MILLIMAN REPORT

# Measuring Claims Cost Savings in MOBE's Randomized Controlled Trials: Review of Methodology

## Commissioned by Plymouth Guarantee, Ltd and MOBE, LLC

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# Introduction

MOBE, LLC (MOBE) is a health management company that uses data science, digital health, and a one-to-one personalized approach to reach, engage, and guide people to better health. Since 2015, MOBE has provided a platform that facilitates self-management services to select members of commercial health plans. These individuals are selected by reviewing 30 or more months of prescription drug and medical claims and enrollment data to produce a roster of individuals who the company believes could benefit from MOBE services, based upon a proprietary algorithm. This list of individuals is reviewed by the health plan to confirm there is limited overlap in the identified population with other care management, disease management, and utilization management programs offered. MOBE then begins direct outreach to the selected members.

MOBE recently began two new engagements structured as randomized controlled trials with a commercial (group and individual) health plan and a Medicare Advantage health plan. Approximately 40,000 fully insured members from the commercial health plan met MOBE's criteria for intervention as of July 2023. MOBE has extended program access to approximately 10,000 of these members while the remaining members form a control group. For the Medicare Advantage health plan, as of October 2022, approximately 52,000 members met MOBE's criteria for intervention and MOBE has extended program access to approximately 38,000 of them while the remaining members form a control group. For each randomized controlled trial, claims costs for both the treatment and control groups of membership will be tracked and compared to objectively measure the claims cost savings due to MOBE's interventions.

As paraphrased from a manuscript originally published in *BJOG: An International Journal of Obstetrics and Gynaecology,*[1,2]

> Randomized controlled trials (RCT) are prospective studies that measure the effectiveness of a new intervention or treatment. Although no study is likely on its own to prove causality, randomization reduces bias and provides a rigorous tool to examine cause-effect relationships between an intervention and outcome. This is because the act of randomization balances participant characteristics (both observed and unobserved) between the groups allowing attribution of any differences in outcome to the study intervention. This is not possible with any other study design.

For this project, Plymouth Guarantee, Ltd (Plymouth), an affiliate of MOBE, and MOBE engaged Milliman to review the methodology MOBE has developed to estimate the claims cost savings due to MOBE's interventions in the two randomized controlled trials. The information included in this report is intended to discuss the actuarial appropriateness of MOBE's methodology for quantifying program impact as it was presented to us. The information included in this report may not be appropriate for and should not be used for any other purpose. The authors of this report are only commenting on the general approach provided to us by MOBE for calculating estimated impacts attributable to the MOBE program. The information does not constitute an endorsement or recommendation of the MOBE program, nor does it quantify the value of the MOBE program in aggregate or for any specific group or individual, historically or in the future.

After summarizing the methodology, we present the results of our review in this report. Based upon our review, we believe that MOBE's claims cost savings methodology is appropriate for achieving MOBE's stated goal of objectively measuring claims cost savings and consistent with typical actuarial practices for achieving that same goal. The methodology is objective, simple, and generally less subject to bias than other approaches.

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6235704/

[2] https://doi.org/10.1111/1471-0528.15199

# Summary of MOBE's claims cost savings methodology

For the commercial and Medicare Advantage randomized controlled trials reviewed, MOBE uses a difference-in-differences method[3] to measure claims cost savings. More specifically, MOBE measures claims cost savings for these randomized controlled trials by comparing the claims cost per member per month (PMPM) for the MOBE treatment group during the performance period (Performance PMPM) to a Benchmark PMPM. The Benchmark PMPM is developed by trending the claims cost PMPM of the MOBE treatment group during the baseline period (Baseline PMPM) using the observed trend from the baseline period to the performance period of an identified control group. The claims cost values used in the calculation reflect total cost of care using paid (plan liability) amounts. MOBE's claims cost savings calculation is outlined in the formulas below:

$$\begin{aligned} &Gross\ Medical\ Cost\ Savings\ (\$) \\ &\quad = (Benchmark\ PMPM - Perormance\ Period\ PMPM_{Treatment}) \\ &\quad \times Performance\ Period\ Member\ Months_{Treatment} \end{aligned}$$

$$Benchmark\ PMPM = Baseline\ Period\ PMPM_{Treatment} \times \frac{Performance\ Period\ PMPM_{Control}}{Baseline\ Period\ PMPM_{Control}}$$

The key elements of this calculation are:

- Identifying members eligible for MOBE's program
- Classifying eligible members into treatment and control groups in a manner such that the trend in the control group is a reasonable proxy for what the trend in the treatment group would have been had the intervention not occurred
- Calculating claims cost PMPMs

Each of these elements is described in more detail below.

