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Actuarial Model for Wellness

SURVEY RESULTS

Sibson Consulting

SOCIETY OF ACTUARIES

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Survey Results

Actuarial Model for Wellness—Survey Results

Overview

The Society of Actuaries (SOA) engaged Sibson Consulting, a division of Segal, to facilitate a collaborative process with the actuarial, vendor and research communities to develop a conceptual actuarial model for wellness as a first step toward the possible development of a computational actuarial model.

The first step in this process was to perform an initial literature review of research and clinical studies to determine if this type of model was feasible (if the data were truly available), and to get a sense of what such a model would need to include, and what it would look like. From this first step, we were able to develop a starting point for the conceptual model supported by the studies reviewed and available data. The following table illustrates the model included with the survey and to which the survey participants provided comment.

PROGRESSION OF HEALTH IN AN ACTUARIAL MODEL FOR WELLNESS[1]

Environmental Factors	Lifestyle Factors	Risk Conditions (measures)	Disease States	Actuarial Outcomes	Actuarial Impact
Demographics	Diet/Nutrition/ Healthy Eating	Obesity (Weight/BMI/ Body Fat)	Diabetes	Complications/ Morbidity	Health Cost
Genetics	Exercise/Physical Activity/Fitness	Hyperlipidemia (Elevated Cholesterol/LDL Level)	Heart Disease/Heart Attack	Presenteeism	Productivity Impact
Physical Environment	Stress/Anxiety	Hypertension (Elevated Blood Pressure)	Asthma/COPD	Absence	Absence Cost
Socio Economic Status	Addictive Behavior (Smoking/Tobacco/ Alcohol/Other Substance Consumption)	Hyperglycemia (Elevated Blood Sugar/Glucose)	Stroke/Kidney Disease	Litigation/Accident/ Property Loss	Property/Casualty Cost
Education	Risky Lifestyle Behavior	Hypertriglyceridemia (Elevated Fatty Molecule/ Triglycerides)	Cancer	Workplace Injury	Workers' Compensation Cost
Culture	Sleep	Anxiety/ Depression	Other Chronic and Non-Chronic Conditions	Disability	Disability Cost
Each column represents a stage of the progression of health, from the environment and lifestyle we choose, to the actuarial outcomes those choices influence. While it is understood that the model may have an intricate web of interdependencies, some of which may impact factors in the same or prior columns, for simplicity sake, it may be best to approach building the actuarial model by applying the prevalence, probabilities, and impact (severity) from left to right. The model can follow the progression reflected in the red timeline (which are the column labels). Note it is not intended to imply any specific dependence across each row.				Loss of Activities of Daily Living	Long Term Care/ Custodial Care Cost
				Mortality	Life Insurance, Retirement, Retiree Health

The rate of progression of health is influenced by and one's condition influences psychosocial factors such as self-efficacy/confidence, readiness to change, level of social isolation, motivation and one's perception of health.

[1] The conceptual model displayed is the actual model presented to survey participants. The conceptual model in the study report has been revised to reflect feedback received from this survey.

In this, the second step, Sibson engaged the vendor and actuarial communities to solicit input on the actuarial model for determining the impact of various environmental, lifestyle and behavioral risk factors. The goal was to understand the extent to which actuaries currently use models around wellness, refine the above conceptual model, and better understand the potential uses of, and value to, the actuarial and vendor communities that would use such a model. We sought to understand the potential applications and sources of data for the actuarial model. We gathered input on how the model would best suit the professional needs and help shape the future role of the actuary. Lastly, we gathered feedback on the above conceptual model.

The process employed in this step included Sibson and the Project Oversight Group (POG) of the Health Section of the SOA collaborating on the creation of the survey, the SOA sending the survey out to about 3,600 Health Section actuaries in health-related careers, and Sibson sending the survey out to about 300 wellness, health and disability vendors. Primarily respondents included health actuaries. Responses were only deemed valid where at least one question was answered; 398 responses were tallied.

The survey sought to produce hypotheses around the following:

- Characterize wellness models that already exist;
- Gather perceptions of the proposed conceptual wellness model;
- Identify top areas of focus for the actuarial wellness model;
- Identify possible sources of data to support the development of a computational actuarial wellness model; and
- Define possible added or expanded actuarial roles in the wellness field.

The survey questions were designed to address these hypotheses. While the scope and use of models to date is very limited, the interest, desire and expected use in the future appear to be much greater.

