings. The CBA will also include gains in the receipt of employer-provided health insurance (the employer-paid portion of the health insurance premium is a form of compensation). Other components related to earnings will capture transfers between participants and taxpayers, such as the receipt of public benefits (including TANF, the Supplemental Nutrition Assistance Program/SNAP, and others) and “net taxes” (taxes paid less Earned Income Credit received). The CBA will also adjust for resource savings to the government, such as reduced administrative costs for public benefits.

In addition to these benefits, education and training impart benefits beyond increased earnings, such as greater life satisfaction for participants, decreased crime, or increased civic engagement for society. These benefits are important potential outcomes of HPOG 2.0 but are difficult to quantify and monetize. The CBA team does not plan to include these additional benefits in our direct estimates, suggesting our estimates of benefits will be biased downward. The bias is likely to be small, however, because these additional benefits are likely second order compared to earnings benefits and the contribution to societal changes. As is standard in CBA studies, this CBA will include such additional benefits in our discussion of results.

### 2.2 CBA Measurement

Cost-benefit analysis requires that all costs and benefits be identified and monetized. In general, the CBA team will estimate a given cost component as the quantity of that service multiplied by an estimate of its price (cost of service per unit). The price estimates will come from a combination of grantee reports (from Program Cost Survey), published reports, and publicly available data. The quantity data will come from surveys of study participants. The CBA team will use the HPOG 2.0 Impact Evaluation’s estimate of the impact of HPOG 2.0 on participant earnings as the main benefit. The CBA will calculate the net present value (NPV) of cost-benefit by subtracting the present value of all costs from the present value of all benefits. (Section 5.1 discusses discounting to calculate present values.)

Most CBAs of interventions or programs in a single or small number of sites are straightforward. The total cost of the intervention is collected and divided by the number of treatment group participants to get a cost per participant. Control group members are assumed to not receive any services (zero costs). Alternatively, in some CBAs of training interventions, the cost of training received by control group members is considered. For three reasons, the HPOG 2.0

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4 These may be costs or benefits depending on the perspective being considered; that is, the participant or the government/taxpayers.

5 See Hendra et al. (2016) and Redcross, Deitch, and Farrell (2010).
CBA cannot simply use the sum of all local programs’ spending as the total HPOG 2.0 Program cost. First, the local HPOG 2.0 programs leverage funds from other partners and community organizations, and we need to include these costs. Second, results from the HPOG 1.0 Impact Study (Peck et al. 2018) show that control group members receive substantial training from sources other than HPOG. Unless the costs of these services are included, the CBA results will overestimate the cost of HPOG 2.0 relative to its impact. Third, study participants might have incurred some costs that were not covered, such as specific materials or tools or additional training after leaving the program. The CBA should also include these costs to compare the net costs of treatment group relative to control group members versus the net benefits of treatment group relative to control group members.

A challenge for the HPOG 2.0 CBA is to develop a cost-effective approach to collecting and aggregating costs resulting from 38 local programs varying in types and intensities of education and training and support services. This variation poses a challenge for collecting and presenting cost data in a comprehensive, consistent manner. Details on our plan to meet this challenge are provided in the Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019).

### 2.3 Data Sources

The CBA will use the five sources of data listed in Exhibit 2-1. The Design Plan for Cost-Benefit Analysis provides more detail.

**Exhibit 2-1. Sources of Data for the CBA**

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPOG 2.0 Program Cost Survey</td>
<td>Survey of each of the 38 local HPOG 2.0 programs on costs for staff, overhead, direct provision of training/education, and provision of support services. This is an original data collection effort for the HPOG 2.0 CBA.*</td>
</tr>
<tr>
<td>Delta Cost Project Database (DCPD)</td>
<td>The DCPD is a publicly available longitudinal database derived from the U.S. Department of Education’s Integrated Postsecondary Education Data System (IPEDS). The database translates IPEDS information into analytic formats for analysis of revenues and expenditures in postsecondary education. The database includes information on more than 6,000 public, private not-for-profit, and private for-profit institutions, allowing estimates of training costs for each local area.</td>
</tr>
</tbody>
</table>
| Participant Follow-up Surveys | Part of the HPOG 2.0 Impact Evaluation, these surveys collect information on treatment and control group members’ experiences after random assignment, including spells of training, employment, and receipt of services. The CBA will use data from two follow-up surveys:  
  ▪ Short-Term Participant Follow-up Survey (15 months after enrollment)  
  ▪ Intermediate-Term Participant Follow-up Survey (36 months after enrollment)  
  