***Member identification.*** On a monthly basis, MOBE applies a proprietary algorithm to claims and membership data to identify members MOBE believes are eligible for intervention. Eligible members are limited to adults (ages 18 and older) who have primary health insurance coverage through the health plan. Once a member is identified as eligible, they are considered to always be eligible. The authors of this paper did not have access to the identification algorithm and the review of the identification algorithm is outside of the scope of this report. Although the identification algorithm may impact the claims cost savings that MOBE achieves, it does not impact the analyses in this report.

***Treatment and control groups.*** MOBE assigns members who are eligible for intervention to treatment and control groups by applying the randomized assignment process outlined below:

1. ***End strata.*** End stratum are defined for each distinct combination of the member features outlined in the figure below. The 6 member features create 144 distinct end strata for the commercial health plan and 72 distinct end strata for the Medicare Advantage health plan. Once identified as eligible, members are assigned to the appropriate end stratum and remain in that end stratum for the duration of the program.
2. ***Seeding schedule using block randomization.*** For each end stratum for the commercial health plan, MOBE creates a seeding schedule of 60,000 records whereby each 8 records are a random mix of 2 treatment and 6 control group members. For the Medicare Advantage health plan, each 10 records are a random mix of 7 treatment and 3 control group members. Each member is assigned to a record when they are identified as MOBE eligible, resulting in their respective assignment to the treatment or control group. The mix of treatment and control group members can be tailored to the level of treatment intervention the health plan or plan sponsor desires, so long as each group has enough members to achieve the desired level of accuracy of claims cost savings for the randomized controlled trial.
3. ***Member assignment.*** MOBE assigns members eligible for intervention to the appropriate end stratum based upon their features, then sorts the members by their member identification number in ascending order. Each member is then assigned to the treatment or control group in sequential order by applying the predetermined seeding schedule for the member's end stratum.

[3] https://dimewiki.worldbank.org/Difference-in-Differences

**FIGURE 1: MOBE MEMBER STRATA**

| MEMBER FEATURES | STRATIFICATION | |
|---|---|---|
| | COMMERCIAL | MEDICARE ADVANTAGE |
| Line of business | ▪ Individual<br>▪ Group | ▪ Medicare Advantage |
| Age | ▪ Over 50<br>▪ Under 50 | ▪ Over 75<br>▪ Under 75 |
| Gender | ▪ Male<br>▪ Female | ▪ Male<br>▪ Female |
| Access to care | ▪ Urban<br>▪ Rural | ▪ Urban<br>▪ Rural |
| Comorbidity index – measure of chronic conditions | ▪ Low<br>▪ Medium<br>▪ High | ▪ Low<br>▪ Medium<br>▪ High |
| Predictive cost risk score | ▪ Low<br>▪ Medium<br>▪ High | ▪ Low<br>▪ Medium<br>▪ High |

***Claims cost PMPM.*** MOBE calculates costs for the baseline and performance periods for both the treatment and control groups on a PMPM-basis using paid claims amounts (excluding member cost-sharing) and membership incurred during each respective period. Both the performance and baseline periods are 12 months with 3 months of claims runout. Members are included in the calculation beginning the month they are identified as eligible for MOBE intervention. Members who leave the health plan are included in the calculation up until the month their enrollment in the health plan is terminated.

When calculating claims cost PMPMs, MOBE applies several exclusions:

- Incurred months where the MOBE algorithm indicates the member is not eligible for MOBE services;
- Paid claims costs in excess of $75,000 for a member in any given month during the baseline or performance periods; and
- Paid claims costs in excess of $150,000 for a member during the baseline or treatment periods.

The claims cost amount thresholds noted are approximately the 99$^{th}$ percentile of member claims costs.