Existing Models

In order to learn from those with expertise in working with existing actuarial models, the survey asked respondents questions about their level of expertise and experience with different types of actuarial models and the characteristics of those models. There were 123 participants that indicated they work with an existing model. The survey respondents characterized three general types of wellness-related models:

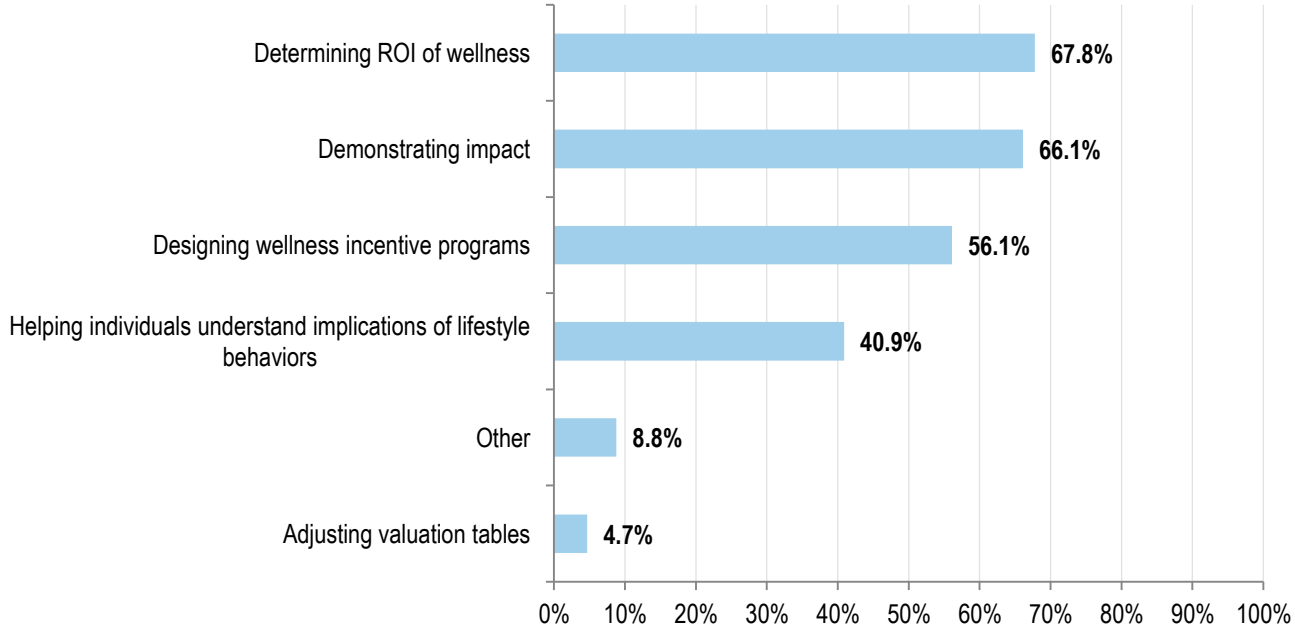
- Internal/home-grown models that are used to justify health/pre/post comparison models for cohort matching/wellness programs and determine return on investment (ROI);
- Risk factor scoring models such as the Dee Edington model, HERO Health Risk model, DxCG Risk Adjustment model, and more; and
- Underwriting/pricing models including the Milliman Health Cost Guidelines. Included under these pricing models are separate models by industry (such as life insurance, pensions and disease management).

Some of the specific models referenced in the survey included: Archimedes, Optum's proprietary model, Milliman's Health Cost Guidelines, Gallup, Ingenix, Kenexa, MediSave developed by Medical Scientists, University of Michigan risk model, StayWell cost impact model, Truven ROI

model, Choosing Healthplans All Together (CHAT—developed by NIH/University of Michigan/CHD), Insignia patient activation, Prometheus, My Own Network powered by the Agency for Healthcare Research and Quality (MONAHRQ), American Academy of Actuaries paper on disease management, WellScore, and HERO model. No attempt was made to verify the appropriateness of any of these models.

To further characterize current models, the survey asked participants about their involvement with current models. Of the 171 respondents to this question who work with models, the following chart summarizes the current involvement.

