Validating the Accuracy of the CentraForce Health Data Analytics Platform

The blending of statistically valid large-scale market research datasets with multiple national consumer data files and other observed behavioral datasets can provide unique and powerful insights on the attitudes, preferences, and behaviors of individuals that cannot otherwise be accurately ascertained. The CentraForce Health Population Health Intelligence Platform employs a sophisticated blending of multiple, validated commercial data sources and calculations to model the Comprehensive Determinants of Health (CDoH) and communications and engagements preferences of populations, cohorts, and individuals.

CentraForce Health retained Artemis Strategy Group, a respected consumer research firm whose partners have decades of experience in survey research, the statistical protocols associated with survey samples, and their interpretation and use in segmentation, profiling, and modeling, to conduct a thorough examination of the company's methodology and algorithms to assess the accuracy of their models and the internal protocols used by CentraForce Health to develop those projections.

Artemis reviewed the details of how CentraForce Health develops its models and performed a number of tests and data checks designed to assess the accuracy of population, cohort, and individual risk, communication and engagement projections. Actions included examining the definitions, variable compositions and data sources for individual risk categories; reviewing the inputs and outputs from data integration calculations; testing the accuracy of projections derived from survey sources; and reviewing quality control protocols.

The Artemis review concluded that the overall structure and processes of the system are sound and statistically valid. The primary health database draws from robust and representative large-scale survey data acquired from several nationally recognized sources, and the national household database also is robust and well-established. The review of variable construction found good rationale to support risk category definitions. The process of projecting risk measures to specific geographic areas or populations involves a number of calculations, assumptions and data validity checks is logical and sound. The CentraForce Health analytics team demonstrates an excellent understanding and execution of procedures

make sense.

for identifying and addressing survey data anomalies. This is a robust system with opportunities for continuing refinement and growth.

The core question about this modeling system, as with any other, concerns how confident users can be about the accuracy of the risk projections.   In a complex system there are many elements that affect accuracy and there is no singular answer to the question.   However, it is possible to test accuracy and to provide an estimate of accuracy ranges.   Accuracy depends especially on the original source of information for projections.

Artemis went back to the original licensed sources for the key variables in the equation: the local and large-scale population surveys used to measure health behaviors, attitudes, and communications and engagement preferences. Surveys encompassed more than 8,000 of these measures and are refreshed every six months.   Drawing from a pool of over 10 million individual respondent records, populations are able to be defined by their zip codes, disease states, types of payers and host of other available criteria.   We examined various measures on key subpopulations within a geography (Columbus, OH) to assess the accuracy of the data from the several survey sources used for projections.

Assuming that the sample is selected in a manner that represents the full population, the statistical accuracy of any projection to a given population depends on the size of the survey sample.   The statistical calculation determines a confidence interval – the range of accuracy.

Artemis calculated statistical confidence intervals across the full range of risk projections and other variables associated with five specific population segments reflecting the range of audiences that might be of interest to users (commercially insured by age; specific Medicare and Medicaid populations).   Risks that affect both large and small portions of the population were measured because that dimension also can affect the size of the confidence interval. Each of the several different survey sources was tested. Confidence intervals for over a thousand risk projections were calculated.

As expected, the review found that statistical error ranges vary by population segment, risk factor and survey source.   National estimates are extremely accurate because of the very large survey bases.   Most local estimates fall within a relatively tight accuracy range. For example, confidence intervals for most risk variables, using the best national level survey source, are at 1 percentage point or less.   Using local market level survey sources, confidence intervals vary from 2 percentage points to 11 percentage points, with a median of five percentage points, depending on the population segment and survey source. Most of the resulting risk metrics, developed using the best or multiple sources, have confidence intervals below the median, a

reasonable range for most accuracy estimates. A confidence interval of two percentage points indicates that in 95 cases out of 100 it is within 2% on either side of the actual measure for the full population it is estimating.

Below is an excerpt from the confidence interval assessment. Focusing in on adults with Medicare Advantage insurance, we examined several CentraForce Health risk measures.

Risk Measure	N (sample size for surveyed population with Medicare Advantage)	Estimated Proportion of people covered by Medicare Advantage flagged for risk	Margin of Error (95% Confidence Level)	Confidence Interval
At Risk Cardiology	N = 15,002	26.48%	0.71%	25.8% to 27.2%
At Risk Diabetes	N = 15,002	10.6%	0.49%	10.2% to 11.1%
BMI Risk	N = 15,002	25.72%	0.70%	25.0% to 26.4%
Alcohol Risk	N = 1390	6.26%	1.27%	5.0 % to 7.5%

These statistical tests provide assurance that the data sources and source data handling protocols used in the CentraForce Health models generate accurate risk projections in most circumstances and properly flag specific situations or measures where the underlying data are not stable enough for a strong projection.