## Analysis of MOBE's claims cost savings methodology

***Monte Carlo simulation.*** The authors of this paper employed Monte Carlo simulations to assess the accuracy of MOBE's methodology for measuring claims cost savings for the randomized controlled trials. For members that met MOBE's criteria for intervention in each randomized controlled trial, MOBE provided historical claims cost by member, net of exclusions, for the baseline period and the year prior to the baseline period. Using the provided year-over-year data, we conducted the Monte Carlo analysis as follows:

1. We performed 2,000 simulations. For each simulation:
    a. For each end stratum, we randomly assigned members into two groups aligning with the proportion used in the randomized controlled trial.
    b. We calculated claims PMPMs for each of the two groups for both the year prior to the baseline period (year one) and the baseline period (year two).
    c. We calculated a claims trend rate from year one to year two for each of the two groups using the simulated claims PMPMs.
    d. We then calculated the difference in the claims trend rates between the two groups for each respective simulation.
2. For the final step of the Monte Carlo analysis, we aggregated the results of the 2,000 simulations.

The year prior to the baseline period and the baseline period are both prior to MOBE interventions, so the simulations are measuring the trend *difference* between the treatment and control groups in absence of interventions. Results from the simulations are illustrated in Figures 2 and 3. The simulations for the commercial population produced an average trend difference between treatment and control groups of approximately -0.02% and the trend difference was within approximately -2.9% to +2.8% in 80% of simulations. For the Medicare Advantage population, the simulations produced an average trend difference between treatment and control groups of approximately 0.00% and the trend difference was within approximately -3.5% to +3.4% in 80% of simulations. Therefore, in the absence of intervention, the control group's trend can be expected to be within these ranges from the treatment group's trend approximately 80% of the time when the performance period is the year immediately following the baseline period.

The claims and enrollment data used for the Monte Carlo analysis are limited to a consecutive two-year period for each of the two populations. The appropriateness of the results may need to be reassessed if:

- There is a gap between the baseline and treatment periods (there was not enough historical data available to test the accuracy of the methodology under this scenario); or
- There are factors external to the MOBE program that create materially different conditions in the treatment period than were observed in the period used in the Monte Carlo analysis.

    An example of an external factor that might impact the appropriateness of the analysis might be an event like the COVID-19 pandemic, where the variance in PMPM cost is increased due to members either having very little cost due to reduced utilization of elective and preventive services or members having high costs due to a COVID-19 related hospitalization.

**Figure 2**
**Commercial Study**
**Difference in Treatment and Control Groups' PMPM Trend for 2,000 Randomized Simulations**

