Annual Report to UMBC
FY 2020 & FY 2021
(July 2019 to June 2021)

November 2021
Message from Cynthia Woodcock, Executive Director

We are pleased to update the UMBC community on our work and the dedicated people behind it.

As a public university, UMBC’s mission includes not only research and teaching, but also service to the state of Maryland. The Hilltop Institute epitomizes the spirit of this three-part mission. We work with our state agency partners to harness the power of data to promote evidence-based decision making. We collaborate with faculty to identify research questions important to policymakers and apply sophisticated data analytics to address them. We are also helping to prepare the next generation of data scientists, health services researchers, and public policy professionals.

Hilltop’s 2018 Strategic Plan captures the spirit of this mission (Figure 1). Hilltop’s central focus is providing data-driven research and policy analysis to the state of Maryland. We also perform research and engaged scholarship that complements and informs our work for Maryland state agencies. We are working to increase Hilltop’s national footprint through participation in cross-state research and providing technical assistance to other states. With ongoing guidance from Hilltop’s Advisory Board, we have made significant progress in achieving the vision of our Strategic Plan over these past two years and are pleased to report on our activities.

Figure 1. Hilltop’s Strategic Plan
Focus Area 1: Service to the State of Maryland

We will solidify and expand our role as the leading provider of health informatics for Maryland state agencies to inform policy and decision-making.

Overview

Hilltop’s partnership with the Maryland Department of Health (the Department) dates back to 1994. Funding for our interagency agreement totaled $9.1 million in FY 2020 and $9.6 million in for FY 2021. For HealthChoice, Maryland’s Medicaid managed care program, Hilltop conducts an annual evaluation and develops risk-adjusted capitated payment rates for the nine participating health plans. HealthChoice currently serves 1.6 million Marylanders with annual capitation payments totaling $7 billion. Hilltop provides operational and analytic support for program innovations and delivery system reforms in primary care, behavioral health, and long-term services supports. To support this work, Hilltop maintains an extensive data repository.

Hilltop also performs work for other state agencies, such as the Health Services Cost Review Commission (HSCRC), the Maryland Health Benefit Exchange (MHBE), the Maryland Health Care Commission (MHCC), and the Prescription Drug Affordability Board, as well as other offices within the Maryland Department of Health, such as the Developmental Disabilities Administration, the Behavioral Health Administration, and Public Health. As part of our Strategic Plan, we seek to continue to build our knowledge base in data science and advanced analytics, expand our work with current state agency sponsors, and take our expertise to additional agencies with the overarching goal of becoming the state’s leading provider of health informatics.

Below we describe new analytic tools built by Hilltop for Maryland state agencies during FYs 2020 and 2021, followed by data-driven analyses we performed to inform state policymaking.

Building New Analytic Tools

**Maryland Medicaid DataPort:** In FYs 2020 and 2021, Hilltop continued development of the Maryland Medicaid DataPort, State Edition, for the exclusive use of the Department. The DataPort enables Department users to query Medicaid administrative data to produce standard dashboards and custom reports on eligibility, enrollment, and service utilization. Special modules provide dashboards on capitation payments to health plans and COVID-19 testing and vaccinations. The DataPort uses a Tableau® front-end and gives authorized users additional data exploration tools that provide tiered levels of data granularity. A SQL Server database houses the back-end data, which are accessed using an extract-transform-load (ETL) process.

**Multi-Payer Claims Analytic Tool (MCAT):**
Hilltop was awarded a $2 million contract from the HSCRC in FY 2020 to develop a tool that is supporting Medicare performance and quality monitoring under Maryland’s Total Cost of Care Model by automating data aggregation, visualization, and report generation. The HSCRC plans to eventually expand the tool to include Marylanders participating in Medicaid and commercial health plans. Hilltop is building the MCAT using a technology similar to the platform developed for the DataPort.

**Maryland Primary Care Program (MDPCP):**
Maryland’s Total Cost of Care Model includes the MDPCP, a voluntary program open to all qualifying Maryland primary care providers that offers funding and support for the delivery of
advanced primary care to Medicare beneficiaries. With support from a $500,000 interagency agreement, Hilltop developed the Hilltop Pre-AH Model™, which uses Medicare claims and other publicly available data sets to estimate the likelihood that an individual will incur an avoidable hospital event in the near future.