INVOLVEMENT WITH CURRENT MODELS[1]

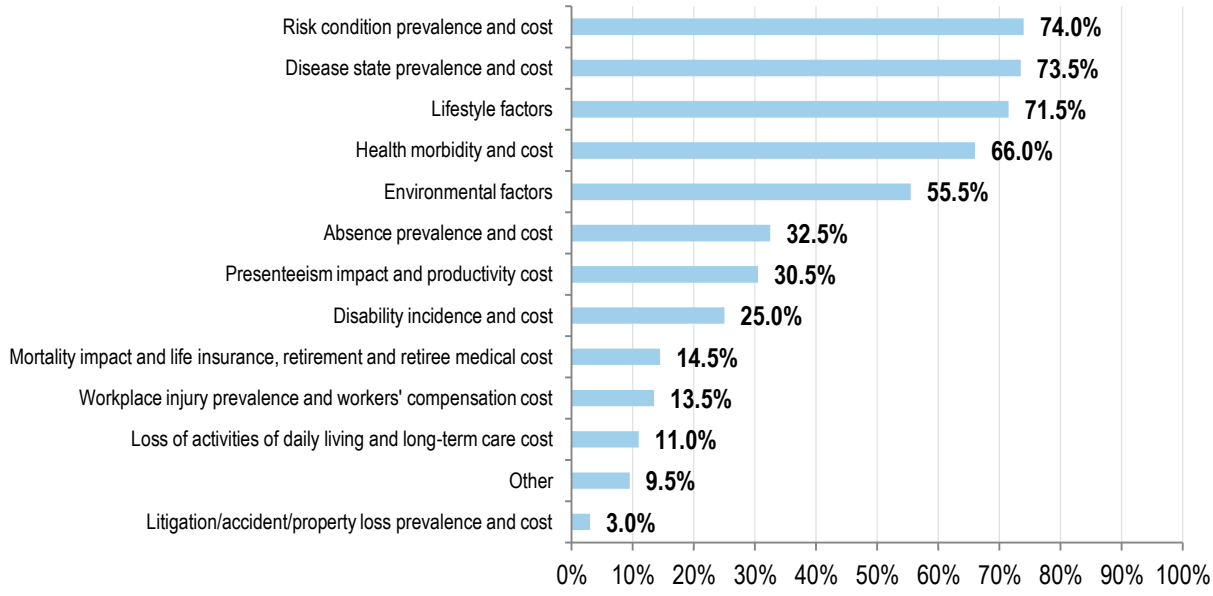


Most respondents indicated using current models for determining ROI, demonstrating impact and designing wellness incentive programs. There was very little use of current models for adjusting valuation tables. Written responses also indicated that models were used to analyze physician incentives, look at disease management and oncology outcomes, identify members likely to benefit from wellness activities, and evaluate cost of programs to address socioeconomic determinants of health.

[1] The percentage indicating involvement is of those who currently work with models (i.e., the denominator excludes those who responded with only "Not Applicable").

In order to understand which data points were most important in the current models, the survey asked respondents to rank different categories of data points. The following chart shows the 200 respondents' answers to this question regarding important factors included in current models.

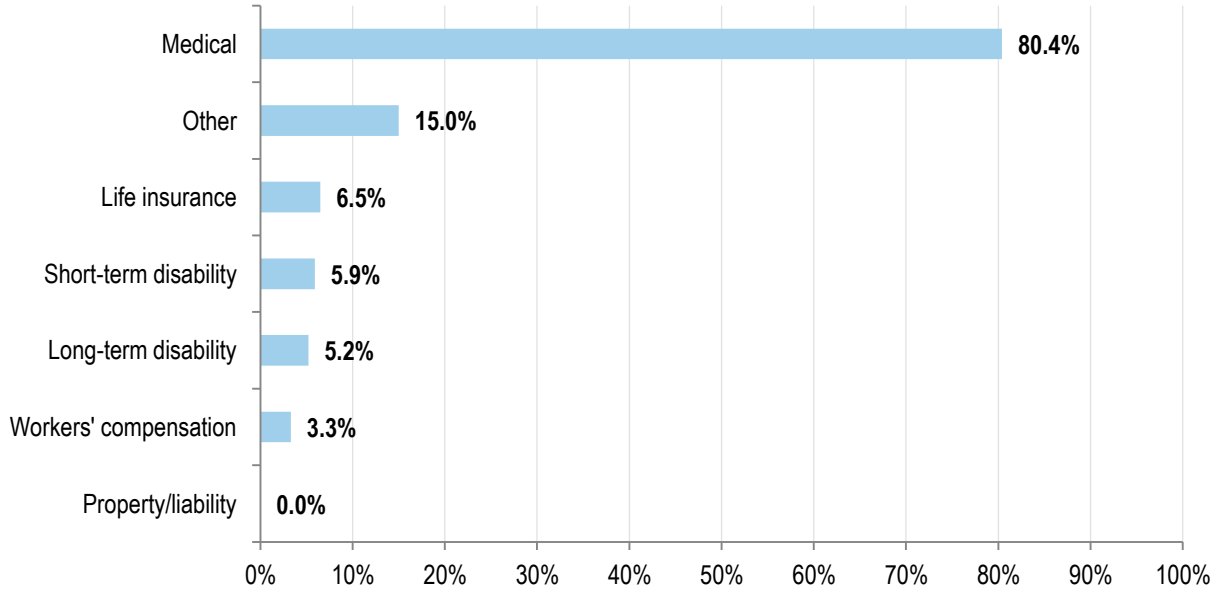
MOST IMPORTANT DATA POINTS IN THE CURRENT MODELS