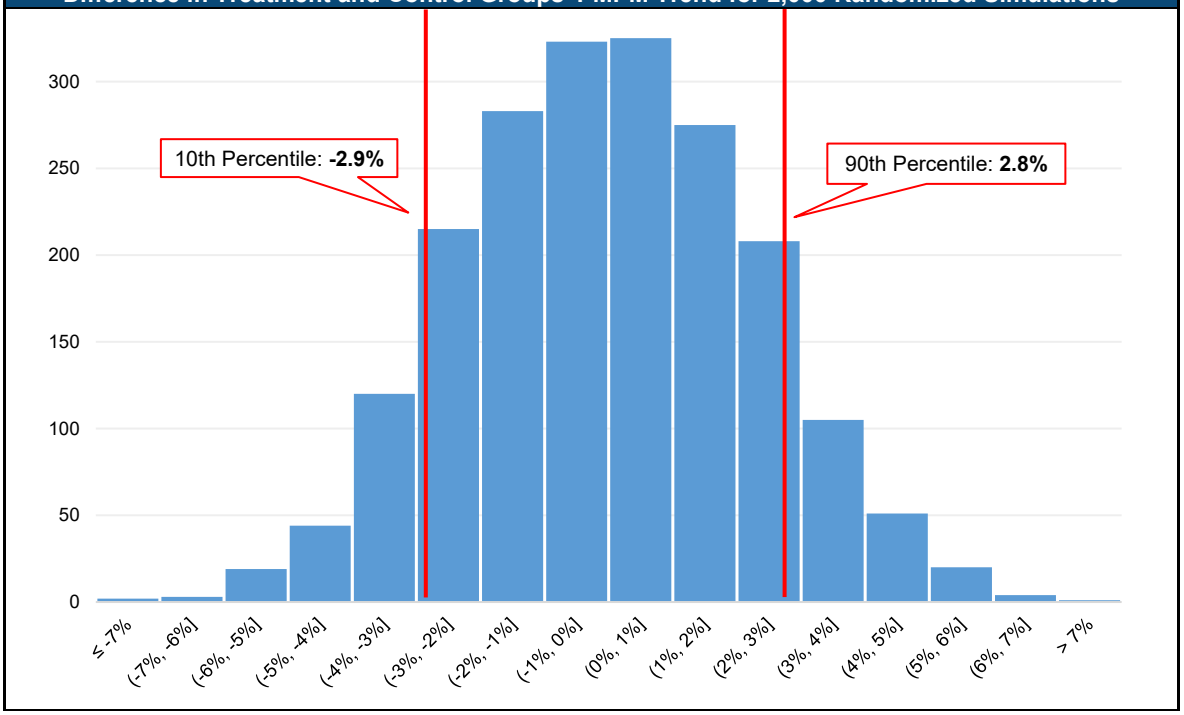
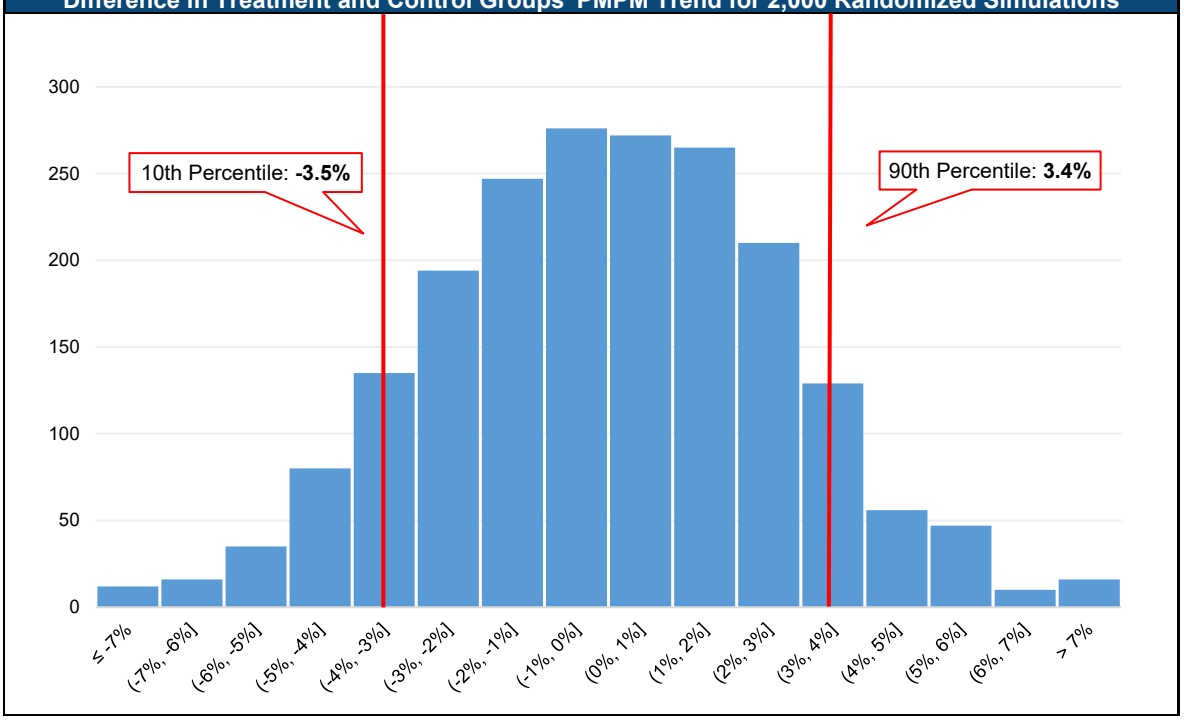



**Figure 3**
**Medicare Advantage Study**
**Difference in Treatment and Control Groups' PMPM Trend for 2,000 Randomized Simulations**



Notes for Figures 2 and 3:

1. For the commercial study:
    - Year one includes claims incurred September 2020 to August 2021 paid through November 2021, reflecting 232,373 member months.
    - Year two includes claims incurred September 2021 to August 2022 paid through November 2022, reflecting 370,604 member months.
2. For the Medicare Advantage study:
    - Year one includes claims incurred August 2020 to July 2021 paid through October 2021, reflecting 256,217 member months.
    - Year two includes claims incurred August 2021 to July 2022 paid through October 2022 reflecting 401,786 member months.
3. Members' year one experience was in-scope for the analysis if they were eligible on the first day of year two. The data provided by MOBE only contained the number of months a member had coverage in each year, therefore coverage was assumed to be continuous when determining when a member was eligible in year two.