In production since October 2019, the Hilltop Pre-AH Model™ generates individual risk scores that are disseminated to primary care practices through the Chesapeake Regional Information System for Our Patients (CRISP), the state’s health information exchange. These scores are updated monthly and cover over 400,000 beneficiaries in more than 500 primary care practices around the state. Hilltop continues to update the model and has developed functionality that enables providers to view factors contributing to an individual’s overall risk score and additional risk factors to enhance the model’s predictive capabilities. The Hilltop Pre-AH Model™ has also been incorporated as an element of the MDPCP’s COVID-19 response workflow. See Figure 2.

**Cost Calculator for the Maryland Health Connection:** Hilltop and the MHBE developed a cost calculator that enables Maryland consumers to estimate potential out-of-pocket costs for health insurance plans offered by the Maryland Health Connection, Maryland’s marketplace authorized under the Affordable Care Act (ACA). Hilltop developed the cost calculator under an interagency agreement with the MHBE. Consumers can compare the cost of monthly premiums for different plans as well as estimated out-of-pocket costs after applying any deductibles and cost sharing. Hilltop uses data from the state’s all-payer claims database to estimate a consumer’s health care expenditures based on age, gender, ZIP code, and whether the consumer anticipates being a low, medium, or high user of health care services. These estimates populate a database used to display health plan options and associated costs on the Maryland Health Connection website. The MHBE reports that over 80% of site users are using this tool.

**Data Analysis to Inform State Policymaking**

**Responding to COVID-19:** Since the onset of the pandemic in spring 2020, Hilltop has assisted the Department with the state’s response on a daily basis. Hilltop participates in an inter-agency team consisting of CRISP, the Maryland Hospital Association, the Maryland Institute for Emergency Medical Services Systems, and other Department consultants to collect, analyze, and monitor daily hospital occupancy and equipment supply data. Hilltop analyzes these data to develop daily briefing reports for the Secretary of Health, the Medicaid Director, and the state’s COVID-19 Task Force. Hilltop managed an effort by the interagency team to document statewide maximum hospital surge capacity among the state’s 50 hospitals. This informed surge planning, operational decision-making, and resource allocation.

Hilltop conducted reviews of Medicaid providers eligible for the Coronavirus Aid, Relief, and Economic Security (CARES) Act and assisted the
Department with interpretation and implementation, including providing data to the Centers for Medicare & Medicaid Services (CMS) for calculating enhanced payments for Medicaid providers to support their COVID-19 response efforts. Additionally, Hilltop assisted the Department in identifying Maryland Medicaid providers who received CARES Act payments.

Hilltop developed a COVID-19 module for the DataPort, State Edition, that links Medicaid claims and National Electronic Disease Surveillance System (NEDSS) data to produce dashboards—updated weekly—on COVID-19 testing and vaccinations among the Medicaid population. In addition, Hilltop conducted bi-weekly analyses of COVID-19 fatal cases among the overall Medicaid population, as well as nursing facility residents. The state expanded coverage for telehealth; Hilltop continues to monitor telehealth utilization by Medicaid participants to inform the state’s deliberations on continuing these services after the public health emergency comes to an end.

Many Medicaid participants delayed seeking health care services for non-urgent conditions during the pandemic. This posed challenges for HealthChoice payment rate development for CYs 2021 and 2022 because capitated payment rates are based on prior years’ experience with health care utilization, and Hilltop has been working closely with the Department to develop actuarially sound payment rates in this unusual environment. Hilltop also worked with the Department to develop a global risk corridor to mitigate the financial impacts of COVID-19 on the nine health plans participating in the HealthChoice program in CYs 2020 and 2021.

**Addressing the Opioid Crisis:** Hilltop provides monthly reports to the Department on medication-assisted treatment (MAT) utilization by Medicaid participants with substance use disorders (SUDs), focusing on three medications: buprenorphine, methadone, and naltrexone (Vivitrol). Hilltop also provides reports on Naloxone prescriptions, a medication used to rapidly counter the effects of opioid overdose. Hilltop also reports fatal overdoses to the Department. In 2020, Maryland was awarded a Maternal Opioid Misuse (MOM) grant by CMS. MOM aims to better align and coordinate care of pregnant and postpartum Medicaid beneficiaries with opioid use disorders (OUDs). Hilltop is performing data analysis to produce monitoring measures for the program.