  The follow-up surveys are being conducted for some but not all treatment and control group members. The CBA will assume the information from the surveys is representative of all treatment and control group participants. |
| Participant Accomplishment and Grant Evaluation System (PAGES) | PAGES is the management information system for HPOG 2.0, in which all programs record participants’ receipt of training and services funded by their grants. |
| National Directory of New Hires (NDNH) | NDNH is a federal administrative database that contains quarterly earnings data for all covered workers, from federal agencies and employer reports to state workforce agencies. |

*The instrument is available for review at: https://www.reginfo.gov/public/do/PRAOMBHistory?ombControlNumber=0970-0462
3. Finalizing Measurement of Costs

This chapter provides the analytic plan for finalizing the measurement of costs of the HPOG 2.0 Program. The *Design Plan for Cost-Benefit Analysis* (Loprest, Lerman, and Klerman 2019) provides a plan for measuring costs of different components of HPOG 2.0 for treatment group members and the corresponding costs of training and services received by control group members. This section summarizes the approach from the *Design Plan* and then presents new decisions on the final assumptions, imputations, and estimation approaches that the CBA team will use in measuring costs.

3.1 Summary of Measurement of Component Costs

In general, the CBA team will estimate a given cost component as the *quantity* of that type of service from the Participant Follow-up Surveys multiplied by (an estimate of) the *price* (i.e., cost of service per unit). The price estimates will come from a combination of grantee reports in the HPOG 2.0 Program Cost Survey (combined with PAGES data), published estimates, and our analysis of publicly available data. Prices may differ for control and treatment group members, although for the most part this study assumes the same price for both.

The following equation represents the general calculation of net cost per person for each cost component, where $k$ indexes the component being measured, $i$ indexes individual study participants, and $T$ and $C$ represent the number of individuals in the treatment and control groups, respectively. Net cost per person for a component is derived by taking the average cost per treatment group member (the sum of quantity multiplied by price for all treatment group members divided by the number of treatment group members) less the average cost per control group member.$^6$

$$Net \text{ cost per person } [k] = \left\{\left(\sum_{i \in T} Price[k] \times Quantity[i, k]\right)/T\right\} - \left\{\left(\sum_{i \in C} Price[k] \times Quantity[i, k]\right)/C\right\}$$

The sum across all $k$ cost components per person is the net cost per person of HPOG 2.0.

To improve accuracy of our estimates, to the extent possible, price information will be specific to the local program and be applied to the quantity of services used by each treatment and control group member of that local program.$^7$ Exhibit 3-1 provides an overview of the approach for

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$^6$ Where data are from the Participant Follow-up Surveys, survey weights will be applied.

$^7$ Survey samples of treatment and control group by local program used for measuring quantity may be small. This is not a major concern. The CBA is not trying to estimate local program-specific costs. Rather it is trying to estimate national average costs. For that purpose, errors due to sampling variability at the local program level (approximately) cancel out. Furthermore, using (even statistically noisy) measures of variation in prices across local programs allows us to capture any local program-level correlation of price and quantity (e.g., that estimates of local area price and aggregate quantity vary in similar ways across local areas).
calculating quantity and price for each cost component and the source of price information (including in which cases and from where local program information will be drawn).

### Exhibit 3-1. Measurement and Data Sources of CBA Cost Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Units of quantity (Q) and price (P)</th>
<th>Source of price/cost data</th>
<th>Price varies at local level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education and training</td>
<td>Q unit: Hours of training per spell. Calculated: Total hours per individual spell equals number of weeks in spell multiplied by hours per week in spell. P unit: Cost per class hour (varying by type of institution).</td>
<td>Program Cost Survey; DCPD</td>
<td>Yes</td>
</tr>
<tr>
<td>Basic skills training</td>
<td>Q unit: Hours of training per spell. Calculated: Combined total hours per spell for all spells that include basic education classes. Total hours per individual spell equals number of weeks in spell multiplied by hours per week in spell. P unit: Cost per hour.</td>
<td>Office of Career, Technical, and Adult Education, National Reporting System (2018)*</td>
<td>Yes (state/region)</td>
</tr>
<tr>
<td>Academic supports</td>
<td>Q unit: Number receiving support in 6-month period. P unit: Cost per person who received support during 6-month period.</td>
<td>Program Cost Survey; PAGES</td>
<td>Yes</td>
</tr>
<tr>
<td>Employment supports, transportation, and training-related materials</td>
<td>Q unit: Number receiving support in 6-month period. P unit: Cost per person who received support during 6-month period.</td>
<td>Program Cost Survey; PAGES</td>
<td>Yes</td>
</tr>
<tr>
<td>Child care</td>
<td>Q unit: Hours of care. Calculated: Combined total hours of child care used for all spells of training. Hours of child care for spell of training equals hours in child care per spell multiplied by number of children in age range. P unit: Cost per hour.</td>
<td>National Survey of Early Care and Education Project Team (2016)*</td>
<td>No</td>
</tr>
<tr>
<td>HPOG 2.0 administration</td>
<td>Q unit: Number of treatment participants in local program. P unit: Administrative cost per local program.</td>
<td>Program Cost Survey</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*We will use the most up-to-date available published estimates at the time of the analysis.