Other responses included items such as DNA, risk scores based on past claim history, participation levels for the employee and spouse, business outcomes, behavioral factors and engagement, and dental costs.

In order to understand how current wellness actuarial models are used, the survey asked for which types of insurance are lifestyle behaviors/risk conditions used to adjust premiums.

INSURANCE TYPE



Of the 153 respondents answering this question, 80 percent indicated that they use the current wellness models to adjust medical premiums, but only 5 to 7 percent indicated that they use current wellness models to adjust short-term disability, long-term disability or life insurance premiums. This result is not surprising given that the SOA distributed the survey to only Health Section actuaries, resulting in over 93 percent of respondents indicating that they are health actuaries and less than 15 percent work in any other area of practice (note that some respondents indicated multiple areas of practice). As such, we cannot conclusively determine that other areas of practice are not using lifestyle behaviors/risk conditions to adjust premiums. This may indicate the need to distribute the survey to a broader actuarial audience to understand potential broader application.

Other responses included dental premiums, federal and state health benefit programs, contributions, member incentives, and cost impact of incentives to physicians for complex case management.

Perception of Model Importance and Feasibility

In order to understand if a computational model should be pursued, questions were asked to garner perceptions of feasibility and importance if a model could demonstrate impact. Our analysis focuses on the responses of those individuals who currently work on/with some form of actuarial model. This cohort should be best equipped to understand what is feasible. Thirty-one percent of those answering the survey question related to the perception of model feasibility (of 398 responses) currently work on/with actuarial wellness models.

Although 95 percent of respondents who directly work with or on actuarial wellness models believe it is important to capture the impact of wellness in an actuarial wellness model for their area of practice, only 72 percent believe the computational model is feasible (still a high percentage). In general, among all survey respondents, 162 out of 189 (86 percent) believe it is highly important to reflect the impact of wellness for their area of practice if an actuarial model could demonstrate impact, while 118 out of 186 (63 percent) feel it is feasible to factor in the impact of wellness.

The high percentages of respondents that believe the model is feasible and important suggest that the computational model should be pursued. The 20-percent-plus difference suggests that there is recognition of the challenges inherent in developing such a model.

Perceptions of the Conceptual Actuarial Wellness Model

In order to understand the appropriateness of the draft conceptual actuarial model posed in the introduction to the survey, the survey asked participants to indicate how well the model captures the important factors. The responses were very favorable toward the model, with approximately 80 percent favorable responses (response of 4 or 5 on a scale of 1 to 5, 1 = “does not capture” and 5 = “captures”) to each of the dimensions of the model and only 5 percent on average providing an unfavorable response (response of 1 or 2).

There were a few responses that individuals indicated could enhance the model:

- Required doctor's physical or other tests;

- Other measures of the risk conditions, such as neck circumference and waist circumference for obesity;
- Accounting for interdependencies/causation between each of the environmental factors, lifestyle factors, risk conditions and disease states;
- Timing of impact of factors/risks/adjustments to lifestyles within the model (i.e., how long does it take to progress from one state to another, and how do risk and changes to lifestyle impact that timing);
- Traumatic injuries due to risky behaviors (seatbelt/helmet use, etc.) as an actuarial outcome;
- Cost of communication and delivery to people;
- Include levels of disease severity within each disease state;
- Workforce outcomes such as employee engagement/satisfaction;
- The work type as a component of the physical environment, which also leads to the probability of return to work as another actuarial outcome, perhaps as a component of work place injury and disability;
- Changes to the course of health progression (progression is not linear); and
- Add "Other Life-Threatening Conditions" to the "Disease States" column, and add "Current Medications" to the list of risk conditions, because many medications have increased risks for other diseases associated with their use. Perhaps add an entirely new section for management of diseases.