**Informing Deliberations on Funding for Home and Community-Based Services (HCBS):** Although Maryland has made substantial progress in “rebalancing” Medicaid expenditures for long-term services and supports (LTSS) from institutional care to HCBS and the number of individuals who are using HCBS has increased, program availability is limited, and registries of individuals seeking these services remain long. In a HillTopic post, Cynthia Woodcock discussed this issue and introduced a Hilltop report that presents the findings of a study to estimate the cost of making Medicaid HCBS waiver programs available to more Marylanders. Hilltop conducted the study on behalf of the Department to fulfill a request by the Joint Chairmen of the Maryland General Assembly.

**Enhancing Transitions from Hospitals to LTSS:** In FY 2021, CRISP awarded Hilltop a Maryland Model Analytics Consultant contract to explore the feasibility of developing and deploying a health insurance exchange (HIE)-enabled solution to enhance the quality of care for individuals dually eligible for Medicare and Medicaid in Maryland as they transition between hospitals and LTSS settings. Many of these individuals have multiple chronic conditions and cognitive and physical disabilities. Under the direction of Chief Data Scientist Ian Stockwell, PhD, and Senior Policy Analyst Dolapo Fakeye, PhD, Hilltop is examining how best to link Medicare and Medicaid data for this population, patterns in their transitions across LTSS and acute care settings, and characteristics associated with elevated risk of adverse outcomes.
Focus Area 2: Research and Engaged Scholarship

We will maintain our reputation as a unique university resource and valued research partner and as a central resource for research and engaged scholarship on the UMBC campus aimed at improving the health and wellbeing of people and communities.

Overview

In FYs 2020 and 2021, Hilltop strengthened its relationships with faculty and embarked on a number of research collaborations, all with the goal of expanding our footprint in research and engaged scholarship.

**Reducing Patient Risk through Actionable Artificial Intelligence**

Senior Data Scientist Fei Han, PhD, was awarded funding by UMBC and the University of Maryland, Baltimore (UMB) Institute for Clinical & Translational Research (ICTR) to further develop the Hilltop Pre-AH Model™ event prediction algorithms to estimate individual-level risks of hospitalization due to COVID-19 and other communicable diseases for Medicare fee-for-service (FFS) beneficiaries across the state of Maryland. This predictive model has served as a tool to help health care providers prospectively identify individuals at risk of hospitalization for the current and future pandemics and has been deployed for use in Maryland’s Medicaid population. Dr. Han’s collaborators include Professor Lucy Wilson, MD, UMBC Department of Emergency Health Services, and Assistant Professor Zachary Dezman, MD, Department of Emergency Medicine and Epidemiology, University of Maryland School of Medicine. Read UMBC’s article on Dr. Han’s award.

**All-Cause Readmission**

With funding from UMBC’s Offices of the Provost and Vice President for Research and a University of Maryland Emergency Medicine Associates Medical Research Pilot Grant, Hilltop Chief Data Scientist Ian Stockwell, PhD, and University of Maryland emergency physician and professor Jon Mark Hirshon, MD, PhD, used national commercial health insurance data from the Health Care Cost Institute (HCCI) to develop and test a measure of hospital quality that assesses hospitals based on the frequency of downstream clinically relevant readmissions (DCRR) as opposed to blanket 30-day all-cause readmissions. The DCRR classification algorithm that the research team developed identified key clinical and demographic predictors of a readmission and will further the knowledge base for normalization of readmission measures across hospitals. Access to the HCCI data was provided through the Robert Wood Johnson Foundation’s Health Data for Action program and has led to multiple research articles pending publication.
Health Care Utilization of Violence-Related Injury in the State of Maryland

In another collaboration with Dr. Dezman, Dr. Stockwell developed a computer model that calculates an individual’s risk of receiving a repeat violent injury. The research team created a statewide cohort of victims of violence that can be followed as they seek ongoing care for their injuries to better understand which patient subgroups utilize the greatest health care resources and would most benefit from violence prevention efforts. The team plans to use findings to develop a comprehensive hospital discharge protocol that ensures victims of violence receive the support they need. This work was funded through UMB’s Accelerated Translational Incubator Pilot (ATIP) program in partnership with UMBC’s Office of the Vice President for Research and led to a joint publication in the Journal of Trauma.