### 3.2 Measuring Cost of Occupational Education and Training

To calculate the price of education and training (cost per class hour), the CBA will rely on two sources of information: the HPOG 2.0 Program Cost Survey and the DCPD. The Program Cost Survey will provide cost data for institutions (primarily community-based organizations) not included in the DCPD.

The CBA team will take the training institution name reported by respondents in the Participant Follow-up Surveys and look up the price data for that institution in the DCPD. The Program Cost Survey asks grantees for the price of training from institutions not in IPEDS data (and therefore
not in the DCPD). For treatment group members, we will use this price information. For control group members reporting training from institutions in neither the DCPD nor the Program Cost Survey, we will use an internet search to find price data. If the information cannot be found, we will use the average price of similar institutions in the same program area, the average from the DCPD for community colleges and from the Program Cost Survey data for non-colleges.

We will conduct sensitivity analyses on the price of education and training. One limitation of DCPD data is that they do not distinguish costs for different programs within an institution (e.g., Nursing versus General Studies). Instead, they include an average across all programs within the institution. As Nursing and other healthcare occupations likely use more equipment and possibly higher-paid faculty than other programs, it is possible that the price of healthcare training is higher than the average price in the DCPD. This suggests that our cost estimates would be biased downward.

The CBA will conduct sensitivity analyses to explore the potential bias caused by this limitation. The Program Cost Survey will include reports of costs of healthcare training programs for a selection of community college programs. The CBA team will calculate the difference between the average price of healthcare training from the Program Cost Survey and the average cost of training from all the DCPD institutions included in the CBA. We will present estimates for total costs of education and training that apply this differential to suggest the sensitivity of our results to this limitation. This price differential will be applied to both treatment and control training, assuming many control group participants also engaged in healthcare training. If healthcare training is more costly than training on average and some control group participants engaged in non-healthcare training, application of the differential to all control group member training costs would lead to an underestimate of net training costs.

### 3.3 Approach to Address Limitations in Participant Follow-up Surveys

The Short-Term and Intermediate-Term Participant Follow-up Surveys are critical data for the cost measurement as outlined in the Design Plan for Cost-Benefit Analysis and summarized above in Section 3.1. However, there are two issues related to these surveys that the CBA must address. The analytic approach to address each of these issues is outlined here.

The first issue is the need to impute quantities for respondents with more than two training spells in the Short-Term Participant Follow-up Survey. In the survey, participants report on up to five spells of training, including the duration in months, the usual hours per week in class, and the institution name on each spell. For the longest spell and one other spell selected at random, participants also report on costs and supports associated with the spell of training. The CBA team will impute information necessary for the CBA for other spells of training. This includes receipt of academic supports (for treatment group members); receipt of employment supports, transportation, and training-related materials; use of child care; and out-of-pocket payment for

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8 The Impact Evaluation team is searching for internet links for all institutions mentioned by survey respondents but not included in IPEDS. We will use these links.

9 The Program Cost Survey asks grantees that are community colleges to report costs of community college healthcare training for a small number of trainings to conduct this sensitivity analysis.
training and payment for child care. Unpublished tabulations from HPOG 1.0 survey data collected 36 months after randomization suggest that less than 5 percent of participants will have more than two spells at 15 months. For those with more than two spells, we will impute all elements except use of child care based on the average results for respondents with similar length spells of training. We will impute child care use and payment to be the same as for the respondent’s other spells of training, assuming correlation of use across training spells for an individual.