Specific to the environmental factors, there were suggestions for improvements, such as:

- Definition of cultural impact of work (culture) and home (culture);
- Characteristics of the person that may influence health such as willingness to change behavior, income level, industry of work (the model was revised to change "Demographics" to "Personal Traits");
- Industry/work type ("Culture");
- Air and water pollution ("Physical Environment");
- Emotions and initial mental health state ("Personal Traits"); and
- Health care provider culture ("Culture").

The model in the study report has been adapted to reflect many of these changes. Other recommended enhancements may be details to be included in the descriptions of the items in the model, or items to be considered for the computational model.

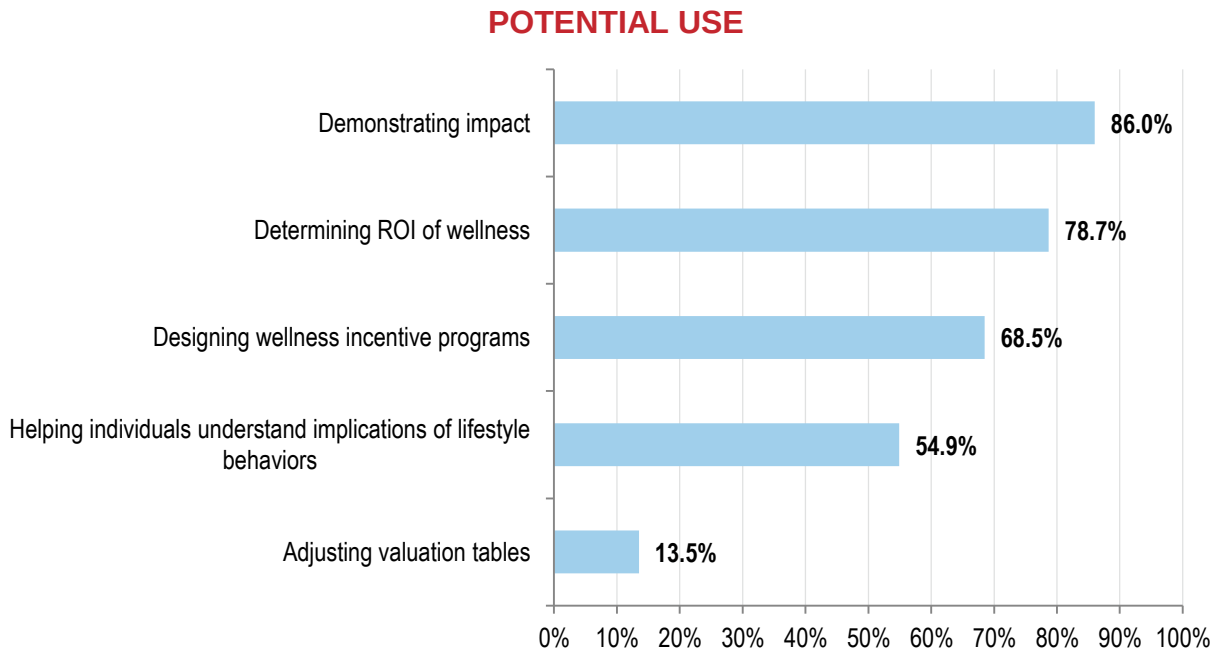
Overall, of the people who responded that the actuarial wellness model would be feasible and important to their areas of practice, about 70 percent felt that the model adequately captures the environmental factors and the progression of health. What this may mean is that there is a significant difference between what the ideal conceptual actuarial wellness model should be, and what the computational actuarial wellness model could capture.

In building out the model, a balance needs to be struck between the level of detail that makes the model useful and avoiding too much detail that makes the model infeasible due to the lack of

available data. A next step in the creation of the model may be a more detailed definition of each item/factor identified in each box.