Just and Responsible Artificial Intelligence (AI) for Population Health

Dr. Stockwell, Shimei Pan, PhD, and James Foulds, PhD (both Assistant Professors in UMBC’s Department of Information Systems) are principal investigators on a five-year National Science Foundation CAREER award for research on improving the fairness and robustness of AI algorithms. AI holds great promise for improving health outcomes, but it is incumbent on practitioners and researchers to develop and deploy fair and responsible models that advance societal good. Project activities include meetings with stakeholders, workshops, hack-a-thons, and pedagogy in diverse data environments.

Faculty Appointments

Hilltop appointed Dana Bradley, PhD, Dean of the Erickson School, and Lucy Wilson, MD, Professor and Graduate Program Director in the UMBC Department of Emergency Health Services, as affiliate faculty. Dr. Bradley also serves on Hilltop’s Advisory Board and is collaborating with Hilltop staff on research initiatives in the field of aging and disability. Dr. Wilson provides clinical consultation for Hilltop’s work and is collaborating on several grant proposals with Hilltop and UMBC’s Imaging Research Center that aim to explore the feasibility of supporting analytical thinking and problem solving through an immersive visualization environment.
UMBC schools and departments granted faculty appointments to the following Hilltop staff:

- **Ian Stockwell, PhD**
  Adjunct Professor, Erickson School of Aging Studies;
  Affiliate Associate Professor, UMBC Department of Information Systems

- **Fei Han, PhD**
  Affiliate Assistant Professor, UMBC Department of Computer Science and Electrical Engineering

- **Morgan Henderson, PhD**
  Affiliate Assistant Professor, UMBC Department of Economics

- **Christin Diehl, MA**
  Adjunct Professor, Erickson School of Aging Studies

- **Cynthia Woodcock, MBA**
  Adjunct Professor, Erickson School of Aging Studies

These Hilltop staff served as adjunct faculty and taught the following courses:

- **Fei Han**: STAT 351 (applied statistics for business and economics), fall 2019; CHEM 101 (principles of chemistry 1), guest speaker, fall 2020
- **Ian Stockwell & James Clavin**: IS 670 (health care information systems), summer 2020 & summer 2021; IS 461/661 (health care informatics II), spring 2021
- **Laura Spicer**: HAP 452 (health care organization and delivery, now the Public Health Program), fall 2020, spring 2021, fall 2021, & upcoming spring 2022

**Welcoming New Research Staff**

- **Leigh Goetschius, PhD**
  Data Scientist

- **Roberto Millar, PhD**
  Policy Analyst

- **Morgane Mouslim, DVM**
  Policy Analyst

- **Tim Williams, DrPH**
  Policy Analyst
Overview

In addition to our work with Maryland Medicaid, Hilltop conducts analyses of Medicaid programs in other states. Hilltop is one of 13 states engaging in cross-state research on Medicaid through the Medicaid Outcomes Distributed Research Network (MODRN) developed through AcademyHealth’s State-University Partnership Learning Network (SUPLN). Participating states use a common data model and standardized analytic code for conduct of local analyses of Medicaid administrative data. States then aggregate their results to present cross-state comparisons of Medicaid initiatives to advance policymaking. Hilltop is a founding member of SUPLN, which was established in 2014 to promote evidence-based state health policy and practice through collaborations by state governments and state university research centers much like the Hilltop partnership with the Maryland Medicaid program. Currently, SUPLN membership includes Medicaid agencies in 26 states that have partnerships with 30 public universities.

MODRN Multi-State Study of Opioid Use Disorder (OUD) Treatment and Outcomes

With funding from the National Institute on Drug Abuse (NIDA), 13 states—including Maryland under Hilltop’s direction—are harnessing the power of MODRN to assess OUD treatment quality and outcomes in Medicaid with the goal of informing policy decisions on coverage and payment for evidence-based OUD treatments. Participating states constructed 20 standardized measures of OUD treatment performance, linked Medicaid data to vital statistics data to examine the association between the quality of OUD treatment and fatal and non-fatal drug overdoses, and conducted a state policy inventory to better understand associations between OUD outcomes and state Medicaid policies. David Idala, MA, and ShamisMohamoud, MA, are leading this work at Hilltop.