The second issue is that quantity data will be drawn from two surveys: a larger short-term survey (9,710 respondents) and a smaller follow-up intermediate-term survey of pre-specified cohorts of those selected for the short-term survey (whether or not they responded to that survey; projected 4,000 respondents). This means the Intermediate-Term Participant Follow-up Survey will not provide a continuation of data on training and service receipt for months 16 through 36 for all Short-Term Participant Follow-up Survey respondents. We plan to draw quantities from the short-term survey for months 1 to 15 and quantities from the intermediate-term survey for months 16 to 36. We will use the same methods summarized in Section 3.1 and data for both sets of calculations. We will combine these costs to establish net costs per person per component, assuming implicitly that quantities are zero past 36 months.  

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10 We will carry out necessary imputations for respondents with more than two training spells as outlined above.

11 The HPOG 2.0 Impact Evaluation will gather data on training enrollment by treatment and control group members more than 36 months after randomization using data from the National Student Clearinghouse. If the Impact Evaluation finds a substantial amount of training more than 36 months after randomization and substantial differences between treatment and control group members, then we will conduct sensitivity analyses of how the CBA estimates would be affected by inclusion of this information. Doing so would entail calculating additional costs by applying average cost of training estimates to training quantities, discounted to the point of randomization.
4. Finalizing Measurement of Benefits

The CBA will measure the benefits of HPOG 2.0 as participant earnings, receipt of employer-provided health insurance, and associated changes in receipt of public benefits and payment of taxes that result from additional training. The Design Plan for Cost-Benefit Analysis (Loprest, Lerman, and Klerman 2019) describes the CBA’s approach for measuring benefits. This section provides details on the assumptions and methods we will use to measure and monetize these benefits.

4.1 Projecting Future Earnings

To measure the benefit of additional earnings for participants, the CBA team will use earnings impact estimates from the Impact Evaluation’s longer-term results based on available NDNH data. These impacts will be measured approximately 66 months (22 quarters) after randomization. However, to capture the hypothesized lifetime earnings impacts, the CBA will need to project the path of earnings impacts into the future over the projected working lives (assumed to be until age 65) of the treatment group members, based partly on their age. This means projections of 30 years or more, given current HPOG 2.0 treatment group members’ average age of 32 at baseline.

The Impact Evaluation team will provide the CBA with estimates of projected earnings impacts. Specifically, for main analyses in the Longer-Term Impact Report, the Impact Evaluation team will use NDNH earnings data to estimate quarterly impacts on earnings through 29 quarters post-randomization. Impact estimates go beyond 22 quarters because some participants were randomized earlier and so have more follow-up earnings data (discussed further below). The Impact Evaluation team will use these estimates to generate discounted lifetime earnings impacts (and standard errors) for the CBA team. Doing so raises issues related to the estimation of impacts and with respect to computation of standard errors and confidence intervals (discussed below in Section 4.2).

The Impact Evaluation team will provide us estimates for lifetime earnings impacts (through age 65, approximately 30 years post-randomization)—overall and for the subgroups specified in Section 5.2 below. There are three issues related to creating projections of earnings impacts:

- The number of quarters of follow-up data varies across participants randomized (for those randomized earlier, we have more quarters; for those randomized later, we have fewer quarters).
- There are no HPOG 2.0 impact estimates past 29 quarters after randomization.
- There are no HPOG 1.0 or HPOG 2.0 impact estimates past 40 quarters after randomization.

In turn, we discuss each of these issues and how we will address it.

First, there is a challenge in how to construct estimates of earnings impacts over several years given that the number of quarters of follow-up data will vary by randomization date. For participants randomized first, there will be approximately 29 quarters of post-randomization data. In contrast, for those randomized last, the Impact Evaluation team will have only about...
eight quarters of post-randomization data. As a result, sample sizes will drop as the number of quarters post-randomization increases.

The Intermediate-Term Impact Report and the Longer-Term Impact Report will include estimates of impact through each quarter. To generate those estimates, the Impact Evaluation team will need to address these issues; that is, how to construct estimates of impact over several years (and its standard error) when the observations contributing to estimates of impact in each quarter vary. The corresponding Analysis Plans will include thorough discussions of these issues. The methods used to compute sums of earnings by quarter since randomization should generalize to estimating discounted sums.