    *For example: if a member had 2 months of coverage in year one and 1 month of coverage in year two, we assume that the 2 months of coverage in year one occurred in the last 2 months of the year and the 1 month of coverage in the year two occurred at the beginning of the year, resulting in continuous coverage.*

***Performance bias.*** While MOBE's claim cost savings methodology controls for many potential sources of bias, one source of bias that is both unavoidable and unquantifiable is the performance bias created by notifying treatment group members of their MOBE eligibility. In some cases, a member being notified of their program eligibility status may trigger member behavior change without vendor engagement and generate claims cost savings. The claims cost savings methodology currently includes savings impacts due solely to members being notified of their MOBE program eligibility, given the control group does not get an eligibility notification. This bias could overstate the value of savings resulting from MOBE's interventions.

***Other bias – truncation.*** Truncating member costs could potentially understate the savings due to MOBE intervention. In the event that MOBE generates a material amount of true savings for the treatment group, the treatment year expenditures for the control group would be more likely to exceed the truncation limit than the MOBE-suppressed treatment group expenditures. It is also more likely that the truncation limit would be reached in the treatment year as opposed to the base year due to medical cost inflation.

# Conclusion

At a generalized level, MOBE's methodology for measuring claims cost savings due to its interventions is to compare the costs for its treatment group to an estimated benchmark cost, with the benchmark reflecting what the claim costs would have been for the treatment group in absence of the intervention. MOBE uses the common and logical practice of establishing the benchmark as the claim costs for the treatment group in a baseline period prior to intervention plus an adjustment factor that reflects how much the baseline period claim costs would have changed in absence of the intervention.

In practice, establishing appropriate benchmark adjustment factors is challenging because of the many influences that can impact the cost of health care from one period to the next, such as changes in: covered services, member cost sharing, population risk profile, physician practice guidelines, emerging technology, pandemics such as COVID-19, flu season severity, etc. MOBE's approach of using a control group established for a randomized controlled trial to measure benchmark adjustment factors is objective and generally less subject to bias. This approach is also simple in that all non-treatment influences that impact members' cost of care during the treatment period are captured in one factor.

Some other approaches used for benchmark adjustment factors are subjective (such as using a negotiated trend factor), may be biased (such as using a trend applicable to a group who elected to not participate in a treatment program), and/or can be complicated (such as using several distinct factors to adjust for different non-treatment influences).

Lastly, although the accuracy of the claims cost savings methodology for both randomized controlled trials we analyzed was similar, the accuracy of the claims cost savings methodology for other randomized controlled trials may differ. The accuracy of the claims cost savings methodology for a randomized controlled trial may be impacted by the strata used, identification algorithm, claim cost exclusions, claim costs measure (e.g., allowed amounts rather than paid amounts), and the size of the treatment and control groups, for example. Monte Carlo simulations can be used to estimate the accuracy of the claims cost savings methodology for randomized controlled trials using such alternative parameters.

# Limitations, reliance, and qualifications

### LIMITATIONS

This report has been prepared for the management of Plymouth and MOBE. We understand that his report may be shared with current and prospective clients of MOBE. To the extent that the information contained in this report is provided to any approved third parties, the report should be distributed in its entirety. Any user of the information presented in this report must possess a certain level of expertise in health care cost modeling that will allow for the appropriate use of the information presented.

Milliman makes no representations or warranties regarding the contents of this report to third parties. Likewise, third parties are instructed that they are to place no reliance upon this report prepared for Plymouth and MOBE by Milliman that would result in the creation of any duty or liability under any theory of law by Milliman or its employees to third parties. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work.

We have developed certain models to estimate the estimated values presented in this report. The intent of the models was to estimate differences in trend between treatment and control group of randomized controlled trials. We have reviewed the models, including their inputs, calculations, and outputs for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice (ASOP). The models, including all input, calculations, and output may not be appropriate for any other purpose.

### RELIANCE

The models rely on data and information as inputs to the models. More specifically, we relied on data and other information provided by Plymouth and MOBE on its face, including but not limited to the following key items:

- A seeding schedule, program overview, and representative MOBE client proposal received March 22, 2023
- Zip code-level member volumes split by treatment and control groups received April 3, 2023
- Member-level summarized claims and exposure data for commercial and Medicare Advantage populations provided August 4, 2023
- Discussion during conference calls on March 17, 2023, May 8, 2023, and August 1, 2023

We have not audited or verified this data and other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete.

We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

## QUALIFICATIONS

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. The authors of this report are members of the American Academy of Actuaries, and meet the qualification standards for performing the analyses in this report.

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