State Medicaid Fees for Services Related to OUD: Building the Evidence-Base to Inform State Policies

Funded by Arnold Ventures and led by the Urban Institute, Hilltop is participating with university researchers from other states on a project to understand cross-state variation in Medicaid reimbursement rates for OUD services and establish benchmarks for states to make informed decisions. The research team is building a database and state billing code crosswalk for the most frequently utilized OUD services across all state Medicaid programs as well as a Medicaid state fee index for each state to facilitate comparisons of Medicare and Medicaid reimbursement rates. Policy Analyst Katie Holmes, MPS, MPH, is leading Hilltop’s research.

Cost of Sexually Transmitted Illness (STI) in Medicaid

The purpose of this study, funded by the Centers for Disease Control and Prevention (CDC), was to estimate the cost of STI screening and treatment for three common conditions (chlamydia, gonorrhea, and syphilis) on state Medicaid programs in two states: one that...
expanded Medicaid in 2014 (Maryland) and one that did not (South Carolina). The findings of this study suggest that diagnosis and treatment of the three most commonly reported STIs may have a considerable financial impact on individual state Medicaid programs. Continuing attention to STI surveillance and prevention efforts, including contact tracing and distribution of prophylactics to prevent disease spread, will have effects on reducing these expenditures.

**Estimating the Economic Impact of Expanding Medicaid in Mississippi**

Under a contract with the Center for Mississippi Health Policy, Hilltop is conducting a study to estimate the economic impact of expanding Mississippi Medicaid coverage to childless adults with income up to 138% of the federal poverty level (FPL). Hilltop is conducting an environmental scan that includes a literature review, data collection on Mississippi’s Medicaid program and economy, and interviews with Mississippi stakeholders, as well as an economic impact analysis of Medicaid expansion on Mississippi providers, the state’s Medicaid program, and the state’s economy. Findings will be shared to inform ongoing policy discussions as Mississippi continues to debate expanding Medicaid under the ACA. Dr. Stockwell is leading the research with Morgan Henderson, PhD, and Charles Betley, MA.

**Medicaid and CHIP Payment and Access Commission (MACPAC)**

In FY 2021, Hilltop was selected to be an indefinite delivery, indefinite quantity (IDIQ) contractor for MACPAC, created by Congress in 2009 and charged with making recommendations to Congress, the Secretary of the U.S. Department of Health and Human Services, and the states on Medicaid policy. Hilltop is eligible to submit proposals for task orders issued by MACPAC.

For the latest news from Hilltop, read our new blog, [HillTopic](#).
Overview

This focus area supports Hilltop’s work under the prior three focus areas. In FYs 2020 and 2021, Hilltop made significant strides in developing its staff (see Focus Area 2 above and Staff Updates below). Highlighted below are Hilltop’s efforts to modernize its IT infrastructure.

IT Modernization

Hilltop’s data repository is extensive and includes protected health information (PHI) subject to federal and state data privacy and security laws and regulations, including the Health Insurance Portability and Accountability Act (HIPAA). Hilltop is partnering with the UMBC Division of Information Technology (DoIT) to ensure data security and to modernize and expand its IT infrastructure to support an exponential increase in data volume and frequency of receipt. With DoIT’s support during the past two years, Hilltop deployed a new server dedicated to quick turn-around and automation of the ETL process that takes raw data and converts it into analytical data sets. Hilltop added a new data science platform to enable the development and execution of models such as the Hilltop Pre-AH Model™. We also upgraded our business intelligence platform, the DataPort, and expanded the user base. Through business associate agreements with Microsoft and Amazon Web Services, Hilltop began using HIPAA-approved cloud services for product development and data retention.

Recognizing Hilltop Students

UMBC students who are considering careers in health policy and health care data analysis are welcome to explore employment and research opportunities at Hilltop. We offer several part-time student internships and graduate assistantships each year.