Second, there is the challenge of how to estimate impact on earnings past 29 quarters, when there will be no HPOG 2.0–specific estimates. Randomization started in HPOG 1.0 about three years before randomization in HPOG 2.0. OPRE expects to continue holding NDNH earnings data for the HPOG 1.0 cohorts. Using HPOG 2.0 funding, we will estimate HPOG 2.0 earnings models on the longest available HPOG 1.0 data—approximately 40 quarters post-randomization. We will use these data to estimate relative impact factors through approximately 40 quarters post-randomization.

Third, past about 40 quarters post-randomization of HPOG 2.0 participants there will be no HPOG-specific impact estimates. To extrapolate impacts past 40 quarters, our tentative plan involves three scenarios: (i) impacts at 40 quarters continue until retirement; (ii) no impacts past 40 quarters; and (iii) the mid-point of the previous two scenarios. The third scenario will be considered the “base” specification; the other two serve as sensitivity estimates, providing a range around the base case of possible earnings projections. For the Longer-Term Impact Report, the Impact Evaluation team will conduct a review of the (as of then current) literature on this issue. As appropriate, we will update this tentative plan based on the observed pattern of decay in the data and other results in the literature.12

Finally, note that these longer-term projections are likely to be relatively unimportant in the overall CBA results. Discounting implies that earnings past 10 years are not highly influential in a present value computation. This will be especially true for higher discount rates. In addition, existing evidence seems to suggest that impacts attenuate (i.e., fall towards zero) with time since randomization. The smaller the longer-term impacts, the smaller their contribution to discounted lifetime impacts.

### 4.2 Estimating Standard Errors

The estimated impacts on discounted earnings will be estimated from a sample and will therefore have sampling variability. It follows that the results of the CBA will also have sampling variability.

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12 For projecting earnings impacts for future quarters past the observed HPOG 2.0 impacts, longer-term results from HPOG 1.0 will be the best available study on which to base these trends. However, the impacts for HPOG 2.0 may vary from HPOG 1.0 due to differences in the HPOG Program’s emphases articulated in the funding opportunity announcements for each round of HPOG. In a sensitivity analysis, we will explore the alternative assumptions for future earnings, adjusting for the observed HPOG 1.0 trends to take into account observed differences between HPOG 1.0 and HPOG 2.0 impacts.
variability. To understand the sampling variability in the results of the CBA, the CBA needs estimates of the sampling variability in the discounted earnings. The Impact Evaluation team will provide the CBA with estimates of HPOG’s impact on the discounted sum of earnings. We will use these standard errors for HPOG’s NPV in a sensitivity analysis. Specifically, we will use the standard errors and an assumption of normality to infer the high and low ends of the 95 percent confidence intervals for the discounted sum of projected lifetime earnings (as derived from the Impact Evaluation models). As sensitivity tests, we will then rerun the CBA using those end points of the confidence intervals.

Estimating standard errors raises two issues. First, the standard error of the discounted sum does not follow simply from the standard errors of the by-quarter earnings estimates (which will be reported as part of the Impact Evaluation). Instead, to estimate net benefit, the CBA can simply take the discounted sum of the quarterly estimated impacts on earnings. These estimates are correlated. Thus, though the CBA could compute the discounted sum of impacts of earnings from the by-quarter impacts on earnings, the CBA cannot compute the standard error of the discounted sum from the standard errors for the individual quarters.

Instead, the Impact Evaluation team will provide the CBA with estimates of the discounted sum and its standard error. These estimates require a specification of the discount rate. (Our proposed discount rates are discussed in Section 5.1.) The Impact Evaluation team is still exploring how to estimate this standard error. One approach is to construct discounted earnings for each observation. Estimating impact for that outcome will yield proper standard errors (using our standard software). This approach is imperfect; it only works if the same observations are used for every quarter, which would require either not using longer follow-up periods or not using all observations. Neither is ideal. Alternative approaches are more complicated, perhaps involving modelling the correlation of earnings. We defer how we will address this technical issue until the Intermediate-Term Impact Report Analysis Plan.

Second, any post-HPOG 2.0 data assumptions about decay rates introduce non-sampling uncertainty, which is not captured by our standard errors. Our tentative plan is to compute standard errors for the discounted sum for the period covered by the discounted sums for which we estimate impact. All other adjustments will be in terms of decay rates. Additional uncertainty in terms of estimates of and assumptions about decay rates will be discussed in the CBA final report narrative, but not explicitly included in the standard errors.\(^{13}\)

### 4.3 Employer-Provided Health Insurance, Public Benefits, and Taxes

The CBA will apply to the projected future earnings impacts measures of the receipt of employer-provided health insurance, net taxes, and public benefits.