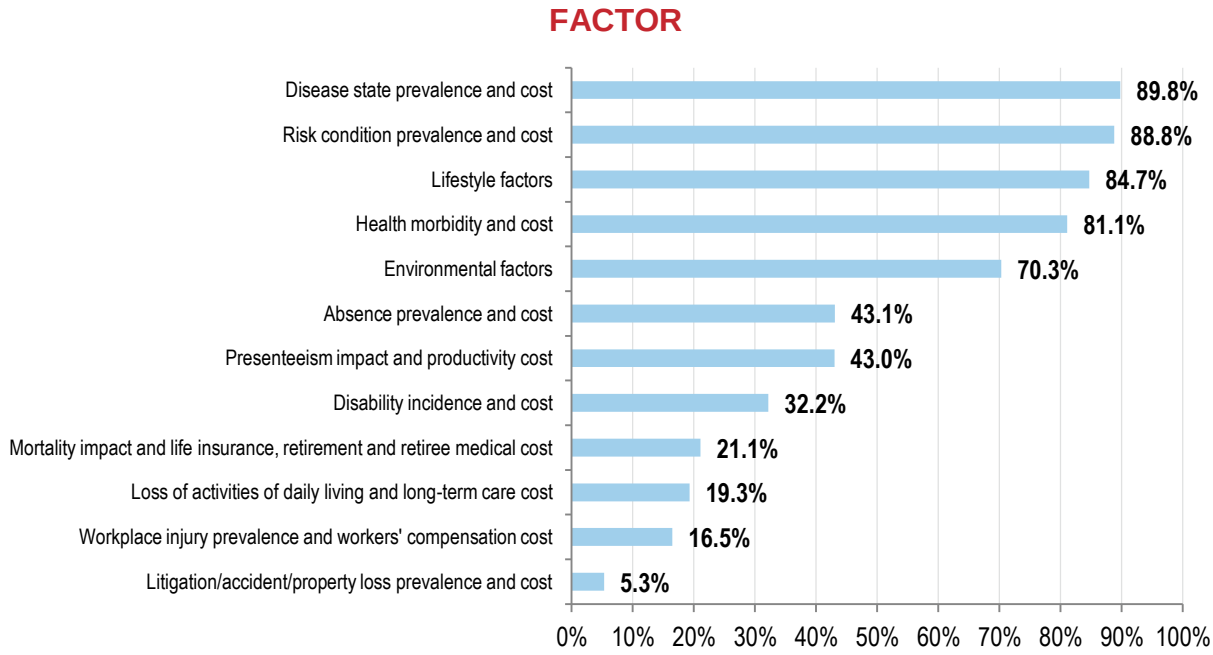
Top Areas of Focus for the Future Actuarial Wellness Model(s)

In order to understand potential future needs, the survey asked questions to determine what should be the top areas of focus for future actuarial wellness models. The following chart represents the percentage responding 4 or 5 on a scale of 1 to 5 of the likelihood that they will use an actuarial model in the future.



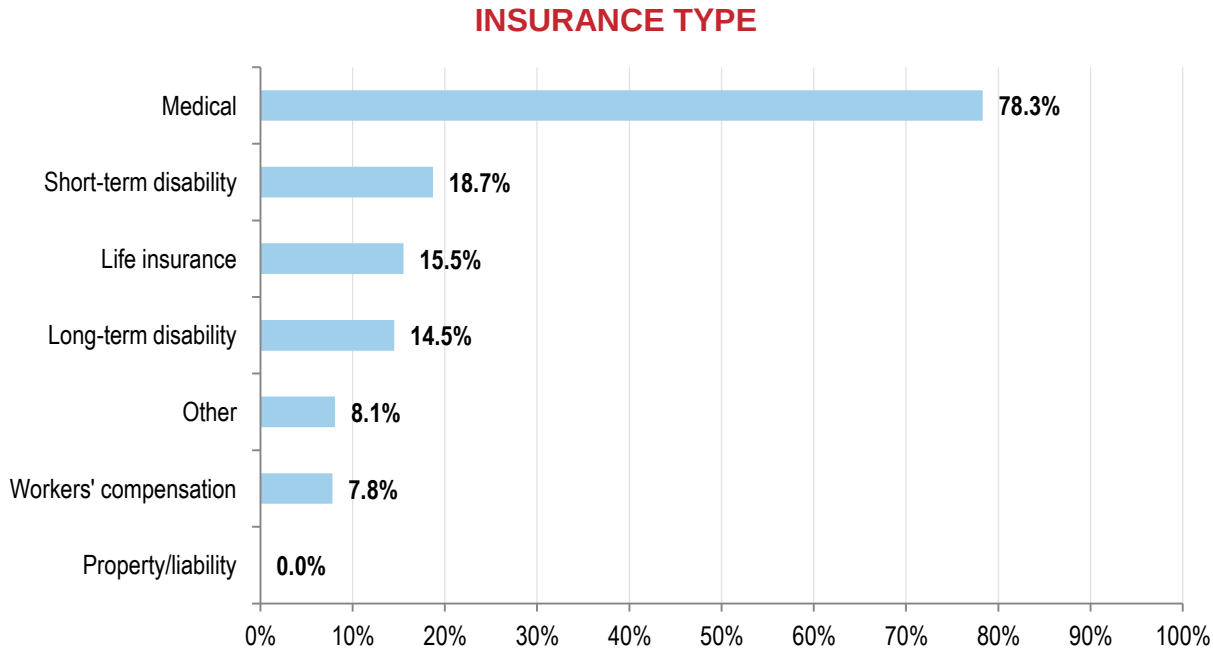
The results of this question are in line with how actuaries indicated they use current wellness models, although the percentage likely to use the models in the future was higher by 10 to 20 percentage points for all potential uses. The results were similar among participants who responded that the actuarial wellness model would be feasible and important to their areas of practice.