In the past two years, three Hilltop students graduated: Ashish Vishwanathan earned an MS in information systems and joined Amazon as a cloud support assistant; Jaya Sachdeva earned an MS in computer science; and Sushmitha Macheri earned an MS in information systems. Sushmitha, who was named Intern of the Week on the UMBC Career Center page, recently joined Hilltop’s Technology Innovation team as a programmer specialist. GRA Tom Gower is now a research assistant in the UMBC School of Public Policy.
The UMBC School of Public Policy’s 2020 Shinogle awardee was Hilltop GRA and doctoral candidate Kiki Malomo-Paris. She presented “Variation in Perinatal Health Outcomes among Low-Income Census Tracts: An Analysis of the Impact of Low-Income Housing Tax Credit Unit Receipt.”

**Staff Updates**

Hilltop’s workforce currently has 51 full-time staff of policy researchers, analysts, and programmers. Nine employees have doctoral degrees, 16 staff members are UMBC alumni, and 4 are currently enrolled in UMBC advanced degree programs. Go to Our Team to read more about our staff.

**Duane Glossner**

Hilltop’s Director of Rate Setting for the past 21 years, announced his retirement effective December 31, 2020. Hilltop was pleased to welcome **Todd Switzer** as Chief Actuary and Director of Rate Setting and Financial Analysis in June 2021. Hilltop also welcomed two new programmers: **Craig Drohan**, programmer advanced, and **Melissa Roll**, programmer specialist.

**Hilltop Staff Award for Innovation:** This award recognizes staff members who develop an innovative product, process, methodology, or approach to addressing a complex problem or issue.

In 2020, **Fei Han** and **Morgan Henderson** received the award in recognition of their work to build the Hilltop Pre-AH Model™.

In 2021, **David Idala** and **Shamis Mohamoud** were recognized for their contributions to MODRN research. **Craig Drohan** and **Alexis Smirnow** were recognized for their efforts to streamline the processing of disparate data sets for COVID-19 reporting. **Chuck Betley, Jack Clark, Laura Humber, Kevin Pyles, Prashant Rana, Andrea Schumacher, and Morgane Mouslim** were recognized for their work to develop the Multi-Payer Claims Analytic Tool (MCAT) for the HSCRC.

**UMBC Service Awards:** Six Hilltop staff were honored at the virtual service awards ceremony held in December 2020. **Sanya Clark** was recognized for 20 years of service to UMBC. **Andrea Schumacher** was recognized for 25 years. **Adrienne Brown, Stephanie Cannon-Jones, and David Idala** were all recognized for 15 years of service to UMBC. **Hamid Fakhraei** was recognized as a retiree.
Six Hilltop staff were honored at the 2019 service awards ceremony. Duane Glossner and Jayne Miller were recognized for 20 years of service to UMBC. Shamis Mohamoud, MaryAnn Mood, Alexis Smirnow, and Brenna Tan were all recognized for 5 years of service to UMBC.

**Peer-Reviewed Publications**


The **Hilltop Challenge** is a new internal competitive grants program that awards release time to Hilltop staff to conduct research aligned with our mission. After receiving a number of outstanding proposals, we are happy to announce the following six awardees for 2021:

- **Dolapo Fakaye:** Comparative Performance of Prospective Risk Assignment Methodologies for Capitation Payments in Limited Data Situation
- **Morgan Henderson:** Why Do Hospitals Give Cash Discounts?
- **Katie Holmes:** Vascular Screening and Amputation in Diabetic Medicaid Participants
- **Roberto Millar:** Evaluating the Implementation of a Risk-Based Algorithm for Enrollment Prioritization of Maryland’s Home and Community-Based Options Waiver Registry
- **Prashant Rana:** Automation of Eligibility Monthly Data Load to the Development Environment
- **Alexis Smirnow:** Pregnancy and Delivery Dashboard

The awardees will be leading teams that include many others from across Hilltop.

**Non-Peer Reviewed Publications**


**Hilltop Publications**


**Presentations**


To see all our publications, visit [https://hilltopinstitute.org/hilltop-publications/](https://hilltopinstitute.org/hilltop-publications/).

**Funding**

All funding for Hilltop is provided by extramural sources; we receive no funding through UMBC’s budget. Our FY 2020 revenue was **$11,003,158**. Our FY 2021 revenue was **$12,174,223**.