We will measure differential receipt of employer-provided health insurance between treatment and control group members as reported in the Participant Follow-up Surveys. We will monetize the value of treatment-induced employer-provided health insurance using published estimates

\(^{13}\) The Impact Evaluation team will revisit these issues in the Analysis Plans corresponding to the Intermediate-Term Impact Report and the Longer-Term Impact Report.
of average employer-costs of worker insurance packages. As of now, the best estimates of employer-provided health benefit costs are published by the Kaiser Family Foundation. These data are reported annually for single individuals and families, by plan type, firm size, region, industry, and whether the firm has few or many lower-wage workers (Claxton et al. 2017). It is therefore our tentative plan to use this information on individual plans with variation by region. The survey does not include data on the other sources of variation available in the published estimates, such as plan type, firm size, industry, or number of low-wage workers. In projecting future treatment-control differences in health insurance, we will assume the ratio of health insurance dollars to earnings remains constant.

The CBA will also calculate the impact of increased earnings on net taxes paid. We will apply the most recent estimates on the effective marginal tax rate for low- and moderate-income workers from the Congressional Budget Office (CBO) at the time of the CBA to the estimated lifetime earnings impacts. This approach jointly estimates the total reduction in public benefits as well as increases in federal and state income taxes (including the Earned Income Credit) and payroll taxes that accompany earnings gains. The public benefits included in the most recent CBO estimates are SNAP benefits and health insurance cost-sharing subsidies.

Because the CBO model does not include TANF benefits, and TANF recipients are a target population of HPOG 2.0, the CBA will use the Impact Analysis’s estimate of the impact on TANF benefits to separately estimate the change in receipt of TANF benefits. We will estimate the change in TANF receipt using information on TANF receipt at baseline from PAGES and information on TANF receipt from the Participant Follow-up Surveys. We will monetize this difference by estimating TANF program benefits using information from PAGES on number of children, other income, and state of residence. Given that other factors are considered in the determination of TANF benefits, this will be a simplified estimate. Information on TANF benefits by state, income, and number of children will come from the annual Welfare Rules Databook (Goering et al. 2019). Past the observed period, the CBA will not estimate additional differences in lifetime TANF receipt. We will add an additional administrative savings of 10 percent of benefits to these estimates to represent the decline in the costs of administering TANF. This percentage is in line with other CBA studies and published estimates of administrative costs (Karoly 2012).

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14 There is also a societal saving to families having employer-provided health insurance relative to being uninsured, in terms of reducing costs of delayed medical care, use of emergency rooms for routine care needs, and costs for uncompensated care. Monetizing these costs is beyond the scope of the CBA, but will be discussed in its final report.

15 See https://www.cbo.gov/publication/50923
5. Finalizing Analytic Approach to Cost-Benefit Calculation

The *Design Plan for Cost-Benefit Analysis* (Loprest, Lerman, and Klerman 2019) describes the CBA’s approach for measuring benefits. This section provides details on the assumptions and methods we will use to measure and monetize these benefits. It describes the analytic approach for calculating cost-benefit estimates, including net present value and discounting, subgroup analyses, and sensitivity analyses.

### 5.1 Final Decisions on Net Present Value and Discounting

Because benefits and costs materialize in different years and because any given dollar amount is worth less further in the future, it is standard practice in CBA studies to adjust costs and benefits to account for these factors. The HPOG 2.0 CBA will calculate the *net present value* (NPV) of cost-benefit by subtracting the present value of all costs from the present value of all benefits.

As described in Section 3, our measurement of costs is limited to 36 months after randomization, and HPOG 2.0 program costs will not likely accrue afterward. Although the specific costs accrue at different points over this three-year period, we will use an approximation for purposes of discounting costs. It is likely that costs of training make up a large percentage of all costs and that most other costs (such as for related services) will accrue in the same timeframe as training. We will use the average timing of months in training for treatment and control group members calculated from the Short-Term (15-month) and Intermediate-Term (36-month) Participant Follow-up Surveys to discount all calculated costs to the point of randomization. We expect discounting costs to have relatively little impact, as most costs are likely to accrue fairly soon after randomization.

The CBA team will also discount benefits to the base of month of randomization. As described in Section 4, benefits will be projected into the future for 30 or more years following randomization. This means the choice of discount rate can have a large impact on the present value of benefits. For this reason, we will present cost-benefit estimates using a base discount rate, but also create estimates using a high and a low discount rate.