Drilling down further, the survey asked what the most important data points will be in the models used in the future.



Of the 189 to 215 individuals responding, 90 percent or more indicated disease state prevalence and cost and risk condition prevalence and cost will be an important set of data points used in future models.

The survey also asked about the likelihood that future actuarial wellness models would be used to impact the pricing of premiums for various types of insurance.



Not surprisingly, response percentages were generally 5 to 10 percent higher for each survey question for those who thought it is important to reflect the impact of wellness for their area of practice, and felt it is feasible to factor in that impact of wellness. Similar to the response rate for current wellness models, almost 80 percent are likely to use a future actuarial wellness model to adjust medical insurance premiums compared to less than 20 percent for any other insurance type, which, as mentioned earlier, is likely skewed because over 93 percent of survey participants are health actuaries and less than 15 percent work in any other area. In order to obtain a broader understanding of the likelihood of the model's use for other insurance coverage, it may be necessary to distribute the survey to a broader actuarial audience. Other items identified include dental, federal and state expenditures, and long-term care.

The POG recognizes that there are many other beneficial aspects to wellness that may not be quantifiable, but should be recognized, such as the impact on absence, morale, retention and productivity.

Data Types and Sources

In order to understand available data sources that could be used for the analysis to develop a computational model, the survey asked participants to identify sources of data that may be available to support the development of an actuarial model, including sources used in their models. The responses included both the types of data that could be captured as well as specific data resources.

Types of Data

Among the raw data, the following items were most prevalently listed:

- Administrative claims data
- Behavioral Risk Factor Surveillance System (BRFSS) results
- Biometric values
- Case and care management records
- Claims and risk pool claims/charges
- Clinical data—blood tests, urine tests, height, weight, BMI/health questionnaires
- Consumer Assessment of Healthcare Providers and Systems (CAHPS)
- Demographic data
- Disease management and wellness participation data
- Disease prevalence from risk models
- Eligibility/enrollment data with demographic information
- Health management program participation, incentives
- Health Risk Assessment (HRA) data
- Internal company claims and diagnostic data
- Lab data
- Life insurance underwriting data
- Lifestyle factors
- Medical and prescription drug claims and utilization data—morbidity, claim costs, medical services rendered diagnoses, Rx possession ratio
- Member "click" results from online portals
- Outcome studies performed in house and with employer groups served
- Patient Activation Measure (PAM)
- Patient surveys
- Physician sourced identification lists
- Presenteeism, absenteeism and leave data
- Reinsurance pool data
- Risk scores
- Exercise/gym membership usage
- Self-reported surveys
- STD and LTD incidence, claim and utilization
- Time 1 and 2 risk factors
- Weight management enrollment information
- Wellness participation & incentives
- Wellness vendor reporting
- Workers' compensation data.