The high-end discount rate will be 7 percent, as suggested by the Office of Management and Budget (2003) to reflect the private return to capital for investments subject to high variability and uncertainty. The low-end discount rate will be 3 percent, reflecting the discount rate on future consumption flows, which are not subject to such uncertainty. The base case discount rate we will use is 5 percent, the mid-point between these estimates.

### 5.2 Subgroup Analyses

The CBA study will calculate separate cost-benefit estimates for subgroups of HPOG participants for whom the HPOG 2.0 Impact Evaluation is generating separate impact estimates. In the *Analysis Plan for the HPOG 2.0 National Evaluation Short-Term Impact Report* (Judkins, Klerman, and Locke, 2020), the authors list 12 categories for which subgroup impact estimates will be calculated (shown in Exhibit 3-1). These categories are based on baseline demographics, background experience information, and results from HPOG 1.0.
### Exhibit 5-1. Subgroups for the Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Subgroup (defined at baseline)</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Gender                        | • Male  
• Female                  |
| Age                           | • Under 25  
• 25 or older but under 30  
• 30 or older              |
| Race/ethnicity                | • Hispanic (any race)  
• American Indian / Alaskan Native (including Hispanic and multi-racial)  
• Other white (neither Hispanic nor multi-racial)  
• Other black (neither Hispanic nor multi-racial)  
• Other (including Native Hawaiian / Pacific Islander, Asian, and other multi-racial) |
| Presence of dependent children| • Some  
• versus none           |
| Currently enrolled in school  | • Some postsecondary schooling  
• versus high school diploma (or equivalent)  
• versus less than secondary completion |
| Educational attainment        | • Below 8th grade on either numeracy or literacy skill  
• At 8th grade or higher on both  
• Unassessed               |
| Low numeracy or literacy (not tested in HPOG 1.0) | • TANF receipt (with or without SNAP or WIC)  
• versus SNAP/WIC receipt (without TANF)  
• versus no receipt of TANF, SNAP, or WIC |
| Currently employed            | • Yes/No |
| Barriers                      | • At least serious life challenge (child care arrangements, transportation, or personal health) “very often” interfered with school, work, job search, or family responsibilities |
| English proficiency           | • Limited  
• Not limited            |
| Public assistance             | • Timing of enrollment in HPOG 2.0 (groupings not yet defined) |

**Key:** SNAP=Supplemental Nutrition Assistance Program. TANF=Temporary Assistance for Needy Families. WIC=Special Supplemental Nutrition Program for Women, Infants, and Children.

### 5.3 Sensitivity Analyses

The CBA will include several sensitivity analyses to reflect the sensitivity of the final NPV estimates to study assumptions. Below is a list of the sensitivity analyses we will include:

- **Sensitivity to alternative assumptions on costs** (described in Section 3.2). We will calculate alternative cost estimates for education and training using reported cost estimates for healthcare program training from community colleges (as reported in the Program Cost Survey).

- **Sensitivity to alternative assumptions for earnings projections** (described in Section 4). We will estimate three different scenarios for projecting future earnings: (i) assuming last measured impacts continue over participants' lifetimes; (ii) assuming no impacts past 10 years
post-randomization; and (iii) the mid-point of the previous two scenarios. We consider this third scenario the “base case” for earnings projections and the other two sensitivity estimates around this base.

- **Sensitivity to earnings projection confidence intervals** (described in Section 4). We will calculate estimates for the base case earnings projections using an upper and lower value of the 95 percent confidence interval on projected lifetime earnings impacts.

- **Sensitivity to discount rates** (described in Section 5.1). In addition to a base case discount rate, we will calculate estimates using a higher and lower discount rate assumption for calculating the present value of benefits.

Exhibit 5-2 provides a sample table of how the CBA will report results of our sensitivity analyses. This table pulls together the results from assumptions in different parts of the CBA. The final CBA report will discuss the reasoning behind assumptions and the results of different assumptions on benefits or costs in those respective sections, as well.

**Exhibit 5-2. SAMPLE TABLE: Estimates of Net Present Value under Different Assumptions**

<table>
<thead>
<tr>
<th>Assumption</th>
<th>PV(Benefits)</th>
<th>PV(Costs)</th>
<th>Net Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Earnings Projections Assumptions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High alternate: Impact at 10 years post-randomization continues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base case: Mid-point of 10-year impact and no impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low alternate: No impact after 10 years post-randomization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Confidence Interval Sensitivity of Benefits around Base Case</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low end of 95% confidence interval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High end of 95% confidence interval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthcare Training Cost Estimate Sensitivity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using healthcare training costs versus average training costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Discount Rate Sensitivity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High alternate: 7% discount rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base case: 5% discount rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low alternate: 3% discount rate</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Timeline and Deliverables

This chapter presents the CBA timeline and deliverables. The timing of the CBA builds on the timing of activities in other parts of the HPOG 2.0 National Evaluation. In particular, the CBA will use estimates of impacts on services received reported in the *Short-Term Impact Report* and the *Intermediate-Term Impact Report*, based on the Short-Term Survey and the Intermediate-Term Survey, respectively. The CBA will also use estimates of impacts on earnings based on the longest possible NDNH follow-up, as reported in the *Longer-Term Impact Report*.

Exhibit 6-1 lays out the stages of the CBA and the timing and deliverables for each stage. The final results of the CBA will be based on the National Evaluation’s longer-term impact analysis estimates. Final analysis for the CBA cannot take place until after those estimates are developed, anticipated in spring 2024. However, parts of the CBA using other sources of information will take place earlier.

Exhibit 6-1. Stages, Tasks, Timing, and Deliverables of Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description of tasks</th>
<th>Timing</th>
<th>Deliverables (Date anticipated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>• Provide input into development of Short-Term Participant Follow-up Survey&lt;br&gt;</td>
<td>Sep 2017–Jun 2019</td>
<td>Design Plan for Cost-Benefit Analysis (July 2019)</td>
</tr>
<tr>
<td></td>
<td>• Develop CBA design&lt;br&gt;</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td></td>
<td>• Develop CBA data collection instruments</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td>Data collection</td>
<td>• Conduct HPOG 2.0 Program Cost Survey, including follow-up phone calls</td>
<td>Nov 2019–Mar 2020</td>
<td>n/a</td>
</tr>
<tr>
<td>Analysis Plan and cost analysis</td>
<td>• Develop CBA analysis plan&lt;br&gt;</td>
<td>Jun 2019–Apr 2022</td>
<td>Analysis Plan for Cost-Benefit Analysis (Winter 2020)</td>
</tr>
<tr>
<td></td>
<td>• Gather data from DCPD</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td></td>
<td>• Analyze data from:&lt;br&gt;</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td></td>
<td>o Program Cost Survey&lt;br&gt;</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td></td>
<td>o Short-Term and Intermediate-Term Participant Follow-up Surveys (from Impact Evaluation)</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td></td>
<td>o DCPD</td>
<td></td>
<td>Adamcis Timelines &amp; Deliverables for the CBA</td>
</tr>
<tr>
<td>Final analysis and reporting</td>
<td>• Use longer-term (66 months) impact estimates from the HPOG 2.0 Impact Evaluation and prior work to complete cost-benefit analysis&lt;br&gt; • Write final report</td>
<td>Apr 2024–Sep 2024</td>
<td>Cost-Benefit Analysis Report (Fall 2024)</td>
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Key: CBA=cost-benefit analysis. DCPD=Delta Cost Project Database. n/a=not applicable.

a This document is the *Analysis Plan*.

The CBA team will conduct the HPOG 2.0 Program Cost Survey starting in November 2019, collecting data for the fourth program year (October 1, 2018 to September 30, 2019) as the reference period. Some programs do not close their accounts for the fiscal year until December, so the survey period (and follow-up phone calls) will continue through March 2020.

We will gather information needed for the CBA from additional sources of data (such as the DCPD) between June and December 2020. We will then analyze these data and the Short-
Term and Intermediate-Term Participant Follow-up Survey data from the Impact Evaluation to complete calculations of the cost part of the CBA by April 2022.

The HPOG 2.0 CBA final results will be reported in the *Cost-Benefit Analysis Report*, the summative document of the CBA effort. This report will include background on the HPOG 2.0 Program, a statement of the conceptual model underlying the CBA, a description of the data sources and methods used, presentation and discussion of the results, and results of sensitivity analyses. A draft outline of the report is as follows:

**Exhibit 6-2. Draft Outline for Cost-Benefit Analysis Report**

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References


National Survey of Early Care and Education Project Team. 2016. Early Care and Education Usage and Households’ Out-of-Pocket Costs: Tabulations from the National Survey of Early Care and Education (NSECE), OPRE Report #n2016-09. Washington DC: Office of