Data Sources

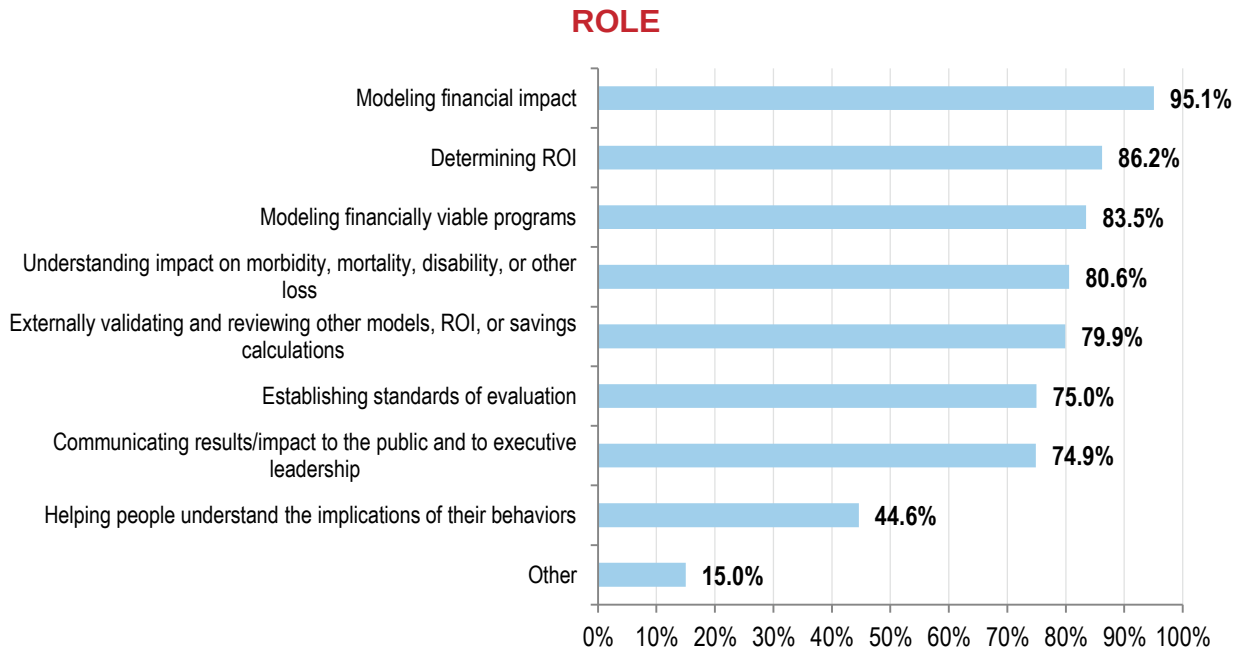
The following sources of data were identified as potential sources:

- Behavioral Risk Factor Survey data
- Bureau of Labor Statistics
- Care Continuum Alliance—building an integrated data warehouse with medical claims, health assessment and program participation data
- Centers for Disease Control—Weekly Mortality & Morbidity reports
- Consumer Assessment of Healthcare Providers and Systems data
- Data warehouse vendors (e.g., Optum Insight, Truven, HDMS, Verisk)
- Dentsource Actuarial Intelligence Module cross-payer database
- Discovery Holdings, Vitality Group or HumanaVitality
- Dr. Dee Edington's risk-stratified model data
- Employee Benefit Research Institute data
- Federal preventive care guidelines
- Government census data
- Health Care Cost Institute (HCCI)
- Healthcare Effectiveness Data and Information Set (HEDIS) data
- Healthentic database
- HPQ-Select Questionnaire Data Set from the Integrated Benefits Institute
- Insurer claim experience
- Insurer or TPA data (Aetna, BCBS, CIGNA, Humana, Kaiser, UnitedHealthcare, etc.)
- Medical Information Bureau (MIB)
- National Health and Nutrition Examination Survey (NHANES) data—CDC
- Reporting requirements around HCR could be a source for developing baseline population assumptions as well as understanding the impact of certain conditions on costs
- Surveillance, Epidemiology and End Results (SEER) program data
- Social Security Master Death File.

Further analysis would need to be conducted to understand the appropriateness and validity of the data sources identified. This likely only needs to be investigated if a computational model would be pursued.

The Role of Actuaries in the Wellness Field

Three-quarters or more of the respondents indicated that each role (other than helping people understand the implications of their behaviors) is important (4 or 5 on a scale of 1 to 5 of importance, with 1 being least important and 5 being most important).



Appendices

Appendix I is the survey instrument.

Appendix II, labeled "Summary of Survey Results," contains a summary of the text and non-text responses received in this survey. It does not contain every text response, and we may wish to look back at the original responses if we wish to create multiple models. The summary consolidates and captures the more vital and interesting